# The Impact of Video Modeling in Teaching Money Skills for Students with Moderate Intellectual Disability

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## ABSTRACT

**This study investigates the impact of Video Modeling (VM) delivered via iPads on the acquisition of functional math, specifically money skills, of students with significant cognitive disabilities. Single-subject, multiple-baseline design across six participants was used to explore the effectiveness of the intervention on the acquisition of money skills by adolescents with Down Syndrome. Results indicated that the participants improved their money skills after the delivery of the VM via handheld devices (iPads). Recommendations for future research and practice were also provided.**

## Introduction

One of the essential aspects of our daily living functions is money and dealing with it. According to Maddumarachchi (2015), money is considered as a means of survival and an important part of community living. Many purposes of money involve: the use of it to exchange goods and services, comparing the values of various objects by using it as a standard or unit of account, deferred payment and for any future transactions (Furnham & Argyle, 1998). Mitchell and Mickel (1999) indicated people's attitudes and behaviors could play a key role in developing their skills in dealing and working with money. Dealing with money includes the skills of knowing/acknowledging the number, value, color and/or drawings, along with the material of that bill. The satisfaction in most aspects of life across gender, age, culture and social setting is related to the individual's financial standing (Mitchell & Mickel, 1999). Accordingly, developing money skills is highly essential for all students including those with disabilities.

Money skills instruction impacts the students' lives and future by increasing their opportunities in grasping an adequate understanding of the use of money: when and how, and that would definitely assist in making future financial decisions (New Zealand Ministry of Education [NZME], 2013). When it comes to students with cognitive disabilities, research pointed out that those individuals manifest deficits in adaptive behaviors that are mandated for everyday living and work such as self-care, eating habits, transportation and mobility along with money management (Westling, Fox, & Carter, 2015). Additionally, students with significant cognitive disabilities demonstrate weaknesses in the areas of reasoning, problem solving, planning, abstract thinking and learning from prior experiences (American Psychological Association [APA], 2013). These deficits negatively impact their integration in the community-based settings and their ability to live successfully and independently.

## Literature Review

### Functional Math Instruction: Money Skills

Functional skills in mathematics represent an essential area of teaching and learning for all students including those with disabilities. Instruction on functional math involves teaching practical mathematics needed in real-life situations, such as estimating volume or distance, telling time, and using money. Using money entails an array of skills, including knowing money bill value for computing, spending, and making money (Browder & Grasso, 1999). Learning money skills is important since they are key to an individual's independence and self-determination (Browder & Grasso, 1990).

### The Use of Technology

Notable recent advances in instructional technology have allowed educators access to cost-efficient, user- friendly technological applications to help improve students with disabilities' learning outcomes. Modern mobile hand-held video display devices, in particular, along with smaller file size and efficient multimedia storage capacity, have increased the instructional utility of video content by facilitating the creation of highly realistic, engaging and risk-free instructional situations. With such devices, instructional video models and self-models have become easier to create, edit, and deliver than ever before.

Recent research literature on video modeling notably points towards the need to examine the promising instructional utilities of handheld devices in video modeling. Jowett, Moore and Anderson (2012), Kagohara, Sigafoos, Archmadi, O'Reilly and Lancioni (2012), Kellems and Morningstar (2012), and Mechling, Pridgen and Cronin (2005) all recommended examining the use of video modeling delivered via handheld devices (e.g., iPods and iPads) on the target behavior of students with Autism Spectrum Disorders (ASD) in future research. Mechling & Hunnicutt, (2011) for example, strongly urged investigating the use of the technology in creating, editing and delivering video models. They stated that the use of the technology would help in creating and editing the video models easily. New easy to use, powerful tools in handheld devices (e.g., iPads) would help in making professional videos without the cost and effort associated with the training, previously required, on devices (such as video cameras) to create these video models (Kellems & Morningstar, 2012). Moreover, operating such devices is so straightforward that they can be used by students with cognitive disabilities, requiring little or no help. (Shane, Laubscher, Schlosser, Flynn & Abramson, 2012).

**Video Modeling**

A review of the literature on video modeling identified only 27 studies that examined the use of video modeling in general for instructing individuals with significant cognitive disabilities, including autism and intellectual disability. Only 8 out of the 27 studies were conducted on the use of video self-modeling (VSM) for students with autism (Bellini, Akullian & Hopf, 2007; Buggey, 2005; Cihak & Schrader, 2008; Delano, 2007; Hart & Whalon, 2012; Marcus & Wilder, 2009; Mechling & Hunnicutt, 2011; Wert & Neisworth, 2003). Only three of the eight studies investigated the impact of VSM in academic areas. Hart and Whalon (2012) investigated the effects of VM delivered via iPad on the academic discussions (responding correctly to teacher's questions) in science class. Marcus and Wilder (2009) explored the impact of VM on responding to novel letters in reading texts, and Delano (2007) investigated the impact of Self-Regulated Strategy Development (SRSD) delivered through VM on the rate of written words and the functional essay elements of students with ASD. This would indicate a lack in the literature on the use of VM to target the academic and/or functional skills of students with Intellectual Disabilities and Down Syndrome. Moreover, none of these identified studies have investigated the impact of VM on aiding the teaching and learning of functional mathematic skills. More specifically, none of these studies investigated the impact of video modeling on adolescents with significant cognitive disabilities, such as those with Down Syndrome for teaching functional mathematics such as money skills. When referring back to the literature on video modeling, it was noted that a recommendation for future research was to investigate the impact of video modeling to explore its impacts with the use of evidence-based strategies (e.g., fading, prompting, time delay or reinforcement) and using new trends of technology such as handheld devices (Alberto, Cihak & Gama, 2005; Apple, Billingsley & Schwartz, 2005; Bellini & McConnell, 2007; Charlop, Carpenter & Greenberg, 2010; Cihak, 2011; Cihak & Schrader, 2008; Delano, 2007; Hart & Whalon, 2012; Kellems & Morningstar, 2012; Marcus & Wilder, 2009; Mechling & Hunnicutt, 2011; Mechling, et al., 2005; Ozen, Batu & Birkan, 2012; Paterson & Arco, 2007; Scheflen, Freeman & Paparella, 2012; Wert & Neisworth, 2003).

