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An Evaluation of Khan Academy Videos as a Supplement to Teacher Instruction for Elementary-Aged Students with Disabilities

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An Evaluation of Khan Academy Videos as a Supplement to Teacher Instruction for Elementary-Aged Students with Disabilities

by

Jacy M. Reed

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of Science
Applied Behavior Analysis
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Keywords: video based instruction, math skills, behavioral skills training, academic performance

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DEDICATION

This paper is dedicated to my fiancé, Ricardo, my parents Jowann and Gary, and my colleague, Mollie. Ricardo sat with me through many late nights and early mornings prepping for data collection, making edits, and finally, my defense. My mother taught me the value of a quality education at a young age, which motivated my research interests in graduate school. Without the support of my father, I could not have finished my program. Lastly, I dedicate this paper to Mollie in that the value of a great friend is unmatched. Thank you all for getting me here today!
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ABSTRACT

Research has indicated video-based interventions are successful at teaching skills to individuals with varying types of disabilities. However, there is a gap in the literature regarding video-based intervention, such as video modeling, as an evidence-based practice for academic skills. As technology becomes more and more integrated into U.S. classrooms each year, it is important to evaluate the effectiveness of these interventions. Khan Academy videos are often used as supplemental resources by teachers to assist students with math work. The purposes of this study were to evaluate if in-class viewing of Khan Academy video models would increase math quiz performance for elementary age students with disabilities when used as a supplement to standard teacher instruction, to determine if the use of Khan Academy video models would decrease the total time required to complete a math quiz, and to evaluate the effects of behavioral skills training on math quiz scores in the event that Khan Academy was not effective. Results were evaluated using a non-concurrent multiple baseline across participants design and showed that overall, Khan Academy videos resulted in a slight increase in performance for two participants. The intervention was not effective for the other four. Overall, the duration to complete the quiz did not decrease with the implementation of Khan Academy. All 6 participants required behavioral skills training to increase their performances to mastery levels.

*Keywords*: video modeling, behavioral skills training, academic performance, developmental disabilities, Khan Academy, math skills
CHAPTER ONE:
INTRODUCTION

In 2010, the United States Census Bureau reported nearly 3 million school aged children diagnosed with a disability. Many people reported these disabilities required special accommodations for education services (Brault, 2011). Sadly, research indicates that by the time they reach high school students with disabilities, on average, are behind their typically developing peers in academic performance. In 2011, students with disabilities had an average GPA of a mere 1.9 in the general education setting and 56.4% of these students had failed one or more classes (Newman et al., 2011). The importance of teaching academic skills to students with disabilities is particularly important, as these skills are crucial for graduating high school, applying for college, and applying for jobs.

According to the Florida Department of Education, to complete a special diploma, students can complete a specific number of courses as determined by the local school district or engage in employment at a community-based job, meet a series of long- and short-term goals, and show mastery of skills relevant to his or her job. Newman et al. (2011) found that in high school, academic courses made up an average of only 57% of all course credits earned by a student with a disability and typically-developing students earned a greater percentage of the total high school credits in academics than those with disabilities.

A larger focus on basic level academics is imperative to student success as Duncan et al. (2007) demonstrated that elementary level reading and math skills development is a statistically significant predictor of those same skills later in one’s academic life. For students with
disabilities, many appropriate-level jobs involve basic math concepts like counting change, sorting, making phone calls, and following recipes. Additionally, Preciado (2016) reported that difficulties with math most often stem from lack of understanding of basic concepts, like fractions. Devoting more resources to teaching math skills at the elementary level is likely to increase the overall long-term success and independent functioning of individuals with disabilities. Peer tutoring, self-monitoring, and video-based instruction are examples of evidence-based practices often used for increasing academic performance for students with disabilities (Bellini & Akullian, 2007; Holifield, Goodman, Hazelkorn, & Hefflin, 2010; Kamps, Barbeta, Leonard, & Delquadri, 1994).

Peer tutoring is defined as an instructional strategy that involves two students working together in an academic setting. In the tutoring relationship, one high-performing student provides instructions and feedback to another lower-performing student (Greenwood, Maheady, & Carta, 1991). There are several different forms of peer tutoring including: classwide peer tutoring, reciprocal peer tutoring, and cross-age peer tutoring (DuPaul, Ervin, Hook, & McGoey, 1998; Fantuzzo, King, & Heller, 1992; Kamps, Dugan, Potucek, & Collins, 1999). Peer tutoring has been effective for increasing a range of skills such as reading fluency and overall performance with math skills across different populations including at-risk youth, students with ASD, and students diagnosed with emotional and/or behavioral disorders (Cochran, Feng, Cartledge, & Hamilton, 1993; Fantuzzo et al., 1992; Ginsberg-Block & Fantuzzo, 1997; Robinson, Schofield, & Steers-Wentzell, 2005; Sutherland & Snyder, 2007).

Although peer tutoring has been effective for teaching skills to students with disabilities, it has several limitations. Research indicates it is effective for students with disabilities only sometimes, and may be a useful component of a treatment package (DuPaul et al., 1998). This
method is not likely the most efficient use of class time or most successful strategy to increase students’ academic performance. It requires teacher time to facilitate and monitor the tutoring process for the entire class in situations where it may be easier to provide more support to struggling students only. Additionally, studies have reported minimal increases in academic performance, limited research on the effectiveness of different peer tutoring strategies with other populations (e.g., persons with disabilities, high school students), and limited feasibility of intervention success for larger classrooms (DuPaul et al., 1998; Fantuzzo et al., 1992).

Another procedure often used to improve academic performance for students with disabilities is self-monitoring. Self-monitoring (SM) is a procedure in which students are taught to evaluate and record their own behaviors. Typically, students are taught to record or label their behaviors on a data sheet or check-in card and evaluate it at a later time. If the student has met the agreed upon performance criteria, he or she earns an award (Shimbabukuro, Prater, Jenkins, & Edelen-Smith, 1999; Todd, Horner, & Sugai, 1999). Shimbabukuro et al. (1999) reported SM has been used to assess academic performance of students from a wide range of populations including learning disabilities, attention deficit hyperactivity disorder, and attention deficit disorder and is established as a successful method for increasing both performance and productivity in writing, reading, and math. Additionally, the same study provided teacher reports in which teachers described SM as: easy to learn, easy to use in the classroom, and appropriate for all of their students to use in class (Shimbabukuro et al., 1999). Similar studies were successful in using SM to teach students with autism spectrum disorder (ASD) and behavioral disorders (Carr & Punzo, 1993; Holifield et al., 2010; Menzies, Lane, & Lee, 2009).

A limitation of SM is the procedure often includes delivery of a pre-determined reinforcer contingent on criterion performance. Some studies also include consequences for
performance below target level. With other variables involved, it is difficult to determine if added consequence contingencies and reinforcers are maintaining behavior or if performance is actually increased through the act of self-monitoring alone (Shimbabukuro et al., 1999).

