The Effects of the Assistive Technology Tool, Picture Sentence Key on the Expressive Language Skills in Children with Disabilities

Mary Catherine Engle
The College at Brockport
The Effects of the Assistive Technology Tool, Picture Sentence Key, on the Expressive Language Skills in Children with Disabilities

by

Mary Catherine Engle

May 13, 2006

A thesis submitted to the
Department of Education and Human Development of the
State University of New York College at Brockport
in partial fulfillment of the requirements for the degree of
Master of Science in Education
The Effects of the Assistive Technology Tool, Picture Sentence Key, on the Expressive Language Skills in Children with Disabilities

By

Mary Catherine Engle

APPROVED BY:

Advisor

2nd Reader

Director, Graduate Studies
Table of Contents

Chapter One: Introduction.................................................................................1

Chapter Two: Review of Literature.................................................................8
  Laws and the Government Are Requiring More Use of Assistive Technology.....8
  Assistive Technology is Being Used to Help Children With Disabilities........11
  Expressive Language Can be Affected in Children With Disabilities..........14
  More Research is Needed..............................................................................16

Chapter Three: Methodology ........................................................................18
  Participants.................................................................................................18
  Procedure..................................................................................................19
  Data Analysis.............................................................................................22

Chapter Four: Results.....................................................................................23
  Descriptive Statistics..................................................................................23
  Inferential Statistics...................................................................................23

Chapter Five: Discussion................................................................................25
  Limitations..................................................................................................25
  Summary.....................................................................................................31

References......................................................................................................33

Appendix: Table 1..........................................................................................35
  Table 2........................................................................................................36
Abstract

The purpose of this study was to investigate if the amount and quality of expressive language in children with disabilities increase or decrease as a result of assistive technology, (focused on hardware and software) that is individualized to the needs of each child. To obtain information about this topic, the researcher reviewed literature and gathered evidence on the language skills of four elementary students with disabilities through pre and post language samples during a play situation. Pre and post language samples were used to assess any increases in the students’ expressive language while using the assistive technology software, Picture Sentence Key (version 2.0) during a span of three weeks. Results suggest improvements in expressive language in half of the students who took part in this study. The findings of this study may be helpful to teachers who work on assistive technology programs with their young students with disabilities. There still needs to be more research to investigate how assistive technology can help the expressive language of students with disabilities and further enhance the outcomes of their learning.
Introductions

As a human I am able to express my thoughts, feelings and desires through the use of expressive language. Expressive language can be how a person communicates both verbally and nonverbally. Nonverbal communication can range from the smirk on a face, to the lowering of the eyes, to the furrow of the brow. When communicating with another individual, I can use the person's nonverbal language to help myself perceive what that individual may be thinking or feeling. I would then use verbal communication along with nonverbal to be able to clearly express how I may feel or show certain wants, providing reasoning behind my behaviors. To help understand an individual's character, I feel I am consciously or/and unconsciously perceiving their expressive verbal and nonverbal language.

When I try to put into perspective how much verbal communication an individual must need to use during a day, throughout a week or even over a month, the events are numerous. I begin to realize how vital a person's verbal skills may be when entering a workplace or educational setting as well as routine daily needs, such as grocery shopping, asking for directions or thanking a person for holding the door for them. I then think of an individual who may have difficulty with their verbal skills, whether it is trouble verbally communicating or difficulty expressing what are they thinking. The daily interactions and verbal skills that were mentioned above can be frustrating and challenging for a person who has trouble with communication, which may hinder his or her way of life in society.

I find that a person who is unable to use verbal communication effectively (with the exception of individuals who use sign language as a way of communicating) may have difficulties being able to function in today's society. There are individuals who find
trouble understanding expressive language, affecting how they may speak and sound, and
verbalize a feeling or a want. A person may find difficulty in being understood because of
problems such as their voice quality, articulation or stuttering. There are areas of
expressive language where a person may not know how to socially communicate.
Individuals may find themselves struggling with the appropriate words or phrases for
certain situations. Some verbal language most people take for granted and use frequently
when communicating, such as introducing themselves or greeting a person, do not always
come naturally for others.

I believe the people who find trouble with communication skills are not less
capable but instead may have a condition which may inhibit progress in language. This
population may consist of people who have disabilities, with examples such as mental
retardation, speech and language impairments, learning disabilities and autism. A
person’s expressive language may be affected by certain disabilities and they cannot pick
up verbal communication, which others may find to come more easily.

I am aware of how a person’s difficulty using verbal communication can impact
their social communications skills, relationships, career options and future goals. I feel
these problems can be prevented or at least helped when the person is still young, when
expressive language is still being learned and mastered. Helping a person pick up needed
language skills at an early age seems more logical than allowing someone to continue to
have difficulty with language skills without any proper intervention.

I think it is possible that one reason a person doesn’t always benefit from proper
intervention is because the curriculum is not modified to his or her needs. I feel that the
main problem does not lie solely with the person with a disability, but also with the
Assistive Technology for Expressive Language

providers, educators whose duties are to provide the best learning alternatives for this individual. There is then, the challenging role of making sure people with communication related disabilities are able to receive appropriate help. This is especially important to be aware of when working within an educational atmosphere.

