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A case study on the effectiveness of Kurzweil software on improving participation and comprehension with special education students in the science classroom

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A case study on the effectiveness of Kurzweil software on improving participation and comprehension with special education students in the science classroom

Abstract

This research project addresses using Kurzweil electronic text software as an accommodation with special education students. The research questions addressed were: Is Kurzweil an effective accommodation for special education students with reading deficits? and Will using Kurzweil improve special education students' participation and comprehension?

A review of literature provided more in-depth information about: (a) electronic text, specifically Kurzweil, (b) the benefits of integrating electronic text into the general education classrooms, and (c) the recommendations or considerations for teachers considering using electronic text. The research based on the literature review shows that the use of electronic text may lead to improved motivation and comprehension and increased attention to text. Study findings supported the use of Kurzweil as an effective accommodation, and showed improved comprehension and participation.

A CASE STUDY ON THE EFFECTIVENESS OF KURZWEIL SOFTWARE
ON IMPROVING PARTICIPATION AND COMPREHENSION
WITH SPECIAL EDUCATION STUDENTS IN THE SCIENCE CLASSROOM

A Graduate Research Project
Submitted to the
Division of College of Education
Department of Curriculum and Instruction
In Partial Fulfillment
Of the Requirements for the Degree
Master of Arts
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by
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This Research Project by: Christina Glaub

Titled: Study on the Effectiveness of Kurweil Software on Improving Participation and comprehension with Special Education Students in the Science Classroom

has been approved as meeting the research requirement for the Degree of Master of Arts.

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ABSTRACT

This research project addresses using Kurzweil, electronic text software, as an accommodation with special education students. The research questions addressed were: Is Kurzweil an effective accommodation for special education students with reading deficits? and Will using Kurzweil improve special education students' participation and comprehension. A review of literature answered provided more in depth information about: (a) electronic text, specifically Kurzweil, (b) the benefits of integrating electronic text into the general education classrooms and (c) the recommendations or considerations for teachers considering using electronic text. The research based on the literature review shows that the use of electronic text may lead to improved motivation and comprehension and increased attention to text. Study findings supported the use of Kurzweil as an effective accommodation and showed improved comprehension and participation.

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INTRODUCTION

Inclusion of special education students in the regular classroom has forced teachers, general and special, to accommodate all students. The Individuals with Disabilities Education Improvement Act (IDEA) laws requiring that special education students are educated in the least restrictive environment (i.e. the general education setting) has made it possible for special education students to participate in the same environment as non-disabled peers. The challenge the classroom and special education teachers must face is how to make the environment and curriculum appropriate by accommodating the special needs of the students.

Reading is one area that is difficult for many special education students. Because reading is such an important skill in any setting the focus of this action research was on reading deficits and what technology offers for assistance in that area.

The ability to read is taken for granted. Gambrell, Morrow, Neuman, & Pressley (1999) explained that "...not all children, unfortunately, acquire literacy easily" (p. 292). Students who have a reading disability must be evaluated before being serviced for special education. Students who have qualified for special education must show significant discrepancy from their peers, their achievement and aptitude, and this discrepancy must not be explainable by other factors (Anderson-Inman, 1999).

There are many considerations when teaching students with learning disabilities (L.D.), not only in the area of language arts, but accommodations that need to be made in all content areas. Roblyer (2004) states "[Considerations need to be made] because literacy skills and processes are fundamental to successful performance in most other disciplines, there is also considerable language arts instruction in content-area courses

(e.g. social studies, sciences and mathematics.)” (p. 237). It is clear that all teachers, not just special education teachers, need to be aware of and to address the needs of all students.

Anderson-Inman (1999) describes what learning disabled students encounter when in the general education setting:

Faced with a text-centered world, they are frequently encumbered by an inability to read and write with sufficient fluency and legibility to meet the expectations of their teachers. Faced with a fast-paced curriculum, they are frequently hampered by minimal organizational skills and slowed by the additional time that even simple assignments can demand when the student has a learning disability. (p. 239)

Yet, it would be unreal to expect even exemplary classroom teachers to do it all. The efforts of all involved should be on “...fostering student success on the classroom curriculum and the enhancement of classroom instruction...” (Gambrell, Morrow, Neuman, & Pressley, 1999, p. 295). Anderson-Inman discusses the reality of learning disabled students reaching their learning goals, “...achieving success usually requires an enormous amount of experimentation and, not uncommonly, extraordinary levels of support and advice from parents as well as teachers,” (1999, p. 239). All parties involved have the main goal of students learning.