Video-based interventions, like video modeling (VM) and video prompting (VP) are evidence-based interventions used to teach skills to individuals with ASD and other developmental disorders. Sigafoos et al. (2007) suggested video prompting (VP) might be especially effective for students with difficulty remaining seated and focusing on a video dictating the steps of one long task. VP breaks the task down into brief segments the learner can watch one by one, similar to the behavioral process of chaining. It promotes independence in that the learner is not prompted until after attempting the step independently (Domire & Wolfe, 2014). Notably, video prompting has been used successfully to target academic performance for students with disabilities. Kellems et al. (2016) taught nine adults with disabilities real-life math skills including: calculating tips, price comparison, and adjusting recipes. The skills targeted in this study were selected from the Common Core curriculum. Results indicated a functional relationship between the treatment package and acquisition of skills for 8 of 9 participants. Weng and Bouck (2014) conducted another study targeting price comparison in adolescents with autism. Two of the three participants that benefitted from the intervention also successfully generalized the skill to novel settings.

VP has several benefits that may make it more appropriate for teaching certain skills to specific types of learners but also has limiting variables. Some skills may be more difficult to break down into task analyses; for example, playing appropriately on the playground. Although one could create specific steps, a full video model would likely be more effective in demonstrating this target skill. Also, VP interventions either require a second person to facilitate
delivery of the prompts, or, as seen with self-directed video prompting, the learner must have prerequisite skills that allow him/her to operate the device independently. Finally, the majority of VP literature focuses on self-help, vocational, and daily living skills; studies using this intervention to target academic performance are very limited.

Video Modeling (VM) is an intervention in which the learner watches a video of another person engaging in the target behavior and then attempts to engage in the same behavior independently. This method has been used in many studies to teach a wide range of functional and daily living skills including pet care, table setting, food preparation, and cleaning skills (Shipley, Benamou, Lutzker, & Taubman, 2002). Like VP, VM has also been used to target mathematics performance for students with disabilities (e.g., Yakubova, Hughes, & Hornberger, 2015; Burton, Anderson, Prater, & Dyches, 2013). However, VM does not require extensive time from a second person to click through prompts, and does not require device manipulation skills as a prerequisite skill because an adult can simply press start and walk away.

Fortunately, displaying the video as a full model instead of smaller steps does not entirely eliminate the benefit of viewing the information in smaller bits. VM still allows the learner to start, stop, zoom in, and rewind as necessary and a second person could manipulate the video as well, if those prerequisite skills were not present. Because of these characteristics, VM is likely more feasible for a classroom intervention than VP.

Yakubova et al. (2015) conducted a study with three boys diagnosed with ASD in which they attempted to use video modeling to teach problem solving for questions with fractions. This study was conducted to address a still present lack of support for video modeling as an evidence-based practice for academic skills. All participants increased from 0% problems correct in baseline to 90% or greater in intervention, and 70% or higher in follow-up sessions. Burton et al.
(2013) also trained four boys with ASD or intellectual disability to complete functional math problems in the form of story problems. The skills selected were based off Common Core standards and all four boys improved percent of questions correct to 100%. The participants continued to perform to criterion in all maintenance probes and decreased performance only minimally in follow-up sessions. As Kellems and Edwards (2016) explained, math skills are particularly appropriate for targeting with video-based instruction because the target skill is observable and steps are easily discernable via video. Additionally, the different forms of VM have been cited to facilitate generalization of skills outside of the learning environment, a process that can be difficult for persons with disabilities and particularly those with ASD (Dowrick, 1999).

Across the country, educators have begun using different forms of technology as added support for students to access both in and outside of the classroom. The U.S. Department of Education reported 48 states are currently supporting the use of online learning opportunities as a way to facilitate both better student learning and adult teaching methods. As technology is being integrated into classroom instruction more and more, the importance of identifying effective methods for teaching with this modality becomes crucial.

One resource often used by teachers as a supplement to class instruction is the Khan Academy (Murphy, Gallagher, Krumm, Mislevy & Hafter, 2014). Khan Academy videos are freely available on YouTube and provide examples and explanations of concepts across many grade levels and various math-based topics. In a recent study, Murphy et al. (2014) recruited nine school sites including private, public, and charter schools, many of which were in areas of low socio-economic status. Researchers investigated different methods of implementation of Khan Academy videos in classroom settings. They found teachers most often used the videos as an
addition to teacher-led instruction whether given as a resource for homework or incorporated into class time. Results varied, but the majority of teachers did not expect students to actually use the videos outside of class. Researchers also reported the videos aligned appropriately with content standards of the relevant grade level (i.e., Common Core standards) and that availability of individual computer use was a key indicator of video use in class. Most notably, results indicated a significant relationship between minutes spent working with the videos and number of problems completed accurately. Implications for future research suggested the need for more information on Khan Academy’s effectiveness for different types of students and a greater focus on outcomes compared to implementation.

Light and Pierson (2014) conducted similar research concerning different uses of Khan Academy videos for students in Chile and they concluded the videos were useful for supplementing procedural skills but not for teaching complex ideas or promoting higher understanding of math concepts. The authors highlighted that the accessibility of the videos and how accurately they align with concepts already taught in the classroom are variables likely to facilitate further integration of Khan Academy videos into class instruction. Similar research was conducted in 9th grade math and geometry classes at a public school in California. Teachers integrated Khan Academy videos into class time and even highlighted its use for remediating struggling students. Teachers here supported a future in blended learning: the combination of technology and teacher led instruction, as a means of supporting their students (Bernatek, Cohen, Hanlon, & Wilka, 2012; Wilka & Cohen, 2013).

The existence of video modeling as an evidence-based practice, particularly for individuals with disabilities like ASD indicates Khan Academy videos may also be effective in supplementing math performance for those same individuals. However, research is lacking in
support of Khan Academy videos for improving math performance and has not yet been evaluated for students outside of general education settings. As mentioned, students with disabilities have an increased importance for adequate comprehension of basic math skills, though they often fall behind typically developing peers later in life. For this reason, the purpose of this study was to address the following research questions:

1. Would in-class viewing of Khan Academy video models increase math quiz performance for elementary-age students with disabilities when used as a supplement to standard teacher instruction?

2. Would the use of Khan Academy video models decrease the total time required to complete a math quiz?

3. Would the implementation of behavioral skills training affect math quiz performance in the event that Khan Academy is not effective in doing so?
CHAPTER TWO: 
METHOD 

Participants and Setting 

This study included six elementary-aged students who were recruited from a local public school district. “Elementary aged” was defined as: any student currently enrolled in any grade from kindergarten to fifth. All six students included in this study attended the same school and were placed in the same third grade general education classroom. The participants were given the following pseudonyms: Michael, Angela, Meredith, Jim, Pam, and Toby. Inclusion criteria for participants were as follows: participant had to be a public school student and had to have an individualized education program (IEP) indicating some disability that might hinder academic performance. All participants included in the study were receiving exceptional student education (ESE) services in addition to tier 2 math supports in the form of small group work sessions. Diagnoses were not specified further; however, the teacher reported that some of the students were diagnosed with a variety of disabilities such as: ADHD, ADD, and various learning disabilities, and processing disorders. The participants selected all had records indicating math performance below grade level. Additionally, all participants were in educational settings in which they were expected to learn and comprehend basic math skills. Students placed in restrictive educational settings in which academics were not a primary target were not included in this study. Students that engaged in any extreme problem behaviors as outlined by the IEP and students that were not able to watch and attend to a video (based on parent or teacher report)
were excluded; and the selected students were not involved with any other video-based interventions in the academic setting.