I am an educator who is currently working towards a Master's degree in Special Education. I have a certification in childhood education and want to venture into the field of special education to gain broader knowledge about all students. I know each classroom contains a diversity of learners and there cannot be solely one way to teach all learners. Each child deserves to be given the best quality education whether they may have a disability or not. Each child is at their own level of learning so, therefore, I recognize the need to differentiate learning by various strategies within an educational setting. I feel one way to individualize the way a person with communication difficulties can learn skills in language is through the use of technology.

I see the advances in technology and how society is continually adapting to it. There are currently hardware and software programs available to aid individuals with specific disabilities, called assistive technology. Assistive technology can be "any item, piece of equipment, or product-whether acquired, commercially or purchased off the shelf and modified, or customized-that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities" (Kochhar, C., West, L. & Taymans, J, 2000, p. 127). Assistive technology gives the educator the opportunity of being able to use designed software and/or hardware to help increase the learning of students, such as those with expressive communication difficulties. My question then arises: Does the amount and quality of expressive language in children with disabilities increase or
decrease as a result of assistive technology intervention (focused on hardware and software) that is individualized to the needs of each child?

My current internship is at an elementary school, working within a developmental primary program, where all students possess varying levels of difficulties with expressive language, due to their type of disabilities. Some of the students are able to spend the majority of the time in their general education class while the others are still working towards making the transition into their general education classroom. The transition for these students is a carefully planned process. Each student’s needs are unique and it cannot be easily determined how long the transition may take. What I have noticed is how these students struggle with their usage of expressive communication. I feel an intervention using assistive technology will help these students acquire skills in expressive communication, which will help them socially and ease their transition into a general education atmosphere.

Children who have trouble with expressive language may have difficulty adapting to certain curriculum and social situations within a classroom. Without having specialized instruction and other resources, like specialized educators, they will fall behind their peers both educationally and socially. Assistive technology is made specifically to serve a student with a certain disability. Different types of software and hardware are used to function as tools that will help students remain on course with their other peers, like Braille and translators. I feel specific software can be used to help students build on skills that will help them with their expressive language, making an improved difference on how they respond to academic situations, as well as social.
I should not only be well aware of the effectiveness of assistive technology but also the increasing use of it in students' Individual Education Programs (IEPs). Assistive technology is being placed more and more on students' IEPs, having certain goals and objectives for its use. The educator should accomplish these goals by providing the best resources for the particular student. According to the Individuals with Disabilities Education Act (IDEA), 1997 amendments, "it requires that students be placed into the least restrictive environment..." (Kochhar, C., West, L. & Taymans, J, 2000, p. 53). Assistive technology can help provide a bridge for students to be able to adapt to the least restrictive environment they belong in.

I have the opportunity to do research and conduct a study towards learning whether assistive technology can make an improvement in these students' expressive language skills. I plan to gather information on their current levels of language skills through data, conversation during play situations and observations with the students. I will introduce students to a type of assistive technology, which will be geared towards strategies that can improve expressive communication. I, or another staff member, will train the students on how to use the hardware and software. The subjects will then work on this device through stations for about three weeks.

The assistive technology tool will be chosen based on its qualification that are geared towards language skills. The type of software will be chosen based on the capabilities and individual needs of each student. Assessments will be used throughout the study to view what progress is being made. Two assessments will be used to compare the language skills of the subjects at the beginning of the study with those skills at the end.
My goal is to show an increase in the expressive communication skills of the students tested, due to the integration of assistive technology. I feel assistive technology can be an influencing factor in the improvement of a person’s expressive skills. There should be an increased change of skills or an improvement when comparing the assessments at the beginning of the research to the final assessments. It will then be assumed that any improvement in skills in expressive language from the use of the assistive technology tool will not continue if the use of the assistive technology tool is stopped. My study will only assess the effects of one assistive technology tool on improving expressive communication. The study will only focus on expressive language gains and not on improving academic type skills or the quality of work of the participant when using the assistive technology tool.

I envision not only that assistive technology will provide positive gains for children with communication disorders, but will also result in increasing the knowledge of assistive technology by the general educators. For assistive technology to be effective, I plan to take prior steps before implementing it into instruction or as an aid for a student. First, I would analyze the needs of the student and then research available assistive technology that is designed to fit these needs. The process of researching and reviewing is important towards finding effective assistive technology that has proven credible and educationally based. Once I have found the appropriate assistive technology, I must review the instructional manuals so I am familiar with how to use it so I will be able to instruct a student on it. These steps will help provide the best learning opportunity for a particular student and help turn a teacher into a more effective educator.
I visualize that my research might intrigue other educators to integrate assistive technology into their curriculum. I feel that the value of expressive communication in society is so crucial that educators need to take the initiative to find innovative ways to integrate communication skills into their students' curriculum. Educators need to understand their central roles in increasing the development of expressive communication in their students by exposing them to assistive technology.
Review of Literature

The researcher’s intent is to explore the problems of individuals who struggle with using expressive language. Their struggles can be due to unlearned skills or the difficulties may be related to a certain disability they may have. The difficulty of the person being able to express himself or herself verbally may then create trouble with the way they function in daily living and also impact their future roles in society. Inclusive educators need to find strategies to give these individuals advantages to help them overcome barriers, which hinder their process of learning language. These advantages will then further advance their opportunities of establishing a better quality of their expressive communication. To find solutions to this problem, the question is presented: does the amount and quality of expressive language in children with disabilities increase or decrease as a result of assistive technology (focused on hardware and software) that is individualized to the needs of each child?

