The Impact of Video-Modeling on the Engagement of a Student with Autism Spectrum Disorder

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Abstract

The purpose of this study was to examine the impact of video-modeling on engagement of a student with Autism Spectrum Disorder. This was a six-week case study broken down into three cycles that measured the number of prompts as well as the amount of time a student with ASD required to complete a vocational task. After initial baseline data was collected, video-modeling was introduced using an iPad. The student then used video-modeling to assist with completion of three different vocational tasks. The researcher used a data-collection chart to record the number of prompts and total time the student required each day. The findings revealed that engagement was slightly higher at the end of each cycle when compared with engagement at the beginning of each cycle. The use of video-modeling benefitted the participant in this study, but investigations should continue with a larger group.

CHAPTER I

INTRODUCTION

Overview

According to the Centers for Disease Control and Prevention (CDC, 2014), Autism Spectrum Disorder (ASD) is a developmental and lifelong disability that may cause significant impairments in social, behavioral, and/or cognitive functioning. Consequently, these individuals communicate, behave and learn differently than their typically developing peers. The most recent national statistic indicates that one in sixty-eight children are diagnosed with ASD, and in Maryland the number is closer to one in sixty . Even as these numbers increase, general educators have limited background knowledge on instructing and supporting students with ASD. Many special educators and service-providers are limited by ineffective and obsolete technology to assist these students as well. While there is increasing professional development in the area of technology in instruction, there is a lack of discourse on how to use technology to engage students with ASD.

Students with ASD often face difficulties in academics, social skills, and life skills (Mintz, 2013) leading to inappropriate behaviors, social isolation, and dependence on others. The use of traditional interventions and outdated technology has left students with ASD with insufficient opportunities to succeed in school. Subsequently, individuals with ASD suffer in their adult lives due to inability to find and retain employment, live independently, and maintain personal relationships.

The researcher has experience working with students with ASD and noticed an ongoing problem with engagement for these students. Because of the significant impact ASD has on receptive and expressive communication, many of these students are unable to engage in their own education (Edyburn, 2013). The primary concern is that students with ASD are missing valuable education and life-skills training because they do not have access to effective interventions. With the increasing availability of technology in schools, the researcher had an interest in studying the impact of using technology as an intervention for a student with ASD.

Statement of Problem

The purpose of this case study was to examine the impact of video-modeling on an iPad on the engagement of a student with ASD working on vocational tasks.

Hypothesis

The researcher proposed a null hypothesis in which the use of video-modeling on an iPad will have no impact on the engagement of the student with ASD.

Operational Definitions

The independent variable was video modeling of behavior which was implemented via iPad. The dependent variable was engagement which was measured as number of prompts and time required to complete a task. Prompts used in the study were limited to verbal and were recorded when the participant was off task for more than five seconds or was unable to complete the task correctly. The researcher used a timer to monitor and record the total time it took the participant to complete the vocational task.

CHAPTER II

REVIEW OF THE LITERATURE

This literature review examines the engagement of students with Autism Spectrum Disorders (ASD) and the interventions used to increase engagement. Section one investigates behaviors of students with ASD that interfere with engagement as well as relative strengths that can be used for intervention. Section two reviews traditional strategies and technological interventions used to improve engagement of students with ASD. Section three discusses handheld and portable technology as an intervention for these identified students.

Characteristics of Students with ASD

As the incidence of ASD increases in the United States, there is abundant research relating to the condition. It is generally accepted that ASD is a lifelong disability that impairs individuals primarily in the areas of social and life skills (Mintz, 2013). Due to these deficits, many people with ASD are unable to find and maintain jobs or to establish an independent lifestyle. Additionally, students with ASD are overly dependent on adults (teachers, paraeducators, and assistants) and are alienated from their peers (Boswell, Knight,& Spriggs, 2013). The presence of stereotypes, repetitive behaviors, and overreliance on adult assistance all contribute to lack of success for students with ASD (Carlile, Reeve, Reeve, & DeBar, 2013).