After informed consent was obtained, the teacher completed a brief interview concerning the plan of study in the classroom, typical mathematics performance for the participant, and behavior problems, if any, associated with classwork (Appendix A). Following the teacher interview, the researcher selected subtraction with regrouping as the target skill for Pam, Michael, Jim, Toby, and Meredith. Angela’s target skill was basic division.

To be included in the study, participants had to score 50% or below on the initial quiz. The video modeling and quizzes took place at a table in the media center just outside the students’ classroom.

**Task and Materials**

The students used iPads to view the Khan Academy videos. These videos were available for free use on YouTube and outlined skills and concepts necessary to complete specific math problems. For example, a video for basic addition used drawings of avocados and voice over explanations for one avocado plus two avocados, then counted out the total number of fruits. All videos ranged from 5 to 10 min. The target math skills were selected from the Common Core curriculum based on the student’s individual difficulty as reported by the teacher. Additionally, students were required to wear headphones so as not to disturb or be disturbed by neighboring students. The participants were given a quiz containing 10 relevant problems via pencil or pen and paper (See Appendix B for sample quizzes). In the behavioral skills training (BST) condition, students used white boards, dry erase markers, and erasers and a treasure box containing preferred items such as candy, Slinkys, bouncy balls, slime, and Legos was used during the BST plus reinforcement phase.
Data Collection

The dependent measure for this study was the percentage of problems answered correctly on quizzes. The researcher developed all quizzes with input from the teacher. The teacher confirmed that the content and format of the quizzes was consistent with quizzes that might be administered in class. For a problem to be considered correct in baseline and intervention, the final answer had to match the answer key created by the researcher. For example, a quiz in baseline was scored as 20% if a participant accurately completed only 2 of 10 questions. Partial credit was not given for any quiz items; each item received either one or zero points. Items that were not answered within the 5 min time to complete the quiz were also scored as incorrect, receiving zero points.

The secondary dependent variable was total time required to complete the quiz for all baseline and intervention sessions. The researcher started the timer immediately following presentation of the SD and stopped the timer immediately after the participant indicated that he or she was finished, or when the timer reached 5 min. This measure required an iPhone or Apple Watch timer, datasheet and pen (See Appendix C for data sheet).

Interobserver Agreement

A second observer collected data across the following percentage of all sessions: 57% of baseline, 54% of Khan Academy, 55% of BST, 67% of BST plus extra time, and 37% of BST plus reinforcement. The researcher used the point-to-point agreement calculation. In this method, both the researcher and a second observer observed the participant complete the quiz at the same time (Sample calculation in Appendix D). The researcher and the second observer then scored the quiz independently. They then calculated number of agreements (i.e., the number of items in
which both researchers scored correct and the number of items in which both researchers scored
incorrect) and divided that by the total number of intervals. Agreement fell below 100% on only
three occasions (two baseline sessions and one Khan Academy session). In these instances, the
second observer was unsure about the participant’s handwriting and perceived the number three
as the number five or the number four as a number nine. In all other sessions, the researcher and
second observer agreed on 100% of the scores.

**Experimental Design**

A non-concurrent multiple baseline across participants design was used to demonstrate a
functional relationship between the use of video modeling and improvement of math skills. For
each participant, one math skill was targeted for improvement.

**Procedures**

**Baseline**

The teacher and researcher agreed upon an appropriate time for the researcher to
administer the quiz. This designated time could not be a time in which the participant would be
excluded from any preferred time such as lunch or recess. Therefore, the researcher worked with
the participants in the morning, immediately following specials. The participant was given 5 min
to complete the 10 question quiz. The questions on the quiz aligned with a Common Core
standard targeted at some point in the students’ past academic careers and in which the teachers
indicated the students were still having difficulty with acquiring the skill. The researcher
presented the quiz with the S\(^D\), “Finish this quiz. You have 5 minutes to finish. If you finish
before then you can let me know, turn it over, or move it to the side. We’re going to sit for 5
minutes”. Immediately following the delivery of the S\(^D\), the researcher started the timer. The
researcher then recorded the time at which the participant completed the quiz. The participants were allowed to make changes to the quiz within the 5 min. If this occurred, the researcher made note on the datasheet. On occasions in which the participant did not complete the quiz within the 5 min allotted, the researcher indicated this on the prompting data sheet in the total duration box. An incomplete quiz removed at the 5 min mark was scored as, “5i”. In all phases of the study, a quiz item was scored as correct if it matched identically to the answer key. The participant must have answered the question within the time limit to receive credit for the item. No additional prompting or assistance delivered for completing the quiz items with accuracy. The researcher also indicated frequency of incorrect and unanswered quiz items on the data sheet. No reinforcement was delivered for completion of the quiz or for desired performance; the researcher only delivered a neutral statement such as, “alright” or “thank you.” Participants were moved into intervention when baseline data points indicated stability or a decreasing trend.

**Khan Academy Video Model**

In this condition, each session started with the presentation of the Khan Academy video that corresponded to the participant’s target skill. (For screenshots from sample video see Appendix E). The researcher presented the iPad with the video set and set to the Guided Access function to restrict any extraneous use of the iPad. The researcher then started the video and stopped it when it was finished playing completely. Immediately following the presentation of the video, the quiz was administered.

The quiz was presented in the same format, and contained 10 of the same problem types. On occasion, identical questions from a previous quiz did appear on the quizzes in this condition; however, the latter were presented in a different order and the quiz contained novel questions as well. The researcher presented the same S^D as in baseline: “Finish this quiz. You have 5 minutes
to finish. If you finish before then you can turn it over or move it to the side. We’re going to sit for 5 minutes”. Participants had 5 min to complete this quiz. Immediately following the delivery of the SD, the researcher began the timer. Like in baseline, the researcher made note of the time at which the participant completed the quiz. The participant was allowed to make changes to the quiz within the 5 min. If this occurred, the researcher made note on the data sheet. The researcher followed the same baseline procedure for recording duration of an incomplete quiz. No reinforcement was delivered for completion of the quiz or for desired performance. The researcher delivered a neutral statement such as, “alright” or “thank you.” Mastery criterion for the intervention phase was set to three consecutive quizzes at 90% or higher. 90% was chosen as the target because, though not perfect mastery, it represents an “A” grade on most school districts’ grading scales.

