Effective Assistive Technology Integration for Reading

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Because of challenges in decoding, which impacts comprehension, students diagnosed with high incidence disabilities often have difficulty understanding and being successful in reading across the content areas. Assistive technology, the use of technology for students with disabilities, has the potential to bridge the gap between a student’s ability and achievement. However, assistive technology is not often utilized within the classroom for students with high incidence disabilities, including learning disabilities and emotional disturbances, to support their reading needs. Although there are challenges in implementing assistive technology in schools that support students with disabilities in an inclusion setting, several schools in the United States have developed methods to successfully implement the technology to support student needs. At a single school located on the eastern seaboard, assistive technology has been integrated with the curriculum for students that have disabilities to support reading. This study will investigate the practices, philosophies of the teachers and staff at the school to gain an understanding of factors that support assistive technology use for reading. Knowledge gained from this study could help to improve policies and professional development opportunities for schools that serve students with disabilities, which can help support students access and achievement within the general education curriculum.

**Literature Review**

Due to difficulties in focus, decoding, and processing ideas, students with high incidence disabilities, including learning disabilities and emotional disturbances often have difficulty in the area of reading across content areas (Garjia, 2007). Many students with high incidence disabilities focus on decoding, which decreases comprehension. Reading through the content areas then becomes especially challenging due to increasing difficult vocabulary (Seifert, 2012). Therefore, students with high incidence disabilities which affect their reading ability may benefit greatly from various strategy implementations and technology across the content area to support reading.

Although students with high incidence disabilities struggle in the area of reading, assistive technology may support the needs of students within the classroom. Several studies have reported that assistive technologies, such as text to speech software, supported comprehension and vocabulary of students with and without disabilities in the areas of science, social studies, and reading. (Dolan, 2005; Mooram, 2010, Dawson, 2000). However, assistive technology is not consistently used, with teachers citing various factors as barriers to its implementation for students with disabilities in the classroom (McLaren, 2007; Stinson, 2003). Factors that impact the use of assistive technology in the classroom include lack of support, time, and professional development opportunities. However, the use of technology has been reported to increase student attitudes and performance when used within the general education setting (Walker, 2012).

In addition to the lack of consistent assistive technology use, although beneficial for students in the with disabilities in the general education setting, assistive technology, including low and high technology supports that can be used to support various skills and academic needs, is most commonly used in self-contained students with intellectual disabilities and visual impairments (Behremann, 2009). Specifically for students with high incidence disabilities in the general education population, in a survey study conducted by Behremann and Mastropieri (2009) with 682 special education students, teachers who taught students with emotional disturbances reported no use of assistive technology with that population, and less than ten teachers reported using technology supports for students with learning disabilities.

**Methods**

Although several studies have been conducted to determine the barriers of assistive technology use throughout disability areas, there is a lack of studies that investigate the factors that encourage assistive technology usage that supports that supports student reading in the general education setting. Therefore, this study will investigate the successful implementation of assistive technology at one particular middle school that services students with learning disabilities and emotional disturbances in the general education setting to determine factors that have encouraged its use.

A phenomelogical case study will be utilized in which the data will be collected from a single case, a public school that services general and special education students in a general education setting. After data is collected, open coding will occur so that themes, free from hypothesis, can be developed. The phenomelogical case study will be used to answer the following questions:

1. When offered a variety of strategies and supports, why are digital formats selected by general and special education teachers to support student the reading of students with high incidence disabilities?
2. What factors effect the implementation of digital formats within the classroom?
3. How are digital formats implemented in the classroom for students with high incidence disabilities?

**Setting and Participants**

Purposive sampling will be used to obtain participants for the study. The participating school will be selected based upon a previous survey study regarding assistive technology use. In the study, this single school would have reported high assistive technology use in the area of reading. The participating school, a public school located in a highly populated suburban area on the eastern seaboard, will serve students from grades six through eight. The school will also include a population of general education students with most special education students served in an inclusion setting.

The participants for the study will include general and special education teachers who serve students with disabilities at the identified school with high assistive technology use. The participants can include teachers and assistant teachers who teach any academic area including science, social studies, language arts, and math, or any elective. All teachers contacted for the study will use assistive technology in the classroom, specifically digital supports including text to speech, to support student reading. To identify participants, a list will be provided by the principal of the school and assistive technology specialist who will identify high technology users that service students with disabilities. From the list obtained from the principal and AT specialist, all teachers who meet the requirements will be contacted to participate in the study. One teacher for each from each content and elective will be selected. The researcher will attempt to include an equal number of general and special education teachers for the study. Estimated numbers for the study include seven teachers, one representing each of the content areas of language arts, science, social studies, math, and the electives of art, home economics, and one of the foreign languages.