Each individual with ASD is unique. However, there are characteristics that can be considered typical within the population. Social interactions are a primary issue for students with ASD which impacts them in numerous ways. Individuals with ASD often have an aversion to face-to-face interactions (Wilson, 2013). Additionally, students with ASD have difficulty processing verbal requests and understanding and following oral directions (Mintz, 2013). Consequently, students have difficulty not only succeeding but even participating in the traditional education system in which teachers give a direction (often verbally) and students demonstrate understanding by completing a task. The social repercussions of this deficit area are more pronounced as students with ASD are unable to complete tasks in the same manner or in a comparable time-frame as their peers (Edyburn, 2013). In some cases, individuals are unable to interact with others or communicate verbally at all (Kozloff, 2007). The consequences of these deficits, however mild or severe, limit the engagement of students with ASD.

Another common characteristic for individuals with ASD is the presence of sensory processing issues. It appears that these students often overreact or focus too much attention on extraneous information or stimuli (Kozloff, 2007). Additionally, verbal stimuli tend to overwhelm students with ASD (Mintz, 2013). Because of this sensory overload, students with ASD have more difficulty sitting in their seat, looking at their work or the speaker, and asking for help (Edyburn, 2013). When considering the traditional classroom environment and expectations, this overreaction to the environment has the potential to interfere with engagement for individuals with ASD.

Another area in which students with ASD are deficient is self-management. These students often lack the ability to self-monitor on-task behavior and time-on-task. Thus, these students rely heavily on prompting from adults and are consequently isolated from their peers (Boswell et al., 2013). Without prompting or training, Mintz (2013) points out that these students may not even be able to recognize that their behaviors cause a problem and are unmotivated or unable to make changes to resolve the issue. Without the ability to adjust behaviors or possibly even to recognize behaviors as inappropriate, students with ASD are often off task and are unable to complete tasks correctly.

While many characteristics of those with ASD seem quite challenging, there are areas of relative strength that can be used to an educator's advantage. For example, Shane et al. (2012) report that these students often have natural strengths in visual processing. Because of the deficits in language in general, students with ASD benefit not only from visual cues but also from reduced verbal demands as well as access to screens such as monitors, tablets, or televisions (Wilson, 2013). Additionally, individuals with ASD have shown positive response to behavior analysis and training using repetition, clear expectations, and reinforcement (Kozloff, 2007). These relative strengths can be used to develop appropriate and effective interventions for students with ASD.

Traditional Technological Interventions for Students with ASD

The use of technology in special education and with students with ASD is not a new development. There are innumerable ways educators can use low, mid, and high assistive technology and strategies that have both benefits and limitations.

The initial use of assistive technology can be considered no-tech or low-tech and was designed specifically for communication purposes. Due to the significant impairments in language that are typical to individuals with ASD, this was a crucial development that supports participation and engagement from these students. Included in initial assistive technology devices are paper communication boards with symbols that require students to point or exchange manipulatives to communicate (Shane et al., 2012). These communication boards can be used for expressive and receptive communication. Specifically, the teacher can use them to convey routine, reminders, and reinforcement while the student can use them to communicate responses, identify symbols, or indicate a want or need (Oakley, Howitt, Garwood, & Durack, 2013). Beyond these low-tech devices, mid-tech assistive technology has been used as well. This is defined by Bouck et al. (2012) as text-to-speech software, screen magnifiers, and word-prediction. With the development of portable speech generating devices, the use of high-tech devices was launched (Shane et al., 2012). By quite literally giving students with communication disorders a voice, students with ASD were given a tool with which to engage themselves in their own education.

The traditional use of assistive technology is certainly beneficial for individuals with ASD. Even the lowest-technological devices such as paper point-based system provide students with a way to communicate simple thoughts, ideas and feelings that was not available to them previously (Shane et al., 2012). By creating a system individualized for the user, specific routines, reminders, visual aids, and personal interests were included allowing the individual a personalized communication system (Oakley et al., 2013). Finally, with the creation of speech generating devices, not only can these individuals communicate, they are able to communicate using a system similar to their typical peers.