As a manipulation check to ensure that the participants contacted the independent variable, a prompting procedure was implemented to promote attending to the video model. Attending to the video was defined as: eyes and head facing towards the iPad. A participant was considering “not attending” if he or she was looking at the wall or floor, talking to peers or adults, or out of the seat. Only verbal prompts were delivered. The first verbal prompt was delivered immediately following a continuous 5 s of non-attending. Verbal prompts were then delivered subsequently every 30 s as necessary. The prompt was a neutral statement such as, “pay attention to the video”. Across the six participants, the greatest number of prompts delivered across a single Khan Academy session was three prompts. Most commonly, participants required one prompt to redirect attention to the video for the remainder of the session.
**Behavioral Skills Training**

In the event that Khan Academy videos were not effective in increasing student performance to an acceptable level, the researcher implemented this condition. In this condition, the student engaged in 10 min of BST with the researcher. The skills training was conducted using dry erase markers and a whiteboard. All six participants needed this intervention. BST was implemented as described by Miltenberger (2016); this condition included instructions, modeling, rehearsal, and feedback. To model the design on the video model condition, the researcher first explained how to complete the problem, and then used an example problem that was non-identical to those on the upcoming quiz. Next the researcher presented a novel example for the participant to attempt by his or herself. Once the problem was completed, the researcher delivered either praise or corrective feedback as applicable. The researcher presented a quiz immediately following the competition of the BST session. The quiz was administered following the same procedures as the Khan Academy video model condition. After the first BST session, the quiz from the subsequent session was reviewed as part of the feedback component at the beginning of the next session. This was the only instance in which participants were made aware of their scores. Mastery criterion remained the same at three consecutive sessions with 90% or greater math quiz performance.

**Behavioral Skills Training Plus Extra Time**

In this condition, the BST session was shortened to 5 min and the total time allowed to complete the quiz was increased to 10 min. Jim was the only participant to participate in this condition. All other procedures were followed identically to those of the original BST condition, by working on the whiteboards.
Behavioral Skills Training Plus Reinforcement

In the event that BST alone was not effective, the researcher implemented a BST condition that included the delivery of a tangible reinforcer contingent on achieving a higher score. Michael, Angela, and Toby participated in this condition. The researcher implemented the same 10 min BST session described in the previous condition, using the white boards. The researcher presented a quiz immediately following the competition of the BST session. The quiz was administered following the same procedures as the Khan Academy video model condition. Prior to administering the quiz, the researcher set the expectations regarding the criterion for receiving tangible reinforcement. The participants were able to select one item from the treasure box contingent upon scoring a 70%, and 2 items contingent upon scoring a 100%. The treasure box included a variety of candies, small fidget toys, small containers of slime, small Legos sets, decorative pencils and erasers, silly glasses, and bubble necklaces. The SD for this condition was presented as follows: "if you get seven out of the 10 questions right, you can pick an item from the treasure box. If you get all 10 questions right you can pick two things from the box. If you leave a question blank it will be marked wrong." The researcher scored the quiz immediately after completion and delivered reinforcement as applicable. For Jim, this condition was identical to the BST plus extra time condition in which he received a 5 min training session and was allotted 10 min to complete his quiz. For him, the criterion to earn reinforcement required scoring a 70% on the items he completed in order to earn one item, or 100% of the items completed to earn two items. For all participants, mastery criterion was determined by evaluating changes in the level of the data in previous conditions with consideration that the proficiency score for the students’ school district was 70%. Additionally, data displaying correct items out of
the items completed for Michael, Jim, and Toby, were evaluated to determine mastery for those students in particular.

**Maintenance**

One to two weeks following skill mastery, the researcher conducted maintenance probes. Here, the researcher presented the same $S^D$ as in baseline for Meredith and Pam. Toby, Angela, Michael, and Jim received the same $S^D$ as that delivered in the BST plus reinforcement phase. Contingent upon meeting the criterion as described in the BST plus reinforcement phase, all participants who contacted this condition initially, were given reinforcement following the maintenance probe quiz. Neither video models nor BST were implemented prior to the researcher administering the quiz. The same procedures regarding data collection for both intervention conditions applied for the maintenance probes. These probes were conducted to determine if the participants truly mastered the skill by demonstrating accurate completion in the absence of any additional supports.

**Social Validity**

Following the completion of the study, the participants and teachers completed a social validity questionnaire (See Appendix F). The teacher quiz was a five question Likert-type questionnaire with three anchors per question. For example, one item states: my student’s use of the Khan Academy videos via iPad did not disturb my classroom. Another addresses ease of implementation by asking: I felt this intervention was easy to use in a classroom setting. The participant questionnaire followed the same format, however smiley faces were used in place of numbers as the anchors. This was selected to make the questionnaire easier to complete for elementary-aged students. Students were asked questions similar to that of the teacher questionnaire, however, the students completed two questionnaires. One questionnaire referred
to the Khan Academy procedure and the other referred to BST. The teacher did not complete a BST social validity questionnaire, as she was never present when this intervention was used. Some questions included: watching the videos was easy and didn’t take up much time; and I felt singled out because I was the only one in class using the iPad for math, I liked using the white boards for math, and I would use white boards again to learn math. The results of this questionnaire provided information relating to the feasibility of using video modeling in a classroom setting and student attitudes towards the intervention.

**Treatment Integrity**

Treatment integrity data were collected across the following percentages of all treatment conditions: 35% of Khan Academy sessions, 32% of BST sessions, 37% of BST plus reinforcement sessions, and 33% of BST plus extra time conditions. The treatment integrity for all intervention conditions was 100%. These data represent the degree to which the researcher accurately presented the Khan Academy videos, used the prompting procedure, and implemented BST procedures. A second researcher observed the full length of the intervention session and completed the treatment integrity checklist in real time. The checklist included eight yes or no questions and one that could be answered yes, no, or non applicable. “Non applicable” was marked in the event that the participant attended to the video model independently and did not require prompting, or particular items (e.g., the guided access function) that were not relevant to the BST conditions. Percentage of treatment integrity was calculated by taking the sum of total “yes” responses, dividing that by 8, and then multiplying by 100. For example, if the observer scored eight “yes” items, the correct calculation was: $(8)/(8)=1\times100=100\%$ integrity. If the participant did not require the prompting procedure for the video and all steps were implemented
with fidelity, the denominator was adjusted accordingly. The calculation would be $7/7=1$ (x100)= 100% fidelity. (See Appendix E for data sheet and sample calculation).
CHAPTER THREE:

RESULTS

Figure 1 displays the data for quiz performance and duration to complete quizzes across all six participants. In general, Khan Academy videos were not effective in teaching math skills to mastery level, as all six participants required BST to improve quiz performance. Although the majority of participants did not experience any improvement in the Khan Academy conditions, it is notable that Michael and Jim’s performances both indicated a change in level above that in baseline. This improvement did not lead to mastery, however, and thus, both participants moved into the BST phase. Notably, the researcher was only required to deliver prompts for attending on six occasions throughout the entirety of the study. The most frequently a participant was prompted in a single session was three times.

In evaluating duration values, the overall trend of the data suggests that in baseline, participants spent a greater amount of time working through problems on the first few quizzes with a decreasing trend in baseline. Pam’s duration data, for example, indicate decreasing duration in baseline, an immediate increase once Khan Academy begins, and a decrease again until BST was implemented. As mastery was achieved (with BST), fluency improved for Pam, Meredith, Angela, and Jim, indicating that Khan Academy videos did not have an effect on the total time required to complete the math quizzes. For other participants, such as Michael and Jim, the duration remained close to or at 5 min across all conditions. The teacher reported that both students were typically allotted extra time per their IEP requirements. Both students requiring the
full time across all conditions, with little variability could be related to needs that were a function of their disabilities.