Teachers will be contacted via email with a brief explanation of the study, its requirements, and a consent form for permission to be interviewed for the study. It is expected that the teachers contacted for the study will remain consistent with previous research that identifies high technology users in the classroom (O’Dwyer, 2005). It is also expected that the teachers will be representative of a variety of ethnicities and a combination of male and female teachers. The participants of the study will be able to determine the time and location for the interviews and observation.

**Data Sources**

A variety of data sources, including interviews, teacher notes and observations, will be used as data to develop an understanding of how assistive technology is used effectively in the school. The data sources will be used to support one another in the final data analysis and in the development of themes.

**Interviews.** Interview questions will contain a mixture of semi structured and open ended questions. Semi structured questions include demographic information regarding the teacher and open ended questions were asked to generate responses to gain information regarding the factors that encourage assistive technology use in the classroom for reading. Sample semi-structured interview questions will include the following.

1. How many years have you taught?
2. How many years ago did you receive your teacher training?
3. Do you teach an inclusion or self-contained class?
4. Do you teach general or special education?

In addition, open-ended questions will be asked, such as the following:

1. What type of assistive technology do you use to support student reading in the classroom?
2. In what ways do you use low tech assistive technology devices, including highlighters, post-it notes, or slant boards to support student reading?
3. Do you prefer to use low tech or digital supports, such as text to speech software, with your students to support writing?
4. What are some advantages of using digital supports?
5. Does your school provide professional development that focuses on technology use in the classroom?
6. How do you collaborate with the assistive technology specialists in the school?
7. With what devices, such as laptops, iPads, or computers, do your student’s access to utilize digital reading supports?
8. How do you feel using digital reading supports has supported your students’ reading ability in the classroom?

**Teacher Records.** Prior to the implementation of the study, teachers will be asked to create informal notes on a chart to denote how digital formats were used for any reading activities in the classroom. The teachers will complete this chart for one month prior to the interview with the researcher.

**Teacher Lesson Plans.** If teachers do not collect data on the data collection form, lesson plans for one month from the teacher will be analyzed by the researcher. The researcher will look for what assistive technology was used throughout the lesson to support reading, and how it was implemented for students with high incidence disabilities.

**Observation.** For supplemental information, a second researcher will conduct classroom observations for each teacher interview. Using a developed data recording sheet, the researcher will record information on which technology was used to support student reading in the classroom, how it was implemented, and the engagement of students with the assistive technologies. The observation sheet will include ten questions for the second researcher to answer in note from. Each interview will last one class period, typically 90 minutes.

**Researcher Memos.** During the interviews, the researcher will take researcher memos. These memos will be written during and after the interview process to record written notes regarding thoughts, connections between interviews, and additional ideas.

**Procedures**

Prior to implementation of the study, Human Subject Review Board permission will be obtained by the University. All personal information will be removed from the data obtained from the study. To protect the identity of all participants, ID numbers will be given to each participant.

**Interviews, teacher notes, observations.** Prior to the teacher interviews, the interview instrument will be constructed and pilot tested. For the creation of the interview instrument, a literature search will be conducted for qualitative research interview questions regarding teacher technology and assistive technology use. Appropriate questions will be complied and combined with interview questions constructed by the researcher. Once the interview instrument is completed, the instrument will be pilot tested with five teachers that will not be included in the study’s participants. During the pilot testing, notes will be taken by the researcher that include what questions did not yield appropriate answers for the study. Additional revisions will be made to the questions, and the instrument will go through a second review before its implementation with the sample population.

Teachers’ collected data regarding the implementation of technology use within their classroom will begin in the beginning of April, 2013 and will span one month, with interviews conducted in May of the same year. Researcher observations will occur either in the month of April or May, with the teacher determining the days in which observations can occur. The interviews will be conducted and recorded by the first researcher. Observations and data collected will be completed by a second researcher.

**Follow-up interviews and member checking.** Follow up interviews will be conducted via phone after all interviews are completed. When additional questions are asked in any of the interviews, a document which contained all of the new questions is created, and an amendment is also made to the original interview protocol. Two weeks after the completion of the initial interview, all original respondents will be contacted for a follow up interview and member checking. Each respondent will be asked the additional questions. After the original and follow up interview, respondents will be contacted via email for member checking. For member checking, sections of the interviews will be paraphrased to ask each respondent if the information is correct.

**Data Analysis**

Analysis of the data will be conducted through transcribing and coding of interviews, review of teacher data sheets, and observations. For the teacher interviews, after transcription and member checking, each interview will be open coded for the development of themes after a point of saturation is reached.

**Trustworthiness**. Trustworthiness will be established through the study by member checking and triangulation of data. During each interview, any additional questions asked by the researcher will be included in researcher notes. After the completion of all interviews and transcription, each interview will be reviewed for consistency in interviewer questions. Changes will then be made to the protocol, and follow up interviews will be conducted for respondents who did not receive the same questions as the other respondents for consistency of results. Member checking will also be conducted for all respondents. The researchers will contact each of the respondents and checked answers to select questions within the study.