While the traditional uses of assistive technology for individuals with ASD are beneficial and still hold a place in education, there are still many drawbacks that should be examined. Paper-based communication boards are extremely time-consuming. Educators are required to personalize, create, print, laminate, cut, and organize the picture cues that make up the communication system (Shane et al., 2012). Considering how personal preferences change as well as current schedules, events, requirements, and academic specific vocabulary, maintenance becomes another time consuming task expected of the teacher. With the creation of more technology-based devices, the amount of time required is reduced, but the expense increases as the assistive technology becomes more high-tech. Portable speech generating devices require specialized software and expansions in addition to the initial cost of the hardware itself. McGrath

(2013) points out that a traditional communication device costs roughly the same as twenty-four smart phones. Lastly, these traditional assistive technological devices tend to further stigmatize individuals with ASD particularly those of schooling age. A paper-based communication board must be carried between all settings and is not used by typical peers. A speech generating device is also used only by a small percentage of school-aged children and is cumbersome to carry and transport. As Shane et al. (2012) point out, individuals may resent this stigmatization and therefore be less likely to use the communication system. While the device may have the capability to increase student engagement, if it is heavy, expensive, and stigmatizing, the effects may not be as powerful as educators would hope.

Use of Handheld Technology as an Intervention

After highlighting the limitations of traditional assistive technology, it is clear that there is the need for the availability and use of less expensive, cumbersome, and stigmatizing technology to increase engagement of students with ASD. Additionally, handheld technology appeals in particular to individuals with ASD and has the potential to promote positive outcomes on overall success with these students.

Handheld technology is not limited since the use of this technology by society changes rapidly. Shane et al. (2012) define “consumer level tools” as devices that alleviate the issues of traditional assistive technology including portability, expense, availability, and adherence to social norms. Examples of consumer level tools are laptops, cell phones, tablets, and mp3 and mp4 players. All of these examples are entirely portable and are significantly less expensive than traditional assistive technology. Bouck et al. (2012) point out that traditional devices used for communication or life skills can take months to become available while devices such as cell phones can be ready for use within days. Additionally, these devices have the capability to hold and even organize numerous images, files, and sounds minimizing the amount of time teachers must spend on completing this task manually. Finally, these handheld devices are carried by the majority of the population eliminating the stigma originally attached to the use of assistive technology.

Many of these handheld devices used as assistive technology appeal directly to the strengths and address the many needs of individuals with ASD. Because students with ASD are visual learners, they are highly interested in interaction with screens (Shane et al., 2012). Once the program is individualized to include personal preferences and items of interest, students with ASD become even more engaged with the activity. Additional strengths for students with ASD are the attention paid to visual prompts and tactile opportunities (Boswell, et al., 2013). The use of video modeling and devices with touch-screens increase engagement by applying these areas of strength. Areas of deficit for students with ASD include organization and decision-making. The use of accessible, socially acceptable apps and programs focusing on organization, planning, and monitoring on handheld devices alleviate many issues that accompany these two areas of need. Finally, students with ASD experience high stress when social or face-to-face interactions are required (Alt & Moreno, 2012). With the use of handheld devices, these interactions are limited, reducing the amount of anxiety students experience overall. This also addresses the reliance students with ASD have on adults such as paraprofessionals by increasing independence (Kagohara et al., 2013).

Overall, the use of handheld technology allows individuals to engage in their education and acquire skills that would otherwise be difficult as best and impossible at worst. By using the technology, Edyburn (2013) points out that students are able to supplement or compensate for their disabilities by completing tasks that they otherwise could not. Motivation is a main factor in the use of handheld technology with students with ASD. It serves to increase attention, task completion, as well as attainment, retention, and generalization of skills according to Wilson (2013). One study showed that using handheld technology increased curiosity, attention, behavior, and time on task in individuals with ASD with the participants remaining attentive for 97 percent of the time when using computers (Alt & Moreno, 2012). Kagohara et al. point out that handheld technology can be used beyond academic skills and behavior to teaching independence in life skills, job skills, ability to transition, leisure skills, and communication (2013). In a study using and iPod touch with students with ASD, Carlile et al. (2013) were able to fade adult prompts and even adult presence completely while participants made significant improvement in completion of activity schedules as well as time on task. This study is evidence of the potential use of handheld, affordable technology on the engagement of students with ASD. Finally, with the use of handheld technology lending itself to increased independence, there is significant impact on self-confidence and sense of community students with ASD feel when meeting with success while using technology used by their peers and society (Campigotto, McEwen,& Denmans Epp, 2013).