Figure 2 shows the percentage of correct items out of 10 compared to the percentage of correct items out of those completed for Jim, Michael, and Toby. The data path “percentage correct out of 10” items represents the same data presented for all participants in figure 1. These data were graphed when it became apparent that these participants were accurate in solving the problems they had time to finish, and were losing points for quiz items left blank. These data indicate that although fluency did not increase for Jim or Michael, there may have been a greater effect for both Khan Academy videos and BST on skills performance than originally indicated.

Although improvements in quiz performance were evident, BST did not lead to mastery for Angela, Toby, Michael or Jim. All four participants required BST plus reinforcement. When reinforcement was added, Toby experienced an immediate increase in quiz performance, level with his highest score in the previous condition. Ultimately, Toby’s mastery criterion was determined by investigating the accuracy of his scores by evaluating his data from figure 2. When this condition was implemented for Angela and Michael, both data paths continued on a downward trend for two sessions before improvements were observed but ultimately, both achieved consistent performance in the 80% to 100% range.

Further evaluation of Jim’s data from figure 2, in addition to the teacher report indicating the “extra time” qualification of his IEP, indicated Jim’s accuracy improved greatly with BST, but his fluency was not increasing. In this condition, Jim consistently utilized the full 10 min allotted and continued failing to complete the entire quiz. It was in this condition, however, that Jim completed 9 questions correctly for the first time throughout the study. Interestingly, Jim’s data began to decrease in trend after the third session. Based on verbal report from the
participant, this could have been related to decreasing motivation resulting from the quantity of quizzes completed at this point in the study. At this time, BST plus reinforcement was implemented and Jim also achieved consistent responding in the 80% to 90% range.

When maintenance probe data were collected, Meredith, Michael, Jim and Angela’s performances maintained at mastery levels. All participants who contacted the BST plus reinforcement condition initially earned reinforcement based on the same contingency described above. For Meredith, the duration required for quiz completion was only 20 s longer than her quickest completion time (achieved during the BST condition); and Jim completed his mastery probe with the shortest duration recorded, indicating that the fluency of the skill maintained as well. Pam scored a 0 on her maintenance probe, however, her score increased to 90% immediately following a BST booster session, identical to the BST session in the previous condition. Toby’s score decreased by 20% in his maintenance probe; however, this was considered mastery for him as his score remained at 70% with respect to the items he answered correctly out of those he completed (see figure 2).

Results of the student social validity assessments indicated that the majority of participants felt that using the videos was easy, they would use them again in the future, and overall, they enjoyed using the videos to learn math skills. Four participants reported that they did not feel singled out by using the intervention. One reported she “sort of” felt singled out and one reported that she did feel singled out. The participant who reported the latter response explained that her sister was in the class with her but she did not have to do extra work. Interestingly, five participants reported they felt that the videos helped them understand math better. Scores were not shared with participants until the BST plus reinforcement condition, however, so they were not aware of any improvements, if any, in their performance. With respect
to the BST condition, all six participants reported that they liked this intervention, would use it again, and felt that it helped them learn math skills. All six also responded that they felt the intervention was easy and did not take up much time. Two students responded that he “sort of” felt singled out by being part of this intervention. Neither student reported the Khan Academy condition made them feel this way.

Results of the teacher social validity assessment indicated that the teacher completely agreed that the use of Khan Academy videos did not disturb her classroom, benefitted her students, was easy to use, and that she should likely use it again in the future. Data were shared with the teacher throughout the study. She explained that although their scores may not have improved with the implementation of the video, it could still be a useful tool for her students. Additionally, the teacher responded with “somewhat agree” to the third statement, “I felt like my students’ math skills were improving with time and would have increased in time regardless of the Khan Academy videos”. All participants in this study were receiving additional tier two supports for math; it is possible that the existence of the extra support motivated her response to this item.
Figure 1. Quiz scores and total duration to complete the quiz across participants and conditions. Quiz scores are represented on the line graph and duration is represented via bar graph. BST+ SR represents the BST pus reinforcement phase, M represents a maintenance probe, and booster represents the BST booster session. In Jim’s panel, the maximum time allotted during the first three conditions was 300 s. 600 s was the maximum time for the last three conditions.
Figure 2. Correct quiz items out of 10 and correct items out of total number completed. The open diamonds represent percentage of correct items per total number of items completed. Percentage of correct items out of 10 is displayed with the closed diamonds. Baseline displays only one data path as participants completed all 10 quiz items in this condition.
The purpose of this study was to evaluate the effectiveness of Khan Academy videos on math quiz performance. Additionally, the researcher investigated the effects of the video on fluency of performance. Overall, the Khan Academy videos had little effect on math quiz performance. Consistent with existing literature, the videos were used as a supplement to previous teacher instruction to target a skill the teacher identified as non-mastered (Murphy et al., 2014). The results of this study imply that Khan Academy videos and standard teacher instruction alone are not likely to increase academic performance for students with disabilities.

Although effects of Khan Academy were not always reflected in quiz scores, raw data for Pam and Meredith did show strategic errors. In baseline, the target skill selected for Pam was two digit subtraction with regrouping. The steps involved were as follows: draw a line to separate the ones and tens place, regroup from the tens place, add to the ones place, draw a picture to subtract the ones values, and use finger counting to subtract the tens values. In baseline, Pam made seemingly random errors in regrouping, or failed to regroup at all. On her quiz in her first few Khan Academy session, she regrouped correctly from the tens place to the ones place. The remaining errors occurred when subtracting in the tens values. In several of the other quizzes in this condition, she regrouped and subtracted correctly in the ones place but failed to subtract one from the tens place. It is possible that with the addition of performance feedback, her quiz scores may have improved. With regard to Meredith’s baseline scores, she
consistently regrouped incorrectly by switching the top and bottom values in the ones place. In the first quiz of the Khan Academy condition, she only completed one and a half questions before 5 min elapsed. She regrouped correctly across both places values and made errors only in basic subtraction. Both Pam and Meredith did demonstrate the same errors from baseline on quizzes later in the Khan Academy conditions, however, the existence of some correct steps used, like those modeled in the video, may be evidence of some learning.

With regard to BST, this intervention was effective when Khan Academy was not for only two participants. This intervention was chosen for implementation when Khan Academy was not effective as it closely models standard teacher instruction. Teacher instruction typically follows a format in which teachers explain a concept, model working through the concept, and then work with the students as they complete their own examples of the skill. Consistent with existing literature on BST, it is not always effective in the absence of tangible reinforcement, in situations where social reinforcement is not potent enough (Miltenberger et al., 2004). This could be attributed to the fact that the Khan Academy condition did not include any reinforcement for correct performance or corrective feedback for errors. The format of the Khan Academy videos was similar to the method in which teachers typically present material in class. The person in the video uses images to explain the concept and works slowly through different examples and different ways of conceptualizing the skill. This closely models how a teacher would use a white board to teach a lesson to a class. The variation in duration across the Khan Academy sessions could also be indicative of a lack of motivation in which the participants seemingly “gave up” and began writing in numbers in order to complete the quiz. Five out of six participants demonstrated an increase in duration, often to the maximum time limit (5 min) immediately following the implementation of BST. This change could be contributed to the high quantities of
social reinforcement for fast and accurate responding participants came in contact with during the 10 min BST session conducted before the quiz. This change in duration could be indicative of a change in both skill and motivation.