In addition, previous literature demonstrated the importance of investigating the impact of the video-based intervention (video modeling) on the generalization and maintenance of the target skills by individuals with disabilities including those with intellectual disabilities. According to the National Council of Teachers of Mathematics (NCTM, 2002), there should be a meaningful mathematic instruction for all students, including those with disabilities. Meaningful mathematic instruction would assist students in developing their understanding of mathematical procedures to engage in problem solving that might be used in daily life situations and contexts (NCTM). Maintaining the problem-solving skills and generalizing them in future situations is another goal of teaching functional mathematics for students with disabilities including those with significant cognitive disabilities. Video modelings are those interventions that should be explored to examine their impacts in generalizing and maintaining the target skill (e.g., behavioral, social or academic) (Alberto et al., 2005; Allen, Wallace, Renes, Bowen & Burke, 2010; Ayres, Langone, Boon & Norman, 2006; Blum-Dimaya, Reeve, Reeve & Hoch, 2010; Buggey, 2005; Charlop et al., 2010, Cihak, 2011; Cihak &

Schrader, 2008; Corbett, 2003; Jowett, Moore, & Anderson, 2012; Kagohara et al. 2012; Laarhoven, Winiarski, Blood & Chan, 2012; Maione & Mirenda, 2006; Mechling & Hunnicutt, 2011; Paterson & Arco, 2007; Plavnick & Ferreri, 2011; Scheflen et al., 2012).

Observation is a fundamental aspect in the process of modeling (Bandura, 1969; Schunk, 2012). These individuals might face difficulties in learning through live modeling (performed by peers or adults) because of their deficits in maintaining eye contact or understanding facial gestures and cues. In addition, students with intellectual disabilities (ID) and Down Syndrome (DS) might encounter difficulties in shifting their attention from one idea to the other eliminating the superfluous information presented by the adult or peer model (Buggey & Hoomes, 2011). Therefore, VM helps those individuals fulfill their learning needs and acquire target skills from video models with no social obligations (e.g., eye contact) or experiencing superfluous information (Buggey & Hoomes; Hart & Whalon, 2012). A successful observation requires attention to the model. One cannot learn effectively through observation without attending to the model. Attention facilitates the process of imitating the target behaviors (Bandura). Because students with intellectual disabilities and Down Syndrome might demonstrate difficulty in attention to real models, video technology helps individuals attend to the models presented in videos (Plavnick; Shane et al., 2012). Providing a VM intervention for students with ID or DS encourages them to replicate tasks and steps modeled in the videos, demonstrating to them that they are capable to perform these tasks independently (Bellini & McConnell, 2010). VM facilitates the transfer of learning effects across multiple learning settings and contexts (Bellini & McConnell; Collier-Meek, Fallen, Johnson, Sanetti & Delcampo, 2012).

Another reason for using video modeling in teaching functional math skills is to provide a vivid image of the real-life settings where individuals with DS/ID may experience practice performing functional skills. When using video modeling for teaching functional math (e,g., money skills), teachers are providing a dimension of simulating the community-based settings. The video technology depicts the community and helps individuals with disabilities imitate the models multiple times in a risk-free environment. Viewing a model provides a motivational incentive to stay on tasks, improves self-confidence and efficacy that individual could perform the target behavior (Buggey & Hoomes, 2011).

## VM and iPads

Multiple applications are currently being used to deliver video interventions for students including those with disabilities. One of these devices is the iPad. According to Kagohara et al. (2012), iPads are handheld computers which are portable. The iPads can be used everywhere and at any time. Accordingly, the student would have the opportunity to access the video models at any time and in different settings. Watching the video model does not require the student to be at school or at home. As long as the student has a personal device, the chances of learning the target skill are increased because the student would have more opportunities to access the video than viewing it via other non-portable devices such as a laptop or television (Kagohara et al., 2012). Compared to televisions, for example, iPads are considered new technological tools to deliver video modeling. The novelty effects of the iPads might attract individuals to view models in the videos delivered via iPads. In addition, the options of easy editing, creating, and downloading the videos are also available in iPads. Such options encourage educators to use such tools to present the video models (Jowett et al., 2012; Kagohara et al., 2012).

Shane et al. (2012) noted that portable devices such as the iPad have multiple advantages. These advantages are represented in the iPads' size, portability, mobility, storage options, organization in presenting the images, videos or audio clips, availability and being socially widespread. Unlike low-tech devices such as the traditional video players, the applications on devices such as iPods or iPads are creative. They allow teachers or parents to create high quality videos by combining static images with audios and other effects to create dynamic scenes in a very innovative way. In addition, iPod or iPads are user-friendly and easily accessible (Shane et al., 2012). These advantages make iPads ideal for creating very efficient VMs. The iPad with its numerous applications can be an effective tool for providing opportunities in which students can learn independently from their experiences rather than traditional instruction (Carr, 2012). It was noted that the use of iPads for teaching money skills for students with cognitive disabilities was another gap found in literature. Therefore, this study was an attempt to fulfill a few of these lacks and increase the body of the literature in the area of teaching students with cognitive disabilities with the use of technology.

## Purpose of the Study

This study aims to explore ways to improve and enhance the learning environment, for students with significant cognitive disabilities to help them acquire functional skills and maintain them overtime. In addition, this study targeted the use of evidence-based instructional strategies such as VM that was proven in the research field as effective in teaching students with disabilities and enhancing that strategy through the delivery via the technology of tablets such as iPads. Thus, the purpose of the current study was to explore the impact of video modeling (VM) delivered via iPads on the acquisition and maintenance of money skills by students with significant cognitive disabilities. The study attempts to answer the following research questions:

1 - What is the impact of VM on the acquisition of money skills:

- a - What is the impact of VM delivered via iPads on the number of correct answers per task?
- b - What is the impact of VM delivered via iPads on the number of correct task analyzed steps performed by the participants?

2 - How can the intervention help participants in learning money skills (identifying the value, material and figures of the money bill)?

3 - In what way is the intervention socially valid to help students gain the needed money skills and maintain them over time?

## Methodology

### Experimental Design

The goal of any empirical research is to initiate systematic manipulation. Such manipulation supports the conclusions regarding the cause and effect relationship between the independent and dependent variables (IV & DV; Johnston & Pennypacker, 1993). To demonstrate such relationship, a single-subject, multiple baseline design across participants was used to investigate the effects of VM delivered via iPads on the money skills of participants demonstrated: in correctly performing task-analyzed steps to solve the worksheets, and number of the participants' correct answers/responses on these worksheets. Specifically, the multiple baseline design was used so "the effects are demonstrated by introducing the intervention to different participants at different points in time"

(Kazdin, 2011: 144). Additionally, this design involves a staggered baseline, so each participant is a control for the next one, and the examination of performance is across baselines (Kazdin). The Multiple-baseline design promotes internal validity and experimental control through the marked changes in the dependent variables that coincide with the independent variable manipulations and replications across an adequate number of data series (Christ, 2007; Watson & Workman, 1981).