In reviewing updated literature that is aimed to answer this question regarding assistive technology, there arise three prominent themes: First) Laws and the government are requiring more use of assistive technology. Second) Assistive technology is being used to help children with disabilities. Third) Expressive language can be affected in children with disabilities.

Laws and the Government Are Requiring More Use of Assistive Technology

The government has recognized the benefits of assistive technology and established laws to further the use of these learning tools, establishing in 1988 the Technology-Related Assistance for Individuals with Disabilities Act, known as the Tech Act. The fundamental goal “of the Tech Act was to provide financial assistance to states
to help them develop consumer-responsive, cross-age, and cross-disability programs of technology-related assistance” (Bryant & Seay, 1998, p. 2). This act recognizes the importance of technology assisting individuals, thus providing the best opportunities and benefits for a person with a disability.

The Tech Act was further revised in 1995. The revision enlarged the mandates of the existing act. “The Tech Act in 1989 provided grants to nine states, it was not until 1995 that all states received funding” (Bryant & Seay, 1998, p. 5). Even though the Tech Act was passed in 1988, it appeared to take years before it became recognized and began to be put into use by all states.

To make sure the states carried out the appropriate type of funding for assistive technology “Congress in 1988 allocated financial resources to states for the establishment of statewide projects that would be responsible for improving each state’s AT service delivery system” (Bryant & Seay, 1998, p. 5). Even with these added changes there have been individuals who feel the act has neglected their needs, which has caused, “a corresponding increase in the number of court cases involving access to assistive technology” (Bryant & Seay, 1998, p. 11).

The states have taken steps to try to advance the process of making assistive technology an addition to the education of students with disabilities by providing resource centers which can provide information. “Many states have established assistive technology centers or resource programs and can be located by contacting a state department of special education or early childhood education division...or technology resources are available through the Alliance for Technology Access Centers” (Judge, 2000, p. 129).
The continual promotion of the usage of assistive technology has been included in
the revision of the 1997 Individuals with Disabilities Education Act (IDEA). This Act
“further identified assistive technology as a special factor that must be considered by
each individualized education plan (IEP) team” (Judge, 2000, p. 125). Even with the
Tech Act, individual planning steps for each state and the straight out affirming of
assistive technology being used through the 1997’s IDEA, there have been problems
getting the funding for assistive technology. “Funding under IDEA and the Tech Act is
available for use in supplying technology-related needs; but with shrinking budgets and
limited resources, it is increasingly difficult for funding sources to process all the requests
for assistive devices” (Judge, 2000, p. 127).

Even if some schools are able to have access to assistive technology, there is the
concern of whether or not these devices are being used and if they are used for purposeful
reasons. “Studies show rates of technology abandonment ranging from 8-75%, depending
on the type of device” (access and funding). The reasoning behind this broad percentage
range can be due to “various reasons, ranging from children outgrowing particular
assistive devices to professionals determining what they think is appropriate as opposed
to listening to child and family preferences” (Judge, 2000, p. 126).

Have these laws successfully created a positive use of assistive technology? Do
budget constraints and the large percentage range of student abandonment of assistive
technology dictate that states take a closer look at the process of determining student
need? Is there a process of researching a type of assistive technology before placing it on
a child’s IEP, making sure it fits the needs for the child as well as being useful in school
and/or home settings?
Assistive Technology is Being Used to Help Children With Disabilities

With certain laws and regulations being put into place through the government, there has been more use of assistive technology to aid children with disabilities. There are numerous types of software and hardware that can be assigned through a child’s IEP to help them with specific needs and goals. Some examples of assistive technology being used include hardware such as switches, voice synthesizers, intellikeys, and computers to software like reading and math programs.

The basis of having a student use assistive technology is to confirm that they have the understanding and capacity to use the specific tool. When Schepis, Reid, Behrmann and Sutton (1998) did a study on children with autism using voice output communication aids to increase communication interaction, they first needed to be provided with “descriptive information about each child’s communicative and interaction skills, as well as each child’s most preferred food, items, and activities” (p. 564). These researchers needed to analyze the interest and skills their participants possessed before selecting a VOCA for each student. The students were able to use the VOCA devices as a way to communicate during play and snack routines. The researchers found that the “children displayed an increase in communicative interactions during the VOCA and naturalistic teaching condition, relative to baseline in each classroom routine” (p. 569).