Summary

This literature review discussed identifying characteristics of ASD, traditional approaches to assistive technology for students with ASD, and the use of handheld and portable technology as intervention for students with ASD. By examining the benefits and limitations of traditional assistive technology in congruence with the behaviors that negatively impact the engagement of students with ASD, the use of handheld technology as an innovation is an important area for educators, parents, and service providers to examine in order to allow students with ASD the opportunity to engage and meet with success in the classroom while being an active member of their community without stigmatization or embarrassment.

CHAPTER III

METHODS

The purpose of this case-study was to examine whether or not the use of video modeling on an iPad would impact engagement of a student with Autism Spectrum Disorder.

Design

The independent variable was the use of video modeling on an iPad. The dependent variable was the engagement of the student with ASD. Engagement was measured by the number of prompts required and time used to complete a vocational task as recorded in a data-collection log during the duration of a vocational task. The task started simple and increased in complexity as the student demonstrated improvement. The researcher collected data over a six-week period.

Participants

The participant in this case study was a 14-year old boy with an Autism Spectrum Disorder. He was a student in a public middle school in Baltimore County, Maryland where he participated in a self-contained special education program that focused on academics as well as functional and life skills. The student's teachers and parents both indicated the need for vocational skills training embedded in his school day. The student expressed interest in performing various vocational tasks throughout the building including sweeping floors and wiping down lunch tables. The student was selected based on his identification as a student with ASD as well as his educational concentration on life skills.

Instrument

The instrument was a classroom-based data-collection log. The log included one baseline measurement recorded before the introduction of the iPad-based video-modeling, as well as three subsequent cycles consisting of 10 days each. For the baseline and all cycles, the researcher recorded the amount of prompts required and the time required to complete the task on a daily basis.

Procedure

To collect baseline data, the researcher provided verbal instructions to the student that he should, “Fold and sort the laundry.” The task was to sort and fold wash cloths and towels from a basket. The researcher began a timer after the direction was given. The researcher then provided verbal prompts in the form of repeated directions to the student as needed. A prompt was provided if the student was off task for a period longer than five seconds. The researcher recorded the number of prompts used as well as the total time it took the student to complete the task in the “baseline” area of the data-collection log.

To begin cycle one, the researcher introduced three video models on the iPad. The participant was familiar with how to operate an iPad. He was able to use an iPad independently to access applications, videos, and pictures. He also indicated that he preferred watching videos to direct instruction from a teacher. The first video demonstrated how to fold washcloths. The second video demonstrated how to fold towels, and the third video demonstrated how to sort washcloths and towels by color and size. Instruction from the researcher included how to access the videos, how to play and replay the videos, and how to progress through the series of videos. The student was then given time to view each video twice in sequence.

After viewing each video twice, the researcher gave the same verbal direction as was given for the baseline (“Fold and sort the laundry”) and started a timer. As the student worked on the task, the researcher provided verbal prompts to revisit the videos as needed if the student was off task for more than five seconds or was unable to complete the task correctly. The researcher recorded the number of prompts used. When the task was completed, the researcher recorded the total time it took the participant to complete the task.

For the remainder of cycle one, the student began each session by reviewing the videos twice and attempting the task while the researcher prompted and recorded information as previously described.