## Participants

Six adolescent students with Intellectual Disability and Down Syndrome participated in this study. The inclusion criteria for participants included students who: (a) were middle and high school, ages range 12-17, (b) had a full scale IQ of 36 and above, (d) were native speakers of Arabic, (e) were identified as needing instruction in functional skills including money skills by their classroom teacher. It is noteworthy that those students were tested for their intelligence quotients (IQs) using the Arabized, and adapted editions of the tests indicated in the note of Table 1 below. The researchers obtained the parents' consents before the initiation of the study using parents' consent forms. All participants were assigned pseudonyms to ensure anonymity. Participant demographic data are found in Table 1

**Table (1)**
**Participants' Demographic Data**

| Participant | Age | Gender | Ethnicity | Disability Classification | Full Scale of IQ |
|---|---|---|---|---|---|
| Majed | 15 | Male | Caucasian | Moderate ID/DS | 48[a] |
| Salah | 14 | Male | Caucasian | Moderate ID/DS | 40[a] |
| Abdul | 12 | Male | Caucasian | Moderate ID | 52 |
| Fayed | 17 | Male | Caucasian | DS | * |
| Ahmed | 16 | Male | Caucasian | Severe ID/DS | 36[b] |
| Naser | 12 | Male | Caucasian | Severe ID/DS | 39[b] |

*Note. [a]Stanford-Binet Intelligence Scale III; [b] Stanford-Binet Intelligence Scale IV. ID: Intellectual Disability; DS: Down Syndrome. *Fayed's IQ score was unavailable since he was transferred from another school.*

All six participants completed the four phases of this research study. They all received the VM in their classroom in small groups. Majed and Salah worked in Group 1, Abdul and Fayed worked in Group 2, and Ahmed and Naser worked in Group 3. Majed was observed as a very friendly, compliant and initiative student who enjoyed handicrafts and arts. He was cooperative and able to sort geometric forms and shapes along with having adequate self-care skills. Salah was also observed as a very collaborative student who enjoys working with technology. He was able to sort geometric forms and shapes along with demonstrating adequate self-care skills. Abdul was noted as very respectful individual to authority and adults. He was initiative in classroom participation and group play. Fayed was noted as a very committed to classroom routines and rules. He demonstrated adequate performance in group and peer work during classroom activities. Ahmed was noted as a quiet student who enjoys talking to any visitor in his classroom. He could name items and classify them. Naser was observed as interactive and worked with his classmates during class instruction. He carefully attended to adults' instruction demonstrating commitment to class routines and rules.

## Setting

This study was conducted in the participants' classroom, at a special education school located in Hawalli Governate in the State of Kuwait. This study was exclusively conducted in level 2, self-contained, special education classroom under the General Administration of Special Education District, in Hawalli. Specifically, the baseline, training, intervention and maintenance were all conducted at the back corner of the classroom. All phases were conducted by the first researcher, including the training of the money skills and delivery of the VM in small groups consisting of two students.

## Research Measures

The first dependent variable (DV) was the number of correct answers per each task. Data on this variable were collected using (worksheets) that were created by the third researcher for this purpose.

The second dependent variable was the number of correct steps performed per task. In this variable, the participant were required to perform a 12-task analyzed steps before, through and after solving the worksheets (data collection resources). For scoring the task-analyzed steps, a special task-analysis form was created and used by the first and second researchers to collect data on the number of correct task-analyzed steps were performed by the participants. These task-analyzed steps are demonstrated in Table 2 below.

**Table (2)**
**Task-Analysis**

| | |
|---|---|
| 1. | Open the iPad's cover/case. |
| 2. | Press the iPad's home button. |
| 3. | Slide over the iPad pages. |
| 4. | Select the Notability App/Notes (during baseline). |
| 5. | Choose the participant's name/folder in Notability App/Notes (during baseline). |
| 6. | Select the appropriate pen/highlighter for solving the worksheet. |
| 7. | Attend/listen to the worksheet instruction(s): circle, match, tick, write the correct answer. |
| 8. | Solve the worksheet. |
| 9. | Select the turn off tools option on Notability workplace toolbar/ the Done button on Notes (during baseline). |
| 10. | Select the return to notes option on Notability workplace toolbar/ back to notes list on Notes (during baseline). |
| 11. | Press the iPad's home button. |
| 12. | Close the iPad's cover/case. |

**Reliability.** An inter-rater reliability measure was conducted to ensure scoring consistency across two scorers. Inter-rater reliability is the agreement between two or more individuals on the data. Two raters (the first researcher and a Special Education teacher) independently scored all the participants' worksheets for the dependent variables: number of correct answers per task and number of correctly analyzed steps performed per task. The first researcher trained the second rater on how to score the worksheets, and when they obtained 100% agreement on scoring the worksheets during the training, they moved on to scoring the actual worksheets of the participants. A point-by point agreement ratio was used during the training period as well as when calculating the actual inter-rater reliability of this study to obtain the agreement estimation (Kazdin, 2011). The formula for estimating the point-by-point agreement used was: (agreement/agreement + disagreement) x 100. A minimum of 80% agreement was required for the inter-rater reliability to represent high reliability coefficient (Huck, 2012; Pierangelo & Giuliani, 2012). For the first dependent variable, a reliability agreement of 100% was obtained between the raters. For the second dependent variable, a reliability agreement of 96% was obtained. Both percentages for the dependent variables indicate high reliability coefficients (Huck; Pierangelo & Giuliani).

## Independent Variable

The independent variable consisted of VM delivered via iPads for the purpose of teaching money skills to the participants. These skills involved: identifying the currency of 1, 5 and 10 Kuwaiti Dinars (KD), the value number of the currency, details on the paper bill (e.g., drawings/images), and the material of that bill (paper not plastic). All intervention materials: Notability App and VM were delivered via iPads. All the worksheets were digitized to easily deliver them through the iPads. The first researcher provided iPads and iPad minis installed with Notability apps with styluses for students use.

## Materials

**Video modeling**. The video modeling (first research material) was created by the first researcher using a peer without disability to be the model for doing the task analysis and solving the money tasks on the worksheets. Using iMovie application on MacBook pro computer, the video model (VM) was created, modeling each of the task analysis steps to identify the money and appropriate use along with solving the worksheets. The language of the video modeling, instruction, worksheets was all in Arabic. Afterwards, the movie was installed on each of the iPads so the participants would have the opportunity to access the VM when needed.

**Notability application.** The Notability app was used as the primary platform for participants to solve the tasks on identifying and using money. Notability was selected because it involves multiple options for providing typewritten or handwritten notes, sketches, visuals, web links, graphs and recording (McGivney, 2013; Walter, 2014). During the baseline phase, students used Notes application, provided via iPads to solve the money skills task (worksheets). All these worksheets were transcribed to fit in the Notes app since on this app, a user cannot draw, sketch or write on the images unlike Notability which provides such option easily. During the subsequent phases (e.g., intervention and maintenance), students used the Notability app. Students were free to use all options of the Notability App when necessary/needed. They were given options to use full on-screen touch keypad, a split-screen keypad, and/or stylus.