Once a student grasps how to use a certain assistive technology, they are then able to use the tool for its purpose. In a study by Reynolds and Fucci (1998) which compares children that possess different skills in language, with how they comprehend DECTalk synthetic speech found that, “as all listeners become more familiar with synthetic speech, they are able to process the synthetic speech cues more automatically, leaving more
cognitive resources available” (p. 458). Thus, for the assistive technology to be in effective use by the student, there needs to be knowledge and understanding from both the student and the teacher. In Schepis, Reid, Behrmann and Sutton’s study mentioned above, it was discovered that “it is also likely that increases in staff communicative interactions were due to the ease in understanding the children’s VOCA communication and subsequent staff responses to the VOCA activations” (p. 567).

Students may not be as receptive to using assistive technology if they had prior negative experiences. They just might not like the type of tool. While Reynolds and Fucci’s (1998) study showed results of listeners being able to understand and adapt to the type of technology they were using, not all users may find all assistive technology user-friendly. There may be the chance of some individuals experiencing frustration when trying to use a type of assistive technology. During research on using speech recognition technology, Cavalier and Ferreti (1996) noticed, “some possible drawbacks to the use of this technology...including a client’s frustration with system errors, fatigue from producing speech, and inaccurate recognition as a result of ambient background noise” (p.81).

Not only does a student need to learn how to use the assistive technology they were assigned to, he or she must also understand how it will be incorporated in his or her daily life. Some assistive technology may be used throughout a student’s life, like a VOCA box or perhaps a pair of glasses and they must learn to use them in all their various settings. Other assistive technology may only be used for a specific time or content areas, such as reading and writing programs or during a center time.
After an assistive technology device is chosen and understood by a student and staff, it then needs to show a positive effect on the student’s learning and/or daily living. In research and studies there have been positive effects of the use of assistive technology for children with special needs. Researchers (Lancioni, Singh, O’Reilly & Oliva, 2003) studied how optic micro switches can be useful for students with profound multiple disabilities. These researchers found the optic micro switches helped increase the students’ responses to stimuli and let them achieve more control over their environmental stimulation (Lancioni, Singh, O’Reily & Oliva, 2003). This study shows how assistive technology can be so helpful for that group of students where they then gained more control over their life. In another study by Hetzroni, Rubin and Konkol (2002), a study was conducted to see how assistive technology can help girls with Rett syndrome be able to identify symbols. These researchers noted “that girls with Rett syndrome are capable of matching spoken words to symbols when provided with meaningful instruction...Yet, it is important to note that across time all of the girls learned to identify symbols, and started to use them after the research as part of their classroom instruction” (p. 66-67).

The above studies have mentioned the benefits assistive technology can have on an individual’s learning as well as socialization. Assistive technology appears to bring advantages to the classroom but with bringing in these tools may also introduce time constraints. When studying how assistive technology affected literacy in a preschool classroom, Beck (2002) discovered that having children use a certain software on the computer, one they may even like, took a few weeks for each student to understand how the system worked and then they had to take turns with the technology and had limited use (Beck, 2002). Some types of assistive technology may take some time for an
individual student to understand its use and learn how to use it within its targeted situation.

Assistive technology is also being used as a gateway for promoting more socializing between students with disabilities and their peers. In a study of using peer networks to help social-communicative behaviors for students with autism and their peers, researchers Garrison-Harrell and Kamps (1997) had the students use augmentative communication systems as a part of their study. The researchers found, “The findings from this investigation indicate that peer networks including communication systems are a functional, effective intervention for students with autism in public school settings” (p. 253).

While Garrison-Harrell and Kamps (1997) study found the use of assistive technology to help aid with peer communication, Schepis, Reid, Behrmann and Sutton (1998) found different results. According to Schepis, Reid, Behrmann and Sutton (1998), although the VOCA was used effectively by the children with classroom staff, “the use of the device did not facilitate communicative interactions among children” (p. 577). The researchers have also mentioned that peer interactions may have had different results if peers with no language impairments were present (Schepis, Reid, Behrmann & Sutton, 1998).

Expressive Language Can be Affected in Children With Disabilities

Depending on the type of disability a person may have, it can have an impact on their communicative and language learning skills. The characteristics of certain disabilities may cause a person to have difficulty pronouncing and understanding the sounds and grammar of language, have trouble with the fluency of their speech or not
understanding the social cues of common communication. A person who may struggle with some kind of language type of barrier may also have trouble in other areas as well.

To see how speech impairments have an effect on literacy, researchers Leitao and Fletcher (2002) did a follow-up study on a study that looked at the literacy skills of five to six year olds with speech impairments. In this study, the current literacy skills of 14 students from the original study at ages 12-13 years were assessed. What Leitao and Fletcher (2002) discovered from this follow-up study was that, “The long-term follow up of a small group of subjects has provided further evidence that speech disorders characterized by non-developmental error processes and associated with difficulties at the level of phonological representation place a child at greater risk of difficulties with acquiring literacy skills” (p. 254). Leitao and Fletcher’s (2002) study can give insight toward how a person’s speech impairments may continue to have negative effects on future learning, specifically geared toward literacy type areas.