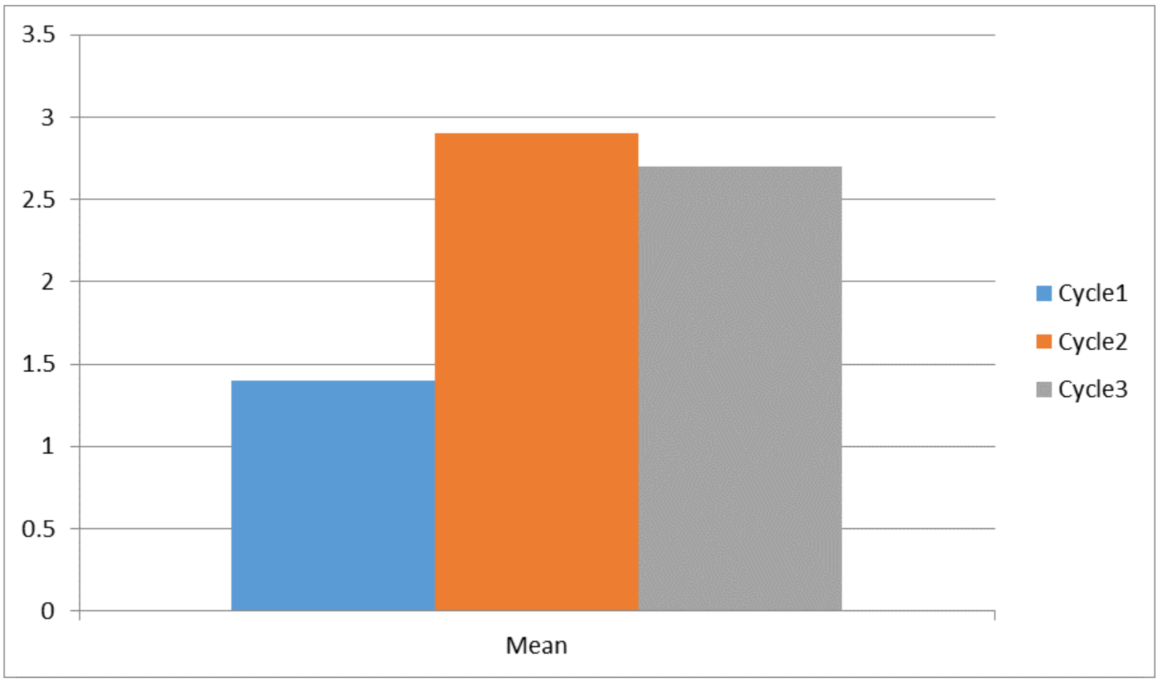
At the end of cycle one, the researcher determined that the student had made progress as indicated by the reduction of prompts and time to complete the task. As a result, the researcher increased the difficulty of the task. Cycle two consisted of the student folding t-shirts using the video-modeling system as in cycle one. Then after cycle two, the participant again demonstrated progress. Cycle three required the student to fold aprons.

CHAPTER IV

RESULTS

The purpose of this case study was to determine if the use of video-modeling had an effect on the engagement of a student with ASD. Analysis of the data indicated differences between the three cycles in the areas of prompts and time required to complete the task. The subsequent figures compare the three cycles' statistics.