## Procedures

**Baseline**. Before the initiation of the study, the participants were introduced to the devices and styluses along with the Notes app. When the participants were settled on the way they would solve the worksheets (e.g., using stylus), and how to go to Notes app, the baseline phase commenced. Considering student schedules and performance levels, they were grouped into three dyads. The time allocated for all sessions was from 20-30 minutes. The worksheets were randomly assigned. For the first group, baseline was conducted in three sessions to document stability in the responding performance of the participants (Horner et al., 2005). The number of baseline sessions for groups 2 and 3 increased during the progression of the study's phases.

**Training.** After a stable baseline was established for participants, the training on how to solve the worksheets, using the VM delivered through the iPads was initiated. Conditions were similar to baseline, with all materials needed to complete the worksheets, except for the use of Notes. In this phase, the Notability app was introduced, and the task analysis was explained. Participants were trained on how to access the videos independently, then on how to solve the worksheets on Notability. The videos were set on chapter mode, so each participant had the opportunity to watch the instructional VM in segments, and immediately perform the analyzed task for solving the worksheets. After viewing each segment of the VM, participants were instructed and prompted to model the completion of a task. Participants had to press on the screen to resume the video after each segment/task completion.

**Treatment/Training Fidelity.** To ensure the treatment implementation integrity, the researcher conducted a fidelity check for the training using a fidelity checklist. The classroom teacher checked each step if it was conducted by the first researcher on the checklist. Fidelity across the training was calculated by summing the number of conducted steps and dividing the sum by the total number then multiplying it by 100. Fidelity across the training was 100% indicating that the researcher implemented all the procedural steps as intended.

**Intervention.** Participants were prompted to perform the steps of task-analysis to solve the money skills worksheets. The researcher administered five sessions during this phase. The wording of the instruction, and directions, prompts (e.g., Use your iPad to solve the worksheets, check the VM) remained consistent throughout the research phases. The time allocated for each session remained the same as the baseline, and training phases (20-30 minutes). Using task-analysis form/checklist, and the worksheets, data were collected in this phase on the dependent variables (number of correct steps performed per task and number of correct answers per task).

**Maintenance.** One month after the conclusion of the intervention phase, the first researcher administered one maintenance session. Again, the wording of instructions, directions and prompts remained the same as those during baseline, training and intervention. Additionally, the same time allocated for prior phases was provided.

## Results

Data were analyzed and presented according to each of the dependent variable: (a) number of correct answers per task, and (b) number of correct task-analyzed steps performed per task. All data were plotted and graphed for visual inspection. Measure of central tendency "mean" as well as percentage of increase for the mean scores were all calculated. Data were evaluated to determine whether there was a functional relationship between the intervention and dependent variables.

In regard to the impact of VM on the acquisition of money skills, data analyses demonstrated that VM improved the dependent variables for all the participants respectively. Results showed that VM increased number of correct answers per task. Each task involved three functional math problems on the money skills (knowing the currency, its value and when to use it), and participants improved their correct answers during the phases of intervention and maintenance in comparison to baseline. Table 3 displays the mean scores and percentages of increase for the first dependent variable:

**Table (3)**
**Participants Mean Scores on Number of Correct Answers per Task**

| Participants | Baseline | Intervention | % of Increase | Maintenance | % of Increase |
|---|---|---|---|---|---|
| Majed | .33 | 2.8 | 748.485 | 3 | 7.14 |
| Salah | .33 | 2.6 | 687.87 | 2 | -23.07 |
| Abdul | .37 | 2.6 | 602.70 | 2 | -23.07 |
| Fayed | .37 | 2.6 | 602.70 | 3 | 15.38 |
| Ahmed | .15 | 2 | 1233.33 | 2.5 | 25 |
| Naser | .19 | 2 | 952.63 | 2 | 0 |

Data Analysis are presented in alignment with research questions:

**1 - What is the impact of VM on the acquisition of money skills?**

**a) What is the impact of VM delivered via iPads on the number of correct answers per task?**

Data demonstrated that participants improved their mean scores on number of correct answers per task. For example, in group 1 both Majed and Salah improved their baseline mean scores from.33 up to 2.8 and 2.6 during intervention phase with percentages of increase of 748.485, and 687.87 respectively. Majed's mean score during maintenance was improved up to 3 with a percentage of increase of 7.14, and 2 for Salah. For group 2, both Abdul and Fayed increased their mean scores on the same variable from.37 during baseline up to 2.6 with a percentage of increase of 602.70. For group 3, Ahmed and Naser improved their mean scores on the same dependent variable from.15 and.19 up to 2 during intervention respectively. These results indicate that there was a functional relationship between the intervention and performance of the participants and the change in the mean scores due to the intervention. It was also noted that after the delivery of the intervention, performance of those participant during phases of intervention and maintenance never returned to baseline levels.

**b) What is the impact of VM delivered via iPads on the number of correct task analyzed steps performed by the participants?**

When it comes to the second dependent variable, an acceleration of the participants' performance (performing correctly task analyzed steps) was observed. For the first group, Majed improved his baseline mean score of 5.6 up to 10.4 during intervention with a percentage of increase of 85.71 and to 12 during maintenance with a percentage of increase of 15.38. Salah also improved his baseline score for the same variable from 3.6 during baseline up to 9.8 during intervention with a percentage of increase of 172.22, and to 11 during maintenance with a percentage of increase of 12.24. For group 2, Abdul accelerated his baseline mean score from 2.3 up to 10.8 during intervention with a percentage of increase of 369.565, and to 12 during maintenance with a percentage of increase of 11.11. Fayed, in the same group, improved his baseline mean score from 1.5 up to 8.4 during intervention with a percentage of increase of 566.66, and to 11 during maintenance with a percentage of increase of 10. For group 3, Ahmed increased his mean score on the same variable from 1.2 during baseline to 8.4 during intervention with a percentage of increase of 600, and to 11 during maintenance with a percentage of increase of 30.95. In the same group, Naser increased his mean scores from. 53 during baseline up to 7.4 during intervention with a percentage of increase of 1296.226, and to 10 during maintenance with a percentage of increase of 35.13.