Researchers Conti-Ramsden and Botting (2004) studied 11-year-old children with specific language impairments and analyzed for any correlations towards having social difficulties and victimization. Conti-Ramsden found that “The majority of the children with language difficulties were experiencing problems with social and behavioral aspects at 11 years of age” (p. 152). Early childhood and childhood educators need to be aware of, and sensitive to, the possible social and behavioral needs of students with certain language difficulties. If it’s detected that an individual needs guidance for social and/or behavioral needs, the educator should seek interventions towards helping the individual work on those needs.
To further investigate how language type disabilities may affect a person’s behaviors, another study was reviewed by Vallance, Cummings and Humphries (1998). These researchers set out to study the risk for problem behavior in children with language learning disabilities (LLD) by testing two groups of children, a group of children with language learning disabilities and a controlled group of children without language learning disabilities. What Vallance, Cummings and Humphries (1998) discovered from their study was, “The identification of communicative skills and social competence as salient mediators suggests that compromised higher order social processing skills, as opposed to lower order primary processing deficits (i.e., impaired syntax and semantic language development), are what ultimately affect the behavioral functioning of children with LLD” (p. 167). This study then supports the notion of how the ongoing difficulty in language may increasingly affect a person behaviorally, as well possibly emotionally.

More Research is Needed

Through reviewing the literature, the researcher has recognized that because of the laws created by the government there has been a greater awareness of provided assistive technology for individuals with specific needs. The ongoing, updated regulations of IDEA have also made assistive technology as a required option when designing an individual’s IEP. The Tech Act has made sure each state will have funding so it is possible for each student to receive the appropriate tools if they may have a specific assistive technology listed on their IEP.

What still remains a question is if these laws provided by the government have really made a significant difference in increasing the quality of assistive technology within the schools. The Tech Act still seems to still be in the process of fully following its
main intentions of providing proper funding to the states, even after more than a decade after being enacted. If states may have trouble providing proper funding for assistive technology due to difficulties in the budget, then it is questionable if all students are receiving the best quality of assistive technology requested on their IEPs. If funding is not a problem there still remain issues of whether students are being provided the best assistive technology to match their needs and if the assistive tools are being properly implemented.

With further venturing into whether assistive technology is being properly implemented, there is also the question of whether or not the assistive technology is making an impact on the individual. Assistive technology is intentionally made to provide better assistance and quality of learning to individuals with special needs. There seems to be research that provides examples of individuals using assistive technology, but not as much information on what impact the assistive technology may have on a specific area.

The researcher sees a need of selecting appropriate assistive technology that is chosen after analyzing the needs and goals of the individual. After the appropriate assistive technology is selected, the researcher then sees a need of investigating the effects the tools has on meeting the special learning goal or that individual. The researcher’s study seems useful towards finding if the amount and quality of expressive language in children with disabilities increases or decreases as a result of assistive technology (focused on hardware and software) that is individualized to the needs of each child.
Methodology

The study consists of examining the effects of assistive technology on the expressive language skills of children with disabilities. The researcher hypothesizes that assistive technology can help increase the quality of expressive language in children with disabilities. The study is action research, which seeks to find if assistive technology contributes to improvements in the expressive language for children who have difficulties in communication.

Participants

The study focuses on six K-third grade students, all with disabilities. Of these six students, the researcher received parental permission forms for four students to be participants for the study. The study’s population is taken from a public elementary school with a population of 507 students in grades K-five, with five percent of the students having Individual Education Plans. The students are all part of a self-contained Developmental Program, a setting that is designed to help their special needs.

The study’s participants are volunteers and may withdraw from participating at any time without any loss of rights or privileges. Any data or information pertaining to any specific individual will then be removed from the study. Participants’ real names will not be used at any time in the study. The only documentation which reveals the participants are the consent forms, which will not be attached to the study but kept in a secured place. All information and data taken from the study will be disposed of within three years of the date the study begins.
**Procedure**

The researcher is planning on gathering pre and post language samples on a play situation and recording daily observational reflections in the journal. Data will be collected throughout the period of time of use of the assistive technology tool, Picture Sentence Key (Mayer-Johnson Inc., version 2.0).

The researcher discussed with one of the school’s speech pathologists what parts of the student’s speech should be evaluated when conducting the language sample. It was decided the best areas to assess are the students’ usage of verbs and nouns. The number of words the student uses throughout the language sample will also be recorded.

There will be a ten-minute language sample taken on each participant, conducted by the researcher. The language sample will document all the language used by the subject during the ten-minute span of free play. All of the student’s language will be recorded, word for word during this sample. The language sample will be taken while the student is engaged in a structured play situation with the researcher or a school staff member (speech, pathologist, special educator or paraprofessional). In the structured play situation, the participant will be playing with a magnetic board of an indoor house, containing magnetic household items and people. This language sample will be used as a type of assessment of the student’s expressive language skills.

The next step will be to have the students use a specific software (Picture Sentence Key) to work on creating correct sentences. The Picture Sentence Key (version 2.0) software helps students create simple sentences through the use of visuals, animation and a voice synthesizer. The Picture Sentence Key (version 2.0) software is designed with three levels of difficulty. Each level increases the length of the sentence the student
creates. The Easy level has two categories for the noun and verb. The student must choose from a list that can range from one to eight pictures and decide which ones will make a correct sentence. The Medium level has three categories for the noun, verb and subject. The Hard level then proceeds into three categories, the noun, subject and total amount of words used. At the last level, the student will create a simple sentence, such as “The boy is feeding the dog.”