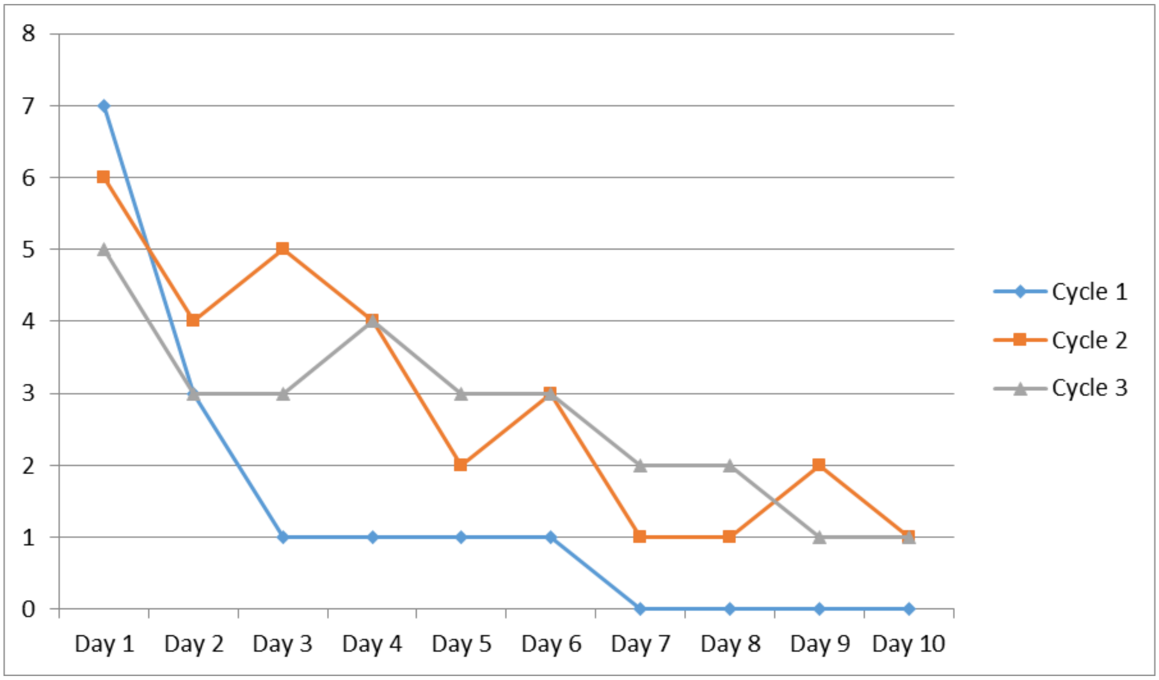
Figure 1: Mean Number of Prompts



When comparing results of cycle one (m = 1.4) and two (m = 2.9), there was a significant difference between the mean number of prompts, $t(9) = -3.5$ $p < .05$. Similarly, when comparing results of cycle one (m = 1.4) and three (m = 2.7), there was a significant difference between the mean number of prompts, $t(9) = -2.9$ $p < .05$. However, when comparing results of cycle two (m = 2.9) and three (m = 2.7), there was no significant difference between the mean number of prompts, $t(9) = .61$ $p = .55$.

When examining the number of prompts required within each cycle, however, there is a negative trend indicating that the number of prompts needed decreased over time. (See Figure 2).

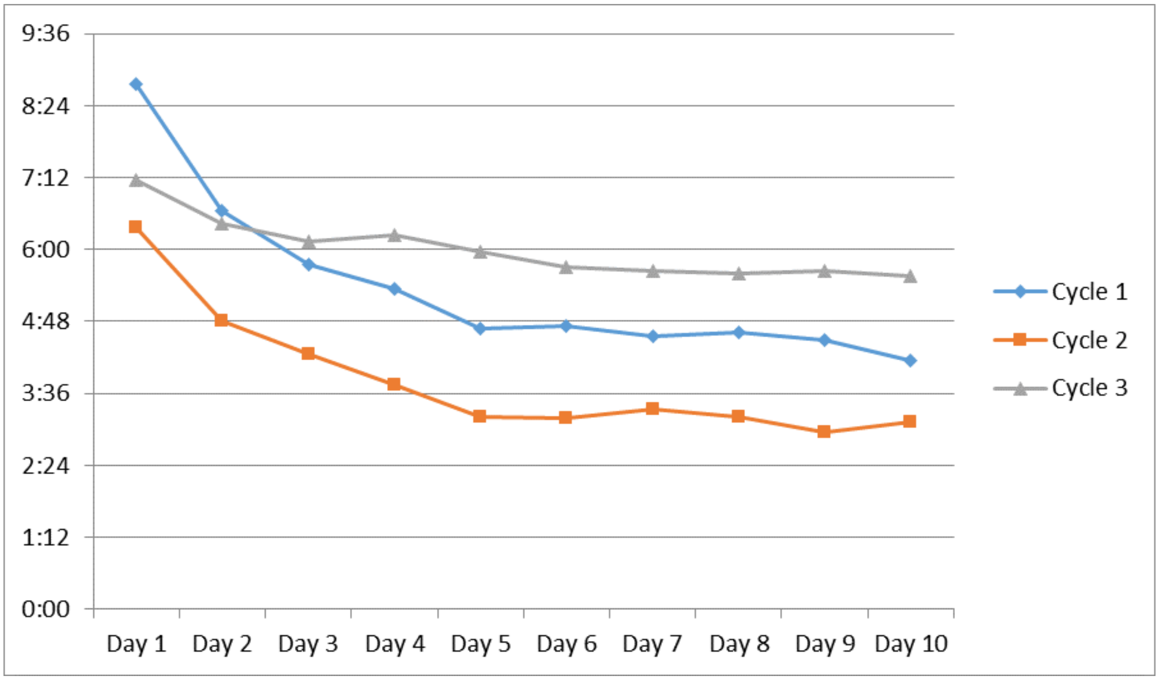
Figure 2: Prompts Required Within Cycles



When comparing mean minutes and seconds of cycle one (m = 5:22) and two (m = 3:49), there is a significant difference between the mean amount of time, t (9) = 13.26 $\underline{p} < .05$. When comparing results of cycle two (m = 3:49) and three (m = 6:06), there is again a significant difference between the mean amount of time, t (9) = -11.47 $\underline{p} < .05$. However, when comparing results of cycle one (m = 5:22) and three (m = 6:06), there is no significant difference between the mean amount of time, t (9) = -2.18 $\underline{p} = .057$.