Additionally, after the interview is conducted, transcription and initial coding will be completed. Transcription and coding will occur using Microsoft Word. After the interviews are transcribed, a second researcher will utilize various shades of text highlighting and text colors and font, including bold and italic, to code emic content. Information which met multiple codes will receive multiple colors and or font style. After the second researcher transcribes the initial code, the first researcher will code and compare coding to the second researcher to reduce researcher bias within the coding.

Triangulation of data will also occur through comparing the participant’s responses in the interview, to the data provided by the teachers’ data sheets, and researcher observation to ensure that the information provided by the teachers was an accurate reflection of assistive technology use in the classroom. Interviews will be used to provide the researchers with a reflection from the teachers’ perspective of how assistive technology is implemented within the classroom, the observations from the researcher will help to support the teacher responses, and the teacher data sheets will reinforce information regarding how assistive technology is used for specific activities.

**Preliminary Results**

**Anticipated Themes**

In previous studies, which determined the barriers of assistive technology in the classroom, themes including lack of time, technology support, and professional development are reoccurring themes throughout several studies (McLaren, 2007; Stinson, 2003). Therefore, although a literature search revealed a lack of studies utilizing qualitative or survey methodologies to investigate effective assistive technology use within the classroom, it is expected that teacher will have ample technology support, professional development focused on technology implementation, and time to collaborate and integrate technology in the classroom. In addition, it is expected that the school focuses on digital reading material for all students, which helps the integration of assistive technology in the classroom, as it works with existing digital formats used for all students.

**Technology Support**

In previous studies, teachers stated that not having appropriate technology and technology support was a barrier to implementing technology (McLaren, 2007; Stinson, 2003). Therefore, it is expected that teachers will have appropriate technology within the classrooms, and support for when technology issues arise with the devices, which increases their assistive technology use within the classroom.

**Classroom organization**

It is expected that the classrooms will have an organization that supports the active integration of assistive technology in reading. Organization themes may include the classroom having built in time, or ready devices, for students to utilize as digital supports with reading.

**Digital Formats**

It is expected that in the school, digitaltext is used at a greater frequency than traditional textbooks. Since traditional textbooks would be difficult to utilize with digital features that support reading, it is expected that the school has access, or either transfers needed text into a digital format for the students to utilize the assistive technology supports.

**Professional Development**

In studies that discussed factors that impacted technology use in the classroom, teachers stated that a lack of professional development impacted their use of assistive technology in the classroom. It is expected that within this case study, data analysis will reveal that teachers have professional development opportunities that support the integration of technology and strategies that support writing within the school.

**Researcher Bias**

As a former teacher of students with disabilities who implemented assistive technology and a current graduate student with a specialization in Assistive Technology, this study may be limited by preconceived notions about what impacts assistive technology based upon my personal experience as a teacher and my experience in working on various research projects regarding assistive technology.  To reduce the amount of researcher bias, I plan to focus on emic data reported from the teacher and reduce the data sources based solely upon my observations.  In addition, collection and review researcher memos throughout the data collection process will help me to identify any preconceived notions and attempt to correct them prior to the development of codes and themes.   Researcher bias will also be reduced through member checking, which will ensure that the information reported is an accurate reflection of the participants.

**Limitations**

Although this study will represent the factors that increase and support assistive technology use in the area of writing at one school, the study is limited as it only captures the perspectives of teachers at the single location. At other schools, with different school climates and philosophy, assistive technology may be utilized at a high frequency due to other reasons or be utilized within the classroom using different techniques. In addition, the study may be limited because most of the data is self reported by the teachers. The teachers may report certain information because they believe it is the what the researcher wants to hear for the study. However, triangulation of data, which includes cross referencing teacher reported data with observation by the researcher, will reduce the chance of inaccurate information being reported for the study, because teacher reported information will be supported by researcher observations.

**Discussion**

Although assistive technology can be implemented in the classroom with students with disabilities to support reading, in qualitative and survey studies, teachers have self-reported that various factors act as barriers to effectively implementing assistive technology in the classroom. Additionally, there has been a lack of studies that analyze how assistive technology is effectively implemented in the classroom**.** Therefore, through application of phenomenological case study with teachers who are high assistive technology users throughout content areas, information can be cultivated to build knowledge regarding effective assistive technology use in the classroom for students with disabilities in the area of reading. Through this knowledge, professional development can be developed, tailored, or implemented that encourages and provides teachers the necessary supports to utilize assistive technology in the classroom. A greater use of assistive technology in classrooms could provide students with high incidence disabilities the ability to gain more independence by receiving the needed support in reading , which may help them to successfully access the challenging content materials across content areas.

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