**Table (4)**
**Participants Mean Scores on Number of Correct Analyzed Step Performed per Task**

| Participants | Baseline | Intervention | % of Increase | Maintenance | % of Increase |
|---|---|---|---|---|---|
| Majed | 5.6 | 10.4 | 85.71 | 12 | 15.38 |
| Salah | 3.6 | 9.8 | 172.22 | 11 | 12.24 |
| Abdul | 2.3 | 10.8 | 369.565 | 12 | 11.11 |
| Fayed | 1.5 | 10 | 566.66 | 11 | 10 |
| Ahmed | 1.2 | 8.4 | 600 | 11 | 30.95 |
| Naser | .53 | 7.4 | 1296.226 | 10 | 35.13 |

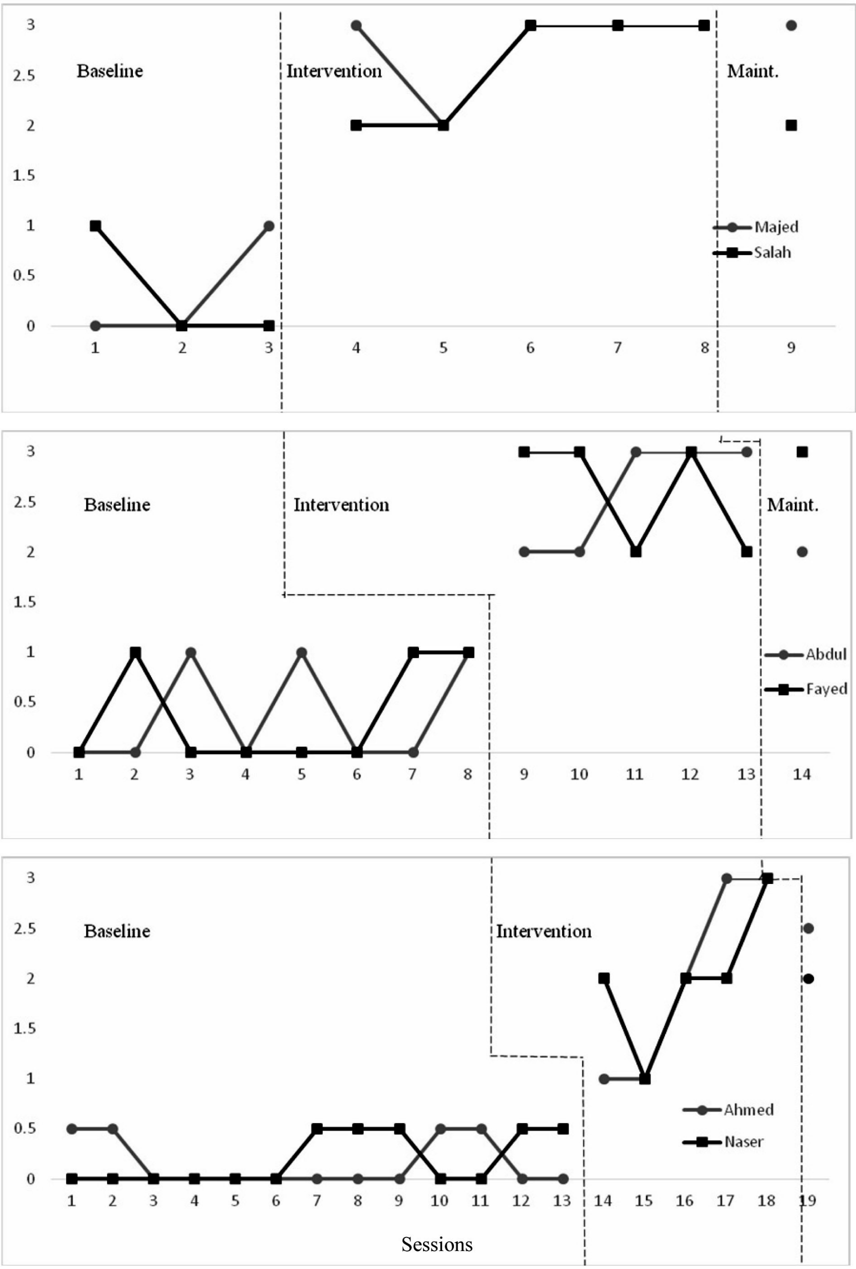


*Figure 1*. Total Number of Correct Answers per Task

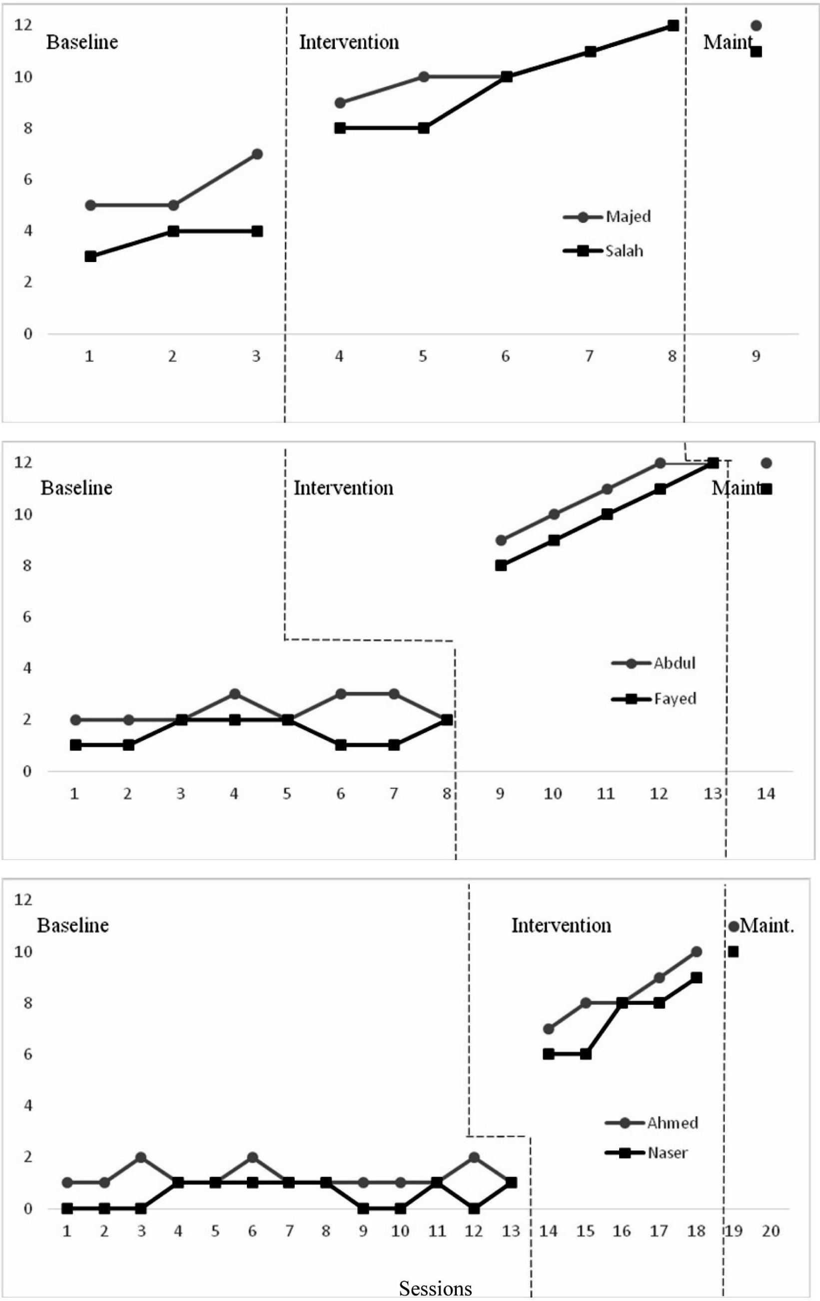


*Figure 2*. Total Number of Correctly Analyzed Step Performed per Task

Figure 1 provides a visual display of six participants' performance on the number of correct answers per task across each experimental phase. Figure 2 provides a visual display of the six participants' performance on the number of correctly analyzed steps performed per task. All students increased the number of correct answers and analyzed steps per task immediately and noticeably. There were no overlapping data points across baseline and intervention phases, suggesting strong treatment effects, while substantial overlapping data in subsequent phases indicate that the effects were maintained.