When examining the amount of time required within each cycle there is a noticeable negative trend indicating that the amount of time needed decreased over time. (See Figure 3).

Figure 3: Time Required Within Cycles



CHAPTER V

DISCUSSION

This case study intended to investigate the impact, if any, video-modeling had on the engagement of a student with ASD. The findings previously discussed in Chapter IV did not support the null hypothesis because there were significant differences between the mean number of prompts and total time needed to complete assigned tasks. Additionally, when comparing individual dates within each cycle, the null hypothesis was rejected as there was a decline in the number of prompts as well as time needed to complete the task.

IMPLICATIONS OF RESULTS

The results indicate that while there were significant differences amongst the cycles, the trend in mean prompts was in a counterintuitive direction. The mean number of prompts in cycle one was the lowest ($m = 1.4$), while cycles two ($m = 2.9$) and three ($m = 2.7$) were clearly higher. The increase from cycle one to cycle two and the difference between cycle one and cycle three is most likely due to the complexity of the tasks. Since cycle one was a relatively simple task, the student required fewer prompts than with the more complex tasks in cycles two and three.

However, when examining the clinical results from the study, there is a noticeable reduction of prompts within each cycle. At the onset of cycle one, the student required seven prompts. By day three he reduced the number of prompts he needed to one and for days seven through ten he did not require any prompts. Similar reduction in prompts was seen in cycle two from six prompts on day one to one prompt on day ten, and in cycle three from five prompts on day one to one prompt on day ten. This decline in prompts within each cycle indicates that he was able to complete the task with less direct instruction and support. Thus, he improved his ability to complete a task with more independence.

THREATS TO VALIDITY

As with any single-subject case study, the results are limited to the participant in the study. In this case, there was no random selection since the participant was the researcher's student. The lack of random selection, as well as the use of only one participant, create low external validity and therefore prevent the researcher from generalizing to a population.

An additional threat to validity in this case study is that maturation happens naturally. The student decreased the number of prompts and time within each cycle, but it can be argued that this improvement was a result of practice and not the use of video-modeling.

CONNECTIONS TO PREVIOUS STUDIES/EXISTING LITERATURE

There are connections between this case study and previous studies involving individuals with ASD and the use of technology. Students with ASD often display low levels of engagement and become overly dependent on adults and prompting (Mintz, 2013). In this study, the student demonstrated improvement in his engagement as shown by the reduction of prompts and time needed to complete vocational tasks within two-week cycles. Mintz points out that without some sort of intervention, students with ASD often are unaware that they are off-task until they receive a prompt. In this study, the participant initially required numerous prompts but with the use of video-modeling as an intervention, he was able to reduce and eliminate the number of prompts he required. Kozloff (2007) reports that many individuals with ASD have also responded well to repetition, training, and clear expectations, similar to the participant in this study. An example of this is from Carlile et al. (2013) in which the researchers were able to remove adult prompting and presence completely based on improvements in the participants' engagement. While these results cannot be used to generalize that the use of video-modeling is beneficial to all individuals with ASD, the outcomes of each study are clinically helpful for educators, parents, and related service-providers.

IMPLICATIONS FOR FUTURE RESEARCH

The results of this case study reveal a few implications to consider in future research. To begin, there was only one participant in the study which inherently limits generalization. In future research, a larger group should be selected. Additionally, the researcher in this case study did not include enough baseline information as an oversight. In future research, a more thorough collection of baseline data would provide more statistically accurate results. Other factors to consider include threats to validity as discussed previously. In future research, the complexity of the task must be considered and possibly avoided to ensure the data between cycles is, in fact, comparable. Maturity is the other threat to validity that must be considered. In the future, researchers must consider that practice tends to increase ability to complete a task and that this has an impact on the outcome in addition to the use of the video-modeling.

CONCLUSIONS/SUMMARY

The results of this case study were statistically significant and did not support the null hypothesis. Additionally, clinical analysis indicates that the student did benefit from the use of video-modeling. This information cannot be used as a research base since it was a single-subject case study, but it provided insight therapeutically that will benefit the participant. This student clearly improved engagement and independence in the assigned tasks while using the video-modeling system.

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