When creating a sentence the participant will say aloud the words and sentences involved. The researcher will monitor and help students through this process, if needed. The students will work on this software once a day for ten minutes, four days a week. The participants will work on the Picture Sentence Key (version 2.0) Software for three weeks, for a total of twelve, ten-minute sessions each. If a participant happens to miss a session due to scheduling conflicts or illness, they will make up the missed session on the following day. Therefore, the time spent on the software may take more than three weeks for all 12 sessions to be completed. Because of time constraints of the study, the sessions will stop completely after four weeks, even if participants were not able to take part in all 12 sessions.

For the first week, the participant will start at the Easy level. The researcher will increase the number of pictures the participants can choose from as the week progresses and as the students have better ease with the software. The researcher will also vary the types of pictures the students will use each day, to present more vocabulary.

The participants will then move on to the Medium level of the program when the second week begins. They will then work at the Hard level of the software for the third week. The researcher will vary the types of pictures used in the program to increase the
learning of different sentences in the program in the same way as the researcher did in the first week. If any participants find trouble using the software as the levels get harder, the researcher will provide any needed guidance during a session. The participants will still continue moving on to the next level, as planned.

Anecdotal notes will be kept on each participant regarding his or her work during each Picture Sentence Key (version 2.0) session. An assistant, paraprofessional or special education teacher, or the researcher will record a reflection on each participant’s use of the software and progress, following each individual session.

This information will be used to assess the assistant’s or the researcher’s perceptions of the participants’ progress, comparing the results of their final language sample to the first language sample. The recorder will be the person who works one on one with the participant during a given session. The recorder will write observational information about how the student is responding to the software. The recorder will assess how well the student is able to use the program and create correct sentences. They will also write down how they feel the student is doing when re-saying the words and sentences aloud. The recorder can also write down any information they see throughout the participants’ school day that is relevant to the project, such as an increase in social communication with peers or adults.

Another language sample will be conducted at the end of the 12 sessions. The same procedures will be used for the final language sample as were used in the first language sample. This sample will also take place within the self-contained classroom. The participant will be assessed in a similar play situation to look for any increase in their expressive communication.
This language sample will then be analyzed using the same criteria as the pre-language sample. After data is recorded and sorted, the researcher will analyze the two sets of data from both language samples, possibly with the guidance of the speech pathologist. The researcher will graph the data to compare any increase or decrease in the number of specific parts of language the participate uses in the two language samples. The reflection journal will then be reviewed and analyzed to compare the observers’ perceptions of the participants’ progress compared to the actual performance on the language samples.

Data Analysis

The researcher will compare the pre and post language samples by the number of nouns, verbs, and total number of words used between the two language samples. The pre and post language samples hold validity of participants’ use of expressive language by recording the number of nouns, verbs and total number of words they use during both language samples. These two variables, the pre and post language samples’ results, will be computed using a Paired-Sample T-Test. Reliability will be shown by The Paired-Sample T-Test which will be computed through the SPSS program. A bar graph of the data will then be formulated to visually display change, if any, between the two variables.
Results

The researcher’s intent was to explore the difficulties of individuals who struggle with using expressive language. This study questioned: Does the amount and quality of expressive language in children with disabilities increase or decrease as a result of assistive technology, (focused on hardware and software) that is individualized to the needs of each child?

Reliability was not computed. The validity of the study was made by a panel of three experts in the field of special education who determined that the method of measuring studied progress was applicable.

Descriptive Statistics

The frequencies, means and standard deviations (N=four) of the data collected are shown in Table 1.

Inferential Statistics

Statistical analysis was performed using the Paired-Sample T-Tests. No significant differences were found for verbs (t = -. 935, p > .05), nouns (t= -. 386, p> .05), and total words (t= -. 551, p> .05).

Even though the statistical results were not at a significant level, the data still suggested improvements in expressive language in half of the students who took part in this study. The researcher also made observational notes in the reflection journal, indicating improvements of verbal usage of participants while using the Picture Sentence Key (version 2.0) software throughout the three weeks that the program was implemented. The researcher noted growth in expressive language in each participant,
making gradual gains in fluency and frequency when repeating the sentences they made while using the software.
Discussion

The researcher wanted to explore the difficulties of individuals who struggle with using expressive language. The research question that was formed from this problem was: Does the amount and quality of expressive language in children with disabilities increase or decrease as a result of assistive technology, (focused on hardware and software) that is individualized to the needs of each child? The researcher set forth to seek answers to the question by having students with communication related difficulties use the software, Picture Sentence Key (version 2.0) to find, if any, improvements in their expressive language. To be able to determine an increase or decrease in the students' expressive language, the researcher conducted individual pre and post language samples on each student during a ten-minute play situation. The language samples were taken before and after the three weeks of sessions the students spent using the Picture Sentence Key (version 2.0) software. Through data collection, no significant differences were found.