**Effect Size:** Effect sizes were calculated to further examine the strength of effects measured (Scruggs, Mastropieri, & Casto, 1987). The effect sizes were calculated using the percentage of non-overlapping data (PND). A minimum effect size of not less than 90% is used to document intervention effectiveness and establish functional relationships (Scruggs & Mastropieri, 1998). The PND was calculated for two dependent variables: number of correct answers, and number of correctly analyzed steps performed per task. PND was 100% for all six participants across baseline versus intervention and maintenance phases. This indicates the effectiveness and strong impact the intervention had on the money skill performance of the participants across two variables; thus, the improvements in money tasks were most likely due to the intervention.

**2. How can the intervention help participants in learning money skills (identifying the value, material and figures of the money bill)?**

As discussed above, the intervention helped participants in accelerating their mean scores on the dependent variables. It was noted that the participants improved their learning of money skills such as identifying the value, material and figures of each money bill introduced and taught to them. Through their engagement during instruction and the delivery of the intervention, students could share the knowledge of the money bill value, and the accurate figures and/or material of each money bill. The first researcher noticed that each participant could immediately answer her questions regarding such information on the money bills after the instruction in comparison to baseline.

## Social Validity

3. **In what way is the intervention socially valid to help students gain the needed money skills and maintain them over time?**

The third question of this study is associated with social validity. Social validity is enhanced when the independent variable changes the outcome, and such change is socially important (Horner et al., 2005). Implementing a practical intervention would also enrich the study's social validity (Horner et al., 2005). To determine social validity, an interview with the participants was conducted to derive their perspective of money skills and the use of technology when learning such skills. The interview involved four open-ended questions in which the participants' perspective, impressions and experiences regarding the intervention were explored. It was evident (from the maintenance phase data) that students could maintain the learned money skills one whole month after the delivery of VM. Afterwards, and through the social validity interview, participants indicated strong support for the intervention. The teacher was also involved in the social validity interview to provide his perceptions and talk about his observations of his students' performance.

**Video modeling.** All participants supported the beneficial aspect of watching a video model of a peer teaching them the currency value, its materials and the figure that it involved. Majed stated, for example, that he increased his knowledge and could solve the tasks on the worksheets after watching the model. In his words:

عرفت عن الفلوس، عرفت أن الدينار لونه أزرق و عليه صورة مسجد ورقم واحد.

*I knew about money, I knew one Dinar. Its color is blue and there is a mosque image on it.*

Salah talked about another money bill, and how the peer in the video model helped him in knowing the value of the money bill, and its color. He also discussed how the video modeling was beneficial in helping him how to use the iPad, press the home button, slide over, go to the Notability App (he called it the Pen program), select the worksheets and solve them:

تعلمت من صديقي بالفيديو عن الخمسة دنانير، و أن لونها بنفسجي. صديقي بالفيديو علمني شلون أحل المسائل بالأيباد، أني أطق الدقمة و اختار برنامج القلم وأروح على ورقة العمل وأحل.

*I learned from my friend in the video about five Dinars, and its color is purple. My friend in the video taught me how to solve the tasks on iPad, push home button, select the pen program (Notability app), go to worksheet and solve.*

**Video modeling and iPads.** Participants had positive impression regarding iPads and digital materials used while learning about money skills. Abdul, for example, explained that the tasks on iPads were easier than ones found on paper and pencil worksheets because on iPad he could slide over, seeing all the pages, with clearer colors and more organized tasks. He said:

التمارين سهلين بالايباد، أحب أشتغل بالأيباد لأنه سهل، ألوانه واضحة و حلوة أكثر من الأوراق، الأيباد ما يتعب، سهل.

*Exercises were easy on iPads. I like working on the iPad because it is easy, its colors are clear and nicer than papers. The iPad does not exhaust, it's easy.*

The teacher discussed his perspectives and the change his students achieved in learning the money skills through video model on iPads in comparison to the prior instruction was given to students. He stated that video modeling was an effective tool to teach his students the money skills.

لقد لاحظت انخراط الطلاب بالتعلم، و الذي بدى مغاير تماماً عن خبراتهم السابقة، أجهزة الأيباد هذه جاذبة و مشجعة للغاية! نموذج الفيديو كان واضحا للغاية، يشرح للطلاب خطوة بخطوة مهارات النقود و من ثم كيفية حل أوراق العمل على الأيباد .

*I noted the students' engagement in learning, and that seemed totally different from their prior experiences. These iPads are so motivational and attracting! The video model was very clear, explaining step by step the money skills and how to solve the worksheets on iPad.*

## Discussion

The need of learning money skills is an essential aspect in individuals' lives, including those with significant cognitive disabilities. Learning functional math, including money skills such as knowing money bill value (Browder & Grasso, 1999), is crucial to help individuals with significant cognitive disabilities such as those with ID and DS be more self-dependent and autonomous when dealing with buying and selling goods, living their daily lives more independently.

Consequently, this study investigated the effectiveness of VM that was supported and enhanced with the use of iPads (tablet devices) to deliver the VM on the money skills (performances) of six students with significant cognitive disabilities including intellectual disabilities and Down Syndrome. Results suggested that the participants increased their number of correct answers per task after the training and the delivery of VM. Participants engaged in an overt learning experience in which they acquired the money skills such as knowing the money bill value, the materials and how to correctly place them in the problems provided in each task. Participants also improved their step analyzed performances when solving those problems starting from how to use the tablets, watching the VM up to going to the correct app (Notability), using all its needed features (the coloring pens, highlighting/circling) and selecting their named worksheets to answer them. These results were consistent with prior research of Delano (2007) and Hart and Whalon (2012) which demonstrated the effectiveness of VM on the learning engagements of students with significant cognitive disabilities. This result also align with prior research of (Marcus & Wilder, 2009) and (Mechling & Hunnicutt, 2011) in which noticeable changes in students' money skills performances were perceived after the delivery of VM. Results also suggest that VM when delivered through iPads improve the students answers per tasks on the money skills. The VM approach demonstrated a very clear, systematic method to answer the worksheets, starting from opening the iPads, answering the worksheets up to closing the iPads, and keeping them in their cases. These steps increased the students' self-regulation skills on how to use the iPads to solve the tasks in more effective and efficient manner. Teaching self-regulation skills is highly recommended for all students including those with cognitive disabilities. Students will be able to accelerate their abilities in regulating their work, efforts, or even actions by monitoring their performance, instructing themselves and reinforcing their own successful positive behaviors (Schunk, 2012). Thus, self -monitoring is essential in developing and promoting behavioral and academic performance (Harris, Friedlander, Saddler, Frizzelle & Graham, 2005).