For some participants, it is likely that additional factors were involved in the lack of improvement on quiz scores. During the BST condition, Michael often stopped during a quiz and refused to work. He made statements about his hand, stomach, or head hurting. Additionally, he often stopped working and began staring ahead of him. These distracting behaviors often competed with quiz completion and did not allow him the full time needed to finish the quiz. Similarly, the researcher consistently observed Jim working slowly and carefully, making only substantial improvements in fluency during training sessions. He completed all problems correctly during the majority of training sessions; however, he typically only completed 2-3 practice problems during the 10 min training session. Other participants completed more than 10. After evaluating his quiz scores from figure 2, it became evident that he needed extra time to complete the quiz with high accuracy.

One limitation of the current study is that the Khan Academy videos were not implemented closely following the teacher’s lesson. Prior research indicates that most often, teachers use the videos as a supplement to their lessons as extra support for homework assignments or incorporated into class time (Murphy et al., 2014). In the current study, the teacher confirmed only that the selected targeted skills were taught either during the current or previous school year. The skills participants were completing did not necessarily contact a teacher lesson with the target skill immediately, or even close to the time in which they then watched the corresponding Khan Academy video. In addition, participant did not receive any performance feedback in this condition. Therefore, a participant could continue making the same mistake across several
sessions and these behaviors were not addressed. For this reason, future research should investigate the effectiveness of Khan Academy videos as supplement to recently taught skills and with the addition of performance feedback. A second limitation of this study is that because all six participants were in the same classroom, those who met mastery criterion and completed the study then shared this information with their peers. One participant commented that he did not ever want to receive a 100% or score well three times in a row. He then commented that he wanted to continue working on the white boards used during BST, however, he did not appear to make any additional errors. The difficulty he experienced with motivation and focus continued after this comment was made.

Another limitation of this study is that several of the selected participants were retained in third grade, and all students were experiencing significant difficulties with math skills. It is possible that the Khan Academy format may not be appropriate for teaching skills to a student with minimal concept of the skill. Future research should investigate using Khan Academy videos as a supplement to BST, or with the goal of higher-level mastery performance for students already performing the target skill at average proficiency.

Furthermore, with the ABC (baseline, Khan Academy, BST) or ABCD (baseline, Khan Academy, BST, BST plus reinforcement) design with a multiple baseline, it is not possible to eliminate the possibility of carryovers effects from previous conditions. Therefore, it is possible that BST was only effective when it followed Khan Academy. This limits the ability to ascertain that BST or BST plus reinforcement contributed entirely to the participants’ improvements in math quiz performance. This supports the development of future research that uses Khan Academy as a supplement to BST.
Lastly, this study was the first to investigate the effects of Khan Academy videos for students with disabilities. Although the researcher was not provided with specific information about the students’ disabilities, the teacher reported anecdotally that several were diagnosed with learning disabilities. It is possible that the video model format may not have been appropriately matched to accommodate the students’ respective disabilities and learning styles. Future research should evaluate the effects of supplemental use of Khan Academy videos relative to specific disabilities.
REFERENCES


Sutherland, K. S., & Snyder, A. (2007). Effects of reciprocal peer tutoring and self-graphing on reading fluency and classroom behavior of middle school students with emotional or behavioral disorders. *Journal of Emotional and Behavioral Disorders, 15,* 103-118.


APPENDICES
Appendix A: Teacher Interview Form

1. Which of your students are struggling with math performance?

2. What sorts of behaviors indicate their struggle? (E.g., low math grades, poor test performance, incomplete or inaccurate work)

3. For the students selected, please list their current math grade.

4. Are these students receiving any extra support for academic work inside or outside of your classroom?

5. Do these students often engage in problem behaviors? (e.g., talking out during independent work, getting out of the seat, inappropriate interactions with other students)

6. Do these students seem eager to learn? Do they put forth their best effort in completing math work
Appendix B: Sample Quiz

Participant Name: ________________

Directions: Solve the problem and write the answer.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1) 52</td>
<td>2) 44</td>
</tr>
<tr>
<td>-15</td>
<td>-25</td>
</tr>
<tr>
<td>3) 57</td>
<td>4) 52</td>
</tr>
<tr>
<td>-38</td>
<td>-26</td>
</tr>
<tr>
<td>5) 83</td>
<td>6) 33</td>
</tr>
<tr>
<td>-65</td>
<td>-17</td>
</tr>
<tr>
<td>7) 72</td>
<td>8) 61</td>
</tr>
<tr>
<td>-48</td>
<td>-24</td>
</tr>
<tr>
<td>9) 92</td>
<td>10) 55</td>
</tr>
<tr>
<td>-46</td>
<td>-37</td>
</tr>
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## Appendix C: Prompt and Duration Data Sheet

<table>
<thead>
<tr>
<th>Khan Academy Video Model</th>
<th>Pro#0036520</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant:</td>
<td></td>
</tr>
<tr>
<td>Date:</td>
<td></td>
</tr>
<tr>
<td>Data Collector:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition:</th>
<th>Condition:</th>
<th>Condition:</th>
<th>Condition:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration for completion:</td>
<td>Duration for completion:</td>
<td>Duration for completion:</td>
<td>Duration for completion:</td>
</tr>
<tr>
<td>Frequency of Prompts Given:</td>
<td>Frequency of Prompts Given:</td>
<td>Frequency of Prompts Given:</td>
<td>Frequency of Prompts Given:</td>
</tr>
<tr>
<td>Mins of BST:</td>
<td>Mins of BST:</td>
<td>Mins of BST:</td>
<td>Mins of BST:</td>
</tr>
<tr>
<td>Quiz Score:</td>
<td>Quiz Score:</td>
<td>Quiz Score:</td>
<td>Quiz Score:</td>
</tr>
<tr>
<td># items answered incorrectly:</td>
<td># items answered incorrectly:</td>
<td># items answered incorrectly:</td>
<td># items answered incorrectly:</td>
</tr>
<tr>
<td># items left blank:</td>
<td># items left blank:</td>
<td># items left blank:</td>
<td># items left blank:</td>
</tr>
<tr>
<td>Notes:</td>
<td>Notes:</td>
<td>Notes:</td>
<td>Notes:</td>
</tr>
</tbody>
</table>