Limitations

The researcher found limitations with the small number of participants. There were only four participants who took part in the study. They were all from a suburban school, grades kindergarten through third. Even though the panel of experts found the study to be valid, the small pool of participants reduced the chances of obtaining significant differences. A larger group of participants was not possible due to the inaccessibility of obtaining a larger amount of participants with similar needs within the school the study took place. A larger pool of participants would require the study to go beyond one classroom to perhaps a district wide pool. The small number of participants
may then not provide a large enough sample to be able to compare the two variables, the assistive technology software and its effect on expressive communication.

The researcher also discovered other variables that may be placed into consideration when analyzing the results. All students had communication-related difficulties, but each had specific disabilities that differed from each other. When assessing the communication skills of a student with special needs there are many factors to consider such as functioning levels and social skills. The researcher saw differences in the mastery and performance between individuals when using the Picture Sentence Key (version 2.0) as the sessions progressed. As the study was set up, the researcher had all participants work on the same activities for each session and would go on to the next higher-level all at the same time. The researcher felt some students could have benefited from spending more time on certain parts of the software before progressing on, while others could have advanced on the program, at a faster pace.

The software may be more beneficial towards helping an individual's expressive language depending on the specific disability or disabilities they may have. While there was no significance found within the results of the study, the researcher did note that while half of the participants showed little or no improvements in communication skills, two of the students' expressive communication skills did show gradual improvements over the course of the three weeks as documented in journal notes and in the post test results. The pre and post test results are shown in Table 2. One of these participants has autism and the other has mental retardation.

To provide consistency within the study, similar play situations were set up for each participant during their pre and post language samples. The play situation that was
set while the language samples were taken appeared to be engaging and matched the interest of the majority of the participants in the study. However, the researcher observed that one participant might have benefited from a different situation. This may have caused an effect on the quality of language the student used during the play situations. During the play situations the researcher also took note of distractions occurring within the classroom setting that may or may not have affected the participants while the language samples were being taken. Instruction was going on with other classmates, students were transitioning to different activities and other students were involved in play situations. These factors also caused noise levels to occur in the classroom as the language samples were occurring; talking, laughing, etc. The researcher felt while observing students in play situations, they showed certain emotions such as curiosity or restlessness that could be connected to the distractions occurring in the classroom. These limitations may or may not have affected the results of the language samples.

In this study, the researcher did come across similar obstacles that were found in Beck's (2002) case. For Beck, it took time for the students to understand how to use the assistive technology appropriately. Beck also found the students to have limited use of the assistive technology because of inaccessibility. The researcher found it took extra planning to be able to fit ten-minute sessions of the assistive technology software into each participant's daily schedule. The four participants within this study each have individual special needs; each has their own unique schedule of their daily specials and related services. To be able to carry out the study, students needed to have the free use of a computer, as well an assistant or the researcher to guide and supervise them during their use of the software. The researcher believes that in order to carry out this process
properly, there needs to be an educator who is capable of providing an organized and planned system for delivering types of assistive technology for students. In a classroom where a teacher is regularly using assistive technology to aid the learning of the students and not for any research purposes, it may be possible to extend the use of the technology tools over longer periods of time and be able incorporate assistive technology within instruction.

During research conducted by Cavalier and Ferreti (1996), they noticed the possibilities of individuals becoming frustrated when using some types of assistive technology. After each session done by the participants when using the Picture Sentence Key (version 2.0) software, the researcher recorded observational notes in a journal. In journal entries, the researcher noted a few times when the participants appeared to become frustrated with the software. Most instances would be when a participant was not completing sentences correctly; usually occurring after they had started a more difficult level of the program. Either an assistant or the researcher was always present to be able to provide guidance to the participant so they understood how to use the program. Either an assistant or the researcher was able to help the participant with a question or problem, so that they were able to solve it and continue to use the assistive technology software. If there was not some type of supervision given to the participants during this ten-minute session, the researcher could possibly foresee a participant becoming anxious or frustrated with the software. The student might want to stop its use and not be in favor of using it in the near future. To maintain student’s interest and use of assistive technology, educators should match appropriate tools and skill levels to the ability of the student to provide positive reinforcement with the specific technology they are using.
In future research, the researcher would like to use more than just one type of assistive technology to be able to compare and find tools that can advance the goal of increasing expressive communication. Having only one type of assistive technology tool, the Picture Sentence Key (2002), limited the researcher’s vision of seeking to see if assistive technology can increase expressive language. Using various assistive technology tools within the study may have increased participants interest levels and connected to their communicative skills levels more closely. Using various assistive technologies might prove to be more useful when analyzing different disabilities. Given that each disability results in different characteristics for each participant, it is not likely that one type of method can be effective towards meeting all or even most of their specialized needs.

The researcher would also like to improve the method of how the participants’ expressive language was assessed. Language samples will still provide evidence of the expressive language in an individual but modifications could be made in when and how the samples will be taken. Only a pre and post language sample was taken to assess the participant’s expressive language during this study. To gain greater insight of the progress of an individual’s language it may be beneficial to have language samples taken more frequently, as in a weekly basis. During this process another expert could also be present to help analyze the language samples and provide better reliability in test results.