When it comes to the technology aspect, the use of handheld devices such as iPads for delivering VM and answering the worksheets was an innovative approach per se for both students and their teacher.

Participants such as Abdul, Salah, Majed and Ahmed shared with the first researcher that they do have an iPad at home, yet they usually use it for watching cartoons, TV series on YouTube. They stated that they have never used such devices for school work such as math. Such devices were engaging and motivating participants for more work and involvement during money skills learning.

## Recommendations

The current study came up with multiple recommendations, including:

1 - Future research is recommended on video modeling, and the use of iPads, especially in other areas of functional math including: estimating volume or distance and telling time to increase the body of research and help practitioners improve their instructional endeavors in teaching students with significant cognitive disabilities.

2 - Benefiting from the present study results in improving the instruction of students with significant disabilities.

3 - Technology, represented in the use of iPads could be a way to reduce motivational and/or physical challenges students with significant cognitive disabilities might encounter when experiencing traditional learning. More particularly, the use of Notability app to type, highlight or select the correct answers when doing the task, giving more options for the participants to answer would increase their opportunities to respond and motivate them for more engagement in that activity.

4 - The use of evidence-based strategies such as VM for students with significant cognitive disabilities would improve those students' endeavors when learning multiple skills including functional math such as money skills.

5 - In and pre-service teachers should be well prepared and trained on how to use appropriate instructional tools when teaching students with special needs, including significant cognitive disabilities. Using instructional approaches that were proven in research as effective would help in accelerating students' learning and their chances in absorbing new knowledge.

# تأثير "نمذجة الفيديو" في تدريس "مهارات النقود" للطلبة ذوي العجز الفكري المعتدل

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## الملخص

تتناول هذه الدراسة أثر استخدام النمذجة عن طريق الفيديو التعليمي الذي تم عرضه عن طريق الأيباد على اكتساب مهارات الرياضيات الوظيفية، وتحديداً مهارات النقود، من قبل الطلاب ذوي الإعاقات المعرفية الشديدة. أجريت الدراسة على ستة من التلاميذ ذوي الإعاقة العقلية الشديدة باستخدام منهج دراسة الحالة الواحدة متعدد الخطوط القاعدية. تم الكشف عن مدى فاعلية برنامج التدخل على اكتساب مهارة النقود من قبل المراهقين ذوي متلازمة داون. وأشارت نتائج البحث الى أن المشاركين قد طوروا من مهارات النقود لديهم بعد إيصال الفيديو التعليمي عن طريق الأجهزة اللوحية (الأيباد). كما خلصت الدراسة الى عدد من التوصيات ومقترحات لأبحاث ودراسات مستقبلية.

## REFERENCES

1 - Alberto, P., Cihak, D., & Gama, R. (2005). Use of static picture prompts versus video modeling during simulation instruction. **Research in Developmental Disabilities**, 26(4), 327-339.

2 - Allen, K., Wallace, D., Renes, D., Bowen, S., & Burke, R. (2010). Use of video modeling to teach vocational skills to adolescents and young adults with autism spectrum disorders. **Education and Treatment of Children**, 33(3), 339-349.

3 - American Psychological Association [APA]. (2013). **Diagnostic and statistical manual of mental disorders:** DSM-5. VA: Author.

4 - Apple, A., Billingsley, F., & Schwartz, I. (2005). Effects of video modeling alone and with self-management on compliment - giving behaviors of children with high functioning ASD. **Journal of Positive Behavior Interventions**, 7(1), 33-46.

5 - Ayres, K., Langone, J., Boon, R., & Norman, A. (2006). Computer-based instruction for purchasing skills. **Education and Training in Developmental Disabilities**, 41(3), 253-263.

6 - Bandura, A. (1969). Social-learning theory of indentificatory processes. In D. A. Goslin (Ed.), **Handbook of socialization theory and research** (pp. 213-262). IL: Rand McNally.

7 - Bellini, S., Akullian, J., & Hopf, A. (2007). Increasing social engagement in young children with autism spectrum disorders using video self modeling. **School Psychology Review**, 36(1), 80-90.

8 - Bellini, S., & McConnell, L. (2010). Strength-based educational programming for students with autism spectrum disorders: A case for video self-modeling. **Preventing School Failure**, 54(4), 220-227.

9 - Blum-Dimaya, A., Reeve, S., Reeve, K., & Hoch, H. (2010). Teaching children with autism to play a video game using activity schedules and game embedded simultaneous video modeling. **Education and Treatment of Children**, 33(3), 351-370.

10 - Browder, D., & Grasso, E. (1999). Teaching money skills to individuals with mental retardation: A research review with practical applications. **Remedial and Special Education**, 20(5), 297-308.

11 - Buggey, T. (2005). Video self-modeling applications with students with autism spectrum disorder in a small private school setting. **Focus on Autism and Other Developmental Disabilities**, 20(1), 52-63.

12 - Buggey, T., & Hoomes, G. (2011). Using video self-modeling with preschoolers with autism spectrum disorder: Seeing can be believing. **Young Exceptional Children**, 14(3), 2-12. doi:10.1177/1096250610395872

13 - Carr, J. (2012). Does math achievement happen when iPads and game based learning are incorporated into fifth-grade mathematics instruction? **Journal of Information Technology Education: Research**, 11(1), 271-286.

14 - Charlop, M., Carpenter, M., & Greenberg, A. (2010). Teaching socially expressive behaviors to children with autism through video modeling. **Education and Treatment of Children**, 33(3), 371-393.

15 - Christ, T. (2007). Experimental control and threats to internal validity of concurrent and non-concurrent multiple baseline designs. **Psychology in the Schools**, 44(5), 451-459. doi: 10.1002/pits.20237

16 - Cihak, D. (2011). Comparing pictorial and video modeling activity schedules during transitions for students with autism spectrum disorders. **Research in Autism Spectrum Disorders**, 5, 433-441. doi: 10.1016/j.rasd.2010.06006

17 - Cihak, D., & Schrader, L. (2008). Does the model matter? Comparing video self-modeling and video adult modeling for task acquisition and maintenance by adolescents with autism spectrum disorder. **Journal of Special Educational Technology**, 23(3), 9-20.