## Appendix D: Sample IOA Calculation

<table>
<thead>
<tr>
<th>Observer A</th>
<th>Correct/Incorrect</th>
<th>Agreement?</th>
<th>Observer B</th>
<th>Correct/Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) 5+3=9</td>
<td>X</td>
<td>Y</td>
<td>1) 5+3=9</td>
<td>X</td>
</tr>
<tr>
<td>2) 6-3=3</td>
<td></td>
<td>Y</td>
<td>2) 6-3=3</td>
<td></td>
</tr>
<tr>
<td>3) 10-2=8</td>
<td></td>
<td>Y</td>
<td>3) 10-2=8</td>
<td></td>
</tr>
<tr>
<td>4) 8+1=9</td>
<td></td>
<td>Y</td>
<td>4) 8+1=9</td>
<td></td>
</tr>
<tr>
<td>5) 5+4=8</td>
<td>X</td>
<td>Y</td>
<td>5) 5+4=8</td>
<td>X</td>
</tr>
<tr>
<td>6) 3+2=6</td>
<td>X</td>
<td>Y</td>
<td>6) 3+2=6</td>
<td>X</td>
</tr>
<tr>
<td>7) 4+4=8</td>
<td></td>
<td>Y</td>
<td>7) 4+4=8</td>
<td></td>
</tr>
<tr>
<td>8) 9-4=5</td>
<td></td>
<td>Y</td>
<td>8) 9-4=5</td>
<td></td>
</tr>
<tr>
<td>9) 3-2=1</td>
<td></td>
<td>Y</td>
<td>9) 3-2=1</td>
<td></td>
</tr>
<tr>
<td>10) 1+3=</td>
<td>X</td>
<td>N</td>
<td>10) 1+3=</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>60%</td>
<td></td>
<td>Total:</td>
<td>70%</td>
</tr>
</tbody>
</table>

IOA: Total Agreements (9)/ total intervals (10)= 90% agreement
Appendix E: Sample Khan Academy Videos

Subtracting with regrouping (borrowing) | Early Math | Khan Academy

\[
\begin{align*}
713 & = 70 + 13 \\
83 & = 80 + 3 \\
-25 & = -20 - 5 \\
58 & = 50 + 8
\end{align*}
\]

The idea of division | Multiplication and division | Arithmetic | Khan Academy

\[
24 \div 3 = 8 \\
3 \times 8 = 24
\]
Appendix F: Social Validity Questionnaires

Teacher Questionnaire
Circle one
1= disagree 2= somewhat agree 3= completely agree

1. My student’s use of Khan Academy videos via iPad did not disturb my classroom.
   1  2  3

2. I feel like my student benefitted from using the Khan Academy videos as a supplement to my instruction.
   1  2  3

3. I felt like my student’s math skills were improving with time and would have increased with time regardless of the Khan Academy videos.
   1  2  3

4. I would use this intervention for other students struggling with math in the future.
   1  2  3

5. I felt this intervention was easy to use in a classroom setting.
   1  2  3

Student Questionnaire
Circle one
😊 = No 🙁 = sort of/maybe 😊 = Yes

1. I liked learning math skills by watching Khan Academy videos on the iPad.
   🙁 😊 😊

2. I would use the videos again in the future to help me with other math skills.
   🙁 😊 😊

3. I felt out singled out because I was the only one in class using the iPad for math.
   🙁 😊 😊

4. I think watching the Khan Academy videos helped me understand math better.
   🙁 😊 😊

5. I thought watching the videos was easy and didn’t take up much time.
   🙁 😊 😊
Appendix F: (Continued)

Student Questionnaire (BST)
Circle one

😊 = No 😐 = sort of/maybe 😊 = Yes

1. I liked learning math skills by working on the white board tables.

😊 😐 😊

2. I would like to use white board tables again to help me with other math skills.

😊 😐 😊

3. I felt out singled out because I had to leave class to work on the white board tables.

😊 😐 😊

4. I think doing math on the white board tables helped me understand math better.

😊 😐 😊

5. I thought doing math on the white board tables was easy and didn’t take up much time.

😊 😐 😊
Appendix G: Treatment Integrity Checklist

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did the researcher present the iPad with relevant Khan Academy video open and prepared?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>2. Did the researcher present iPad with Guided Access on?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>3. Did the researcher press &quot;start&quot; on the video?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>4. Did the researcher deliver the SD as described?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>5. Did the researcher start the timer immediately following delivery of the SD?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>6. Did the researcher record duration when the participant indicated he/she was finished?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>7. Did the researcher follow the prompting procedure for attending to the video?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>8. Did the researcher deliver a neutral statement such as, &quot;thank you&quot; or &quot;alright&quot; contingent on completion of the assessment?</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Sample Calculation: 7 items scored “yes” ÷ 7 total items = 1 (x100) = 100% fidelity
October 16, 2018

Jacy Reed
CFBH-Child and Family Behavioral Health
Tampa, FL 33612

RE: Expedited Approval for Initial Review
IRB#: Pro00036520
Title: An Evaluation of Khan Academy Videos as a Supplement to Teacher Instruction for Elementary-Aged Students with Disabilities

Study Approval Period: 10/16/2018 to 10/16/2019

Dear Ms. Reed:

On 10/16/2018, the Institutional Review Board (IRB) reviewed and APPROVED the above application and all documents contained within, including those outlined below.

Approved Item(s):
Protocol Document(s):
Protocol_Version#1_9.11.18.docx

Consent/Assent Document(s)*:
ParentalPermission_Version#1_10.8.18.docx.pdf
TeacherConsent_Version#1_10.8.18.docx.pdf
VerbalAssent_Version#1_9.11.18.docx

*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent documents are valid until the consent document is amended and approved. Child Verbal Assent is not a stamped form.

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110. The research
Appendix H: (Continued)

proposed in this study is categorized under the following expedited review category:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

This research involving children as participants was approved under 45 CFR 46.404: Research not involving greater than minimal risk to children is presented.

Requirements for Assent and/or Permission by Parents or Guardians: 45 CFR 46.408 Permission of one parent is sufficient.

Assent will be obtained as outlined in the IRB application.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval via an amendment. Additionally, all unanticipated problems must be reported to the USF IRB within five (5) business days.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

[Signature]

Kristen Salomon, Ph.D., Chairperson
USF Institutional Review Board
Appendix I: Parental Permission Form

Study ID: Ame2_Pro00036520 Date Approved: 2/5/2019

Parental Permission for Children to Participate in Research Involving Minimal Risk
Information for parents to consider before allowing your child to take part in this research study

Pro #00036520

The following information is being presented to help you and your child decide whether or not he/she wishes to be a part of a research study. Please read this information carefully. If you have any questions or if you do not understand the information, we encourage you to ask the researcher.

We are asking you to allow your child to take part in a research study called: An Evaluation of Khan Academy Videos as a Supplement to Teacher Instruction for Students with Disabilities

The person who is in charge of this research study is Jacy Reed. This person is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. She is being guided in this research by Dr. K. Crosland.

The research will be conducted at the school your child currently attends.

Purpose of study:
The purpose of this study is to determine if using Khan Academy videos with standard teacher instruction will increase math quiz performance for students with disabilities.

Why is your child being asked to take part?
We are asking your child to take part in this research study because we believe using Khan Academy videos will help improve his/her math performance. He/she is diagnosed with a disability and currently enrolled in an elementary school program in which he/she is supported by a 504 plan or an IEP that indicates a disability that can affect academic performance. We would like to see if using the videos as a supplement to the teacher’s instruction is effective as an additional support for your child. Participants will include six elementary aged individuals diagnosed with a disability and their teachers. Your child’s
teacher will be involved in the selection of specific math skills targeted for improvement and identifying his/her current level of performance.