The play of many individuals with disabilities may not always resemble the play of their peers. In future studies, a researcher needs to analyze and take data on what situations the individual takes most pleasure in. The researcher feels to get the best
quality results of a language samples during a play situation, there needs to be a closer examined process of forms of play for each individual participant.

The researcher also sees a need for more data collection that could have been taken during the study to fully assess the participants' expressive language skills. The language samples taken during a play situation did provide evidence of the participant using language in a relaxed situation but the researcher would also see the benefit of gathering data while participants were using expressive language in other settings in their daily routines. Data taken on a daily basis during a routine such as morning activities could provide evidence of any increases of language in the participant. This example could be used to help see if the participant can carry over any learned expressive language skills from using the assistive technology and begin to use them in their daily situations.

This study could also go deeper into research on the effects of assistive technology on expressive language by collecting data on participants' daily communicative interactions with peers and adults. This type of research could possibly uncover positive results of participants' use of technology to help their language skills in day-to-day verbal interactions. These verbal interactions could be examined and broken down into categories such as informal and formal verbal exchanges. Also, future research should look at any verbal increases occurring as the participants move from a more restricted type of setting to a more inclusive placement.

With all the limitations found in this study, the researcher sees the possible need of converting the study from a group of participants to just individual case studies. When considering the limited availability of having enough participants within the study and the
large variations of individual needs and skills of students, a case study may provide a better in depth understanding of the individual’s response and growth from certain interventions.

Individual case studies would be able to be designed around the specific needs of the student. It could account for different variables that might occur and be able to decipher between them. A case study would allow the researcher to be able to more closely analyze the benefits of the implementation of assistive technology tools.

Summary

Working with just four participants, the researcher saw the need for a more individualized study to be able to obtain the best possible evaluation of the participants' expressive language. More individualization could have occurred with how the researcher set up the software programs towards the day-to-day mastery levels of the participants and also with providing the best possible play situations to improve the quality of each participant’s language sample. Additional methods of assessing expressive communication, such as verbal initiations during daily routines, could also be more applicable when research is being focused on just one individual.

Even after making these modifications to improve this study, there may be more factors to consider when assessing a person's expressive language. Just through this study, the researcher found that using just a single type of assessment is not sufficient to truly understand the growth of a person's expressive language. There needs to be additional research that analyzes the growth of a child's expressive language through the use of assistive technology in different situations in his or her life, besides just play.
This study did not provide any significant statistical evidence on the effectiveness of assistive technology towards the advancement of expressive communication of individuals with special needs. However, there were improvements shown in two of the participants' post languages samples. Therefore, this demonstrates the need of additional research in this field. This study only managed to touch upon a very small example of how assistive technology can be used to aid expressive communication. Overall, the researcher learned to appreciate the depth and complexity of human expressive communication. Studies such as this one can significantly contribute valuable information to teachers who use assistive technology with young students with disabilities.
References


Picture Sentence Key for Windows (Version 2.0), Mayer-Johnson Inc., Solana Beach, CA.


Table 1

Descriptive Statistics

Frequency, Mean and Standard Deviation

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test: Verbs:</td>
<td>4</td>
<td>81.0000</td>
<td>31.11270</td>
</tr>
<tr>
<td>Post Test Verbs:</td>
<td>4</td>
<td>104.0000</td>
<td>24.85961</td>
</tr>
<tr>
<td>Pre Test Nouns:</td>
<td>4</td>
<td>91.2500</td>
<td>42.26405</td>
</tr>
<tr>
<td>Post Test Nouns:</td>
<td>4</td>
<td>99.5000</td>
<td>18.80603</td>
</tr>
<tr>
<td>Pre Test Total Words:</td>
<td>4</td>
<td>292.7500</td>
<td>171.40279</td>
</tr>
<tr>
<td>Post Test Total Words:</td>
<td>4</td>
<td>356.5000</td>
<td>88.82004</td>
</tr>
</tbody>
</table>
Table 2

Pre and Post Language Sample Results

<table>
<thead>
<tr>
<th>Participants</th>
<th>Pre Test of Nouns</th>
<th>Post Test of Nouns</th>
<th>Pre Test of Verbs</th>
<th>Post Test of Verbs</th>
<th>Pre Test of Total Words</th>
<th>Post Test of Total Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Student 1</td>
<td>62</td>
<td>116</td>
<td>49</td>
<td>113</td>
<td>127</td>
<td>479</td>
</tr>
<tr>
<td>Student 2</td>
<td>136</td>
<td>91</td>
<td>115</td>
<td>68</td>
<td>492</td>
<td>293</td>
</tr>
<tr>
<td>Student 3</td>
<td>118</td>
<td>114</td>
<td>99</td>
<td>125</td>
<td>377</td>
<td>365</td>
</tr>
<tr>
<td>*Student 4</td>
<td>49</td>
<td>77</td>
<td>61</td>
<td>110</td>
<td>175</td>
<td>289</td>
</tr>
</tbody>
</table>

*Improvements in Post Language Samples’ Results