18 - Collier-Meek, A., Fallen, L., Johnson, A., Sanetti, L., & Delcampo, M. (2012). Constructing self-modeling videos: Procedures and technology. **Psychology in the Schools**, 49(1), 3-14. doi: 10.1002/pits.20614

19 - Corbett, B. (2003). Video modeling: A window into the world of autism. **The Behavior Analyst Today**, 4(3), 1-11.

20 - Delano, M. (2007). Improving written language performance of adolescents with Asperger syndrome. **Journal of Applied Behavior Analysis**, 40(2), 345-351.

21 - Furnham, A., & Argyle, M. (1998). **The psychology of money.** NY: Routledge.

22 - Harris, K., Friedlander, B., Saddler, B., Frizzelle, R., & Graham, S. (2005). Self-monitoring of attention versus self-monitoring of academic performance: Effects among students with ADHD in the general education classroom. **The Journal of Special Education**, 39(3), 146-156.

23 - Hart, J., & Whalon, K. (2012). Using video self-modeling via iPads to increase academic responding of an adolescent with autism spectrum disorder and intellectual disability. **Training in Autism and Developmental Disabilities**, 47(4), 438-446.

24 - Horner, R., Carr, E., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single subject research to identify evidence-based practice in special education. **Exceptional Children**, 71(2), 165-179.

25 - Huck, S. (2012). **Reading statistics and research.** MA: Pearson Education, Inc.

26 - Johnston, J., & Pennypacker, H. (1993). **Strategies and tactics of behavioral research.** NJ: Erlbaum.

27 - Jowett, E., Moore, D., & Anderson, A. (2012). Using an iPad-based video modeling package to teach numeracy skills to a child with an autism spectrum disorder. **Developmental Neurorehabilitation**, 15(4), 304-312.

28 - Kagohara, D., Sigafoos, J., Achmadi, D., O'Reilly, M., & Lancioni, G. (2012). Teaching children with autism spectrum disorders to check the spelling of words. **Research in Autism Spectrum Disorders**, 6(1), 304-310.

29 - Kazdin, A. (2011). **Single-case research designs: Methods for clinical and applied settings**. NY: Oxford University Press.

30 - Kellems, R., & Morningstar, M. (2012). Using video modeling delivered through iPods to teach vocational tasks to young adults with autism spectrum disorders. **Career Development and Transition for Exceptional Individuals**, 35(3), 155-167. doi: 10.1177/0885728812443082

31 - Laarhoven, T., Winiarski, L., Blood, E., & Chan, J. (2012). Maintaining vocational skills of individuals with autism and developmental disabilities through video modeling. **Education and Training in Autism and Developmental Disabilities**, 47(4), 447-461.

32 - Maddumarachchi, J. (2015). Using video modeling and video self-modeling to teach money handling skills to adolescents and young adults with Down syndrome. Retrieved from https://ir.canterbury.ac.nz/bitstream/handle/10092/11393/thesis_fulltext.pdf?sequence=1&isAllowed=y

33 - Maione, L., & Mirenda, P. (2006). Effects of video modeling and video feedback on peer-directed social language skills of a child with autism. **Journal of Positive Behaviors Interventions**, 8(2), 106-118.

34 - Marcus, A., & Wilder, D. (2009). A comparison of peer video modeling and self-modeling to teach textual responses in children with autism. **Journal of Applied Behavior Analysis**, 42(2), 335-341.

35 - McGivney, C. (2013). Taking notes: Notability & paperport notes. **The Charleston Advisor**, 14(4), 26-32.

36 - Mechling, L., & Hunnicutt, J. (2011). Computer-based video self-modeling to teach receptive understanding of prepositions by students with intellectual disabilities. **Education and Training in Autism and Development Disabilities**, 46(3), 369-385.

37 - Mechling, L., Pridgen, L., & Cronin, B. (2005). Computer-based video instruction to teach students with intellectual disabilities to verbally respond to questions and make purchases in fast food

restaurants. **Education and Training in Developmental Disabilities**, 40(1), 47-59.

38 - Mitchell, T., & Mickel, A. (1999). The meaning of money: An individual-difference perspective. **The Academy of Management Review**, 24(3), 568-578.

39 - National Council of Teachers of Mathematics [NCTM]. (2002). **Principles and standards for school mathematics.** VA: Author.

40 - New Zealand Ministry of Education [NZME]. (2013). Money skills for life. Retrieved from http://www.education.govt.nz

41 - Ozen, A., Batu, S., & Birkan, B. (2012). teaching play skills to children with autism through video modeling: Small group arrangement and observational learning. **Education and Training in Autism and Developmental Disabilities**, 47(1), 84-96.

42 - Paterson, C., & Arco, L. (2007). Using video modeling for generalizing toy play in children with autism. **Behavior Modification,** 31(5), 660-681. doi:10.1177/0145445507301651

43 - Pierangelo, R., & Giuliani, G. (2012). **Assessment in special education: A practical approach.** NJ: Pearson Education, Inc.

44 - Plavnick, J., & Ferreri, S. (2011). Establishing verbal repertoires in children with autism using function-based video modeling. **Journal of Applied Behavior Analysis**, 44(4), 747-766.

45 - Scheflen, S., Freeman, S., & Paparella, T. (2012). Using video modeling to teach young children with autism developmentally appropriate play and connected speech. **Education and Training in Autism and Developmental Disabilities**, 47(3), 302-318.

46 - Schunk, D. (2012). **Learning theories: An educational perspective.** MA: Pearson Education, Inc.

47 - Scruggs, T., & Mastropieri, M. (1998). Summarizing single-subject research: Issues and applications. **Behavior Modification**, 22, 221-242.

48 - Scruggs, T., Mastropieri, M., & Casto, G. (1987). The quantitative synthesis of single- subject research methodology and validation. **Remedial and Special Education**, 8(2), 24-33.

49 - Shane, H., Laubscher, E., Schlosser, R., Flynn, S., & Abramson, J. (2012). Applying technology to visually support language and communication in individuals with autism spectrum. **Journal of Autism & Developmental Disorders**, 42(6), 1228-1235.

50 - Walter, D. (2014, October 13). Review: Notability for mac brings ink to the desktop [Web log post]. Retrieved from https://www.macworld.com/article/2604340/review-notability-for-mac-brings-ink-to-the-desktop.html

51 - Watson, P., & Workman, E. (1981). The non-concurrent multiple baseline across- individuals design: An extension of the traditional multiple baseline design. **Journal of Behavior Therapy and Experimental Psychiatry**, 12, 257-259.

52 - Wert, B., & Neisworth, J. (2003). Effects of video self-modeling on spontaneous requesting in children with autism. **Journal of Positive Behavior Interventions**, 5(1), 30-34.

53 - Westling, D., Fox, L., & Carter, E. (2015). **Teaching students with severe disabilities.** NJ: Pearson Education Inc.