**Study Procedures:**
If your child takes part in this study, s/he will be asked to:

- Answer questions and respond to a verbal assent process if he/she is determined able to do so.
- Spend a maximum of 5 minutes completing a pre and post math quiz covering an on-level skill or a non-mastered skill that is below level.
- Spend a maximum of 15 minutes viewing a Khan Academy video on an iPad monitored by the primary investigator meeting with your child 3-4 times per week. Sessions will be between 5-15 minutes in length.
- In the event that Khan Academy videos do not contribute to improved quiz performance, your child will spend a maximum of 10 minutes engaged in behavioral skills training in order to increase the likelihood of him/her attaining the target skill. This may include a tangible reinforcement component.
- Fill out a 5 question survey about the intervention used.
- These activities will take place during normal school hours and will not affect his/her lunch, recess, or specials time.
- The expected duration of this study will be between 6 to 9 months. The investigator may conduct more than one session per day.

**Total Number of Participants**
About 12 individuals will take part in this study at USF. This includes an estimated 6 students and 6 teachers.

**Alternatives / Voluntary Participation / Withdrawal**
If you decide not to let your child take part in this study, that is okay. Instead of being in this research study your child can choose not to participate. You should only let your child take part in this study if both of you want to. You or child should not feel that there is any pressure to take part in the study to please the study investigator or the research staff.

**If you decide not to let your child take part:**
- Your child will not be in trouble or lose any rights he/she would normally have.
- You child will still get the same services or health care benefits he/she would normally have.
- Your child can still continue receiving instruction from his/her teacher and Khan Academy videos are available for free online.

You can decide after signing this informed consent form that you no longer want your child to take part in this study. We will keep you informed of any new developments which might affect your willingness to allow your child to continue to participate in the study. However, you can decide you want your child to stop taking part in the study for any reason at any time. If you decide you want your child to stop taking part in the study, tell the study staff as soon as you can.

**Benefits:**
The potential benefits to your child include:
Appendix I: (Continued)

Study ID: Ame2_Pro00036520 Date Approved: 2/5/2019

- Increased understanding and mastery of basic math skills required for further schooling and potentially for employment
- Increased teacher satisfaction of their students’ academic improvements
- Increased parent and student satisfaction of academic improvements

Risks or Discomfort
There are no known risks to those who take part in this study.

Compensation
Your child will receive no payment or other compensation for taking part in this study.

Costs
It will not cost you anything to let your child take part in the study.

Privacy and Confidentiality
We will do our best to keep your child’s records private and confidential. We cannot guarantee absolute confidentiality. Your child’s personal information may be disclosed if required by law. Certain people may need to see your child’s study records. These individuals include:

- The research team, including the Principal Investigator, study coordinator, and all other research staff.
- Certain government and university people who need to know more about the study, and individuals who provide oversight to ensure that we are doing the study in the right way.
- The USF Institutional Review Board (IRB) and related staff who have oversight responsibilities for this study, including staff in USF Research Integrity and Compliance.

We may publish what we learn from this study. If we do, we will not include your child’s name. We will not publish anything that would let people know who your child is.

You can get the answers to your questions, concerns, or complaints.
If you have any questions, concerns or complaints about this study, call Jacy Reed at 904-305-1797.
If you have questions about your child’s rights, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu.

Consent to Take Part in this Research Study

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

Signature of Person Taking Part in Study Date

Social Behavioral Version #2

Version Date: 1/24/19
Page 3 of 4
Appendix I: (Continued)

Printed Name of Person Taking Part in Study

Statement of Person Obtaining Informed Consent
I have carefully explained to the person taking part in the study what he or she can expect from their child’s participation. I confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in their primary language. This research subject has provided legally effective informed consent.

Signature of Person Obtaining Informed Consent

Date

Printed Name of Person Obtaining Informed Consent
Informed Consent to Participate in Research Involving Minimal Risk

Pro # 00036520

You are being asked to take part in a research study. Research studies include only people who choose to take part. This document is called an informed consent form. Please read this information carefully and take your time making your decision. Ask the researcher or study staff to discuss this consent form with you, please ask him/her to explain any words or information you do not clearly understand. The nature of the study, risks, inconveniences, discomforts, and other important information about the study are listed below.

We are asking you to take part in a research study called:

An Evaluation of Khan Academy Videos as a Supplement to Teacher Instruction for Students with Disabilities

The person who is in charge of this research study is Jacy Reed. This person is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. She is being guided in this research by Dr. K. Crosland.

The research will be conducted at the school you currently work at.

Purpose of the study
The purpose of this study is to determine if using Khan Academy videos with standard teacher instruction will increase math quiz performance for students with disabilities.

Why are you being asked to take part?
We are asking you to take part in this research study because you are the instructor in a class with a student who is diagnosed with a disability and currently enrolled in an elementary school program in which he/she is supported by a 504 plan or an IEP and struggling with math. We would like to see if using the videos as a supplement to the teacher’s instruction is effective as an additional support for that student.

Study Procedures:
If you take part in this study, you will be asked to:
Appendix J: (Continued)

Complete a social validity survey regarding your opinion of the intervention. This will
Undergo a brief, oral interview with the PI regarding the target students’ specific difficulties in
math and any associated problem behaviors. This will take place at the onset of the study.
This research will take place during normal school hours.
The expected duration of this study will be between 6 to 9 months.
The time commitment will be an estimated 45 minutes for the oral interview and 30 minutes for
the social validity questionnaire.

Total Number of Participants
About 12 individuals will take part in this study at USF. This includes an estimated 6 students and 6
teachers.

Alternatives / Voluntary Participation / Withdrawal
You do not have to participate in this research study.
You should only take part in this study if you want to volunteer. You should not feel that there is any
pressure to take part in the study. You are free to participate in this research or withdraw at any time.
There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this
study. Your decision to participate or not to participate will not affect your job status, employment
record, employee evaluations, or advancement opportunities.

Benefits
The potential benefits of participating in this research study include:
• Increased satisfaction of student’s academic improvements
• Fewer hours dedicated to providing extra support to needy students

Risks or Discomfort
This research is considered to be minimal risk. That means that the risks associated with this study are
the same as what you face every day. There are no known additional risks to those who take part in this
study.

Compensation
You will receive no payment or other compensation for taking part in this study.

Costs
It will not cost you anything to take part in the study.

Privacy and Confidentiality
We will do our best to keep your records private and confidential. We cannot guarantee absolute
confidentiality. Your personal information may be disclosed if required by law. Certain people may
need to see your study records. These individuals include:
Appendix J: (Continued)

The research team, including the Principal Investigator, study coordinator, and all other research staff.

Certain government and university people who need to know more about the study, and individuals who provide oversight to ensure that we are doing the study in the right way.

The USF Institutional Review Board (IRB) and related staff who have oversight responsibilities for this study, including staff in USF Research Integrity and Compliance.

We may publish what we learn from this study. If we do, we will not include your name. We will not publish anything that would let people know who you are.

You can get the answers to your questions, concerns, or complaints

If you have any questions, concerns or complaints about this study, or experience an unanticipated problem, call Jaci Reed at 904-305-1797.

If you have questions about your rights as a participant in this study, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu.

Consent to Take Part in this Research Study

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

Signature of Person Taking Part in Study

Date

Printed Name of Person Taking Part in Study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect from their participation. I confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in their primary language. This research subject has provided legally effective informed consent.

Signature of Person obtaining Informed Consent

Date

Printed Name of Person Obtaining Informed Consent