Technology may be one way of providing accommodation that levels the playing field for all students. When considering the use of technology the goal is to, “...offer an individual with a disability increased opportunities for learning, productivity, and independence—opportunities that otherwise would not be available,” (Roblyer, 2004, p.

316). The research by Anderson-Inman, "...explored ways in which computer technology can be used to minimize the negative impact of students' disabilities and maximize the potential of their learning strengths," (1999, p. 240). Their research provided information about observations in regards to implementation issues for students with learning and studying problems.

Problem Statement

Based on my experiences with working with students with reading difficulties in the general education classroom I questioned current accommodations for students' reading needs. I was also concerned with students' learning in the general education classroom, not for lack of teaching. I had observed, in the general education setting (i.e. during social studies or science), several special education students were not having success on assignments or tests, did not readily participate in discussions, did not appear to be following along while the textbook was being read, and generally did not seem to enjoy learning.

For the reasons previously stated, I decided to try something different. The district had recently purchased the software Kurzweil. The Kurzweil Product Overview (2005) states, "Kurzweil 3000 provides not only the tools students need to improve their reading speed and comprehension, but also the features that make it possible for them to learn and study independently" (p. 1). I based my research on using this software to improve student comprehension, and in turn, participation in the general education setting. The results of this research will inform general and special education teachers about my experiences and findings when using Kurzweil as a means accommodating for

special education students' reading deficits while helping to minimize the frustrations L.D. students encounter when immersed in the general education setting.

Research Questions

It has been my experience and observation that special education students struggle in the general education setting due to their difficulty with reading. Students struggle to follow along while listening due to their discrepancy in the area of reading and the rate at which the text is read is often times too fast. Due to the time constraints there is little opportunity for transferring the knowledge and discussing the information. Also based on my observations special education students are not motivated or engaged while in the classroom setting, have difficulty completing homework, and rarely study or know what to study for tests. The difficult task of reading for these students is interfering with acquiring the knowledge taught in the content areas (i.e. social studies and science).

My purpose for doing this action research is to address the previous accommodation problems I have observed by using different technology: the Kurzweil software. I was concerned with whether the Kurzweil software assisted students so they comprehended the material better and as a result encouraged them to participate during the content area class. Overall, I investigated whether Kurzweil would be an effective accommodation for special education students.

The research questions that were addressed were:

1. Will using Kurzweil improve special education students' participation and comprehension?
2. Is Kurzweil an effective accommodation for special education students with reading deficits?

Definition of Terms

Accommodation: an adjustment made to an assignment, assessment, method of delivery, etc. Accommodations are seen as leveling the playing field for all students.

Students are learning the same material, but go about it differently.

Electronic text: Electronic text is different from traditional print in that electronic text is (a) malleable, it can be (b) enhanced, (c) programmed, (d) linked, (e) modified (f) quickly searched, and (g) shared over long distances instantaneously (Anderson-Inman & Horney, 1998).

Kurzweil: Reading, writing and learning software for struggling students. The software provides the tools students need to improve their reading speed and comprehension along with features that assist students to learn and study independently. One specific feature is the text-to-speech feature that reads text aloud (Kurzweil Educational Systems, Inc. 2005)

Special education: an educational delivery service for students that are identified in one or more areas in which they are discrepant.

IDEA: The Individuals with Disabilities Education Act (IDEA) is a law ensuring services to children with disabilities throughout the nation. IDEA governs how states and public agencies provide early intervention, special education and related services to more than 6.5 million eligible infants, toddlers, children and youth with disabilities (U.S. Department of Education, 2004).

Inclusion: All students should be taught in the same setting. The job of the special education and general education teacher is to adapt, accommodate, modify, and/or

differentiate in order for all students to access the curriculum. Special education services are provided in part or solely in the general education environment.

METHODOLOGY

Participants

I obtained permission from one parent for their child to participate in my research. To insure anonymity I have kept the information about the student as generic as possible in this research report. Therefore, I have not divulged the student's gender or ethnicity. The student I observed is a special education student of the age of nine. The student had a reading deficit of approximately a year behind peers.

This research took place in an elementary school in the Midwest serving fourth and fifth grade students. The school's student enrollment is between 200-240 of which 49.3 percent of the students are eligible for free or reduced lunch Iowa Department of Education (2006-2007) website.

The classroom setting was a fourth grade science class consisting of 29 students, including 7 students with special needs. The general education teacher, the Title I teacher, and the special education teacher were the adults available in the classroom. The science class met five days a week for 30-40 minutes each day. The classroom computer did not have the Kurzweil software installed and therefore the student used a desktop computer in the media center.

Data Collection Materials

To measure participation, I used a table (see Appendix A) to document the date, a place to tally for opportunities for participation, and a place to tally the student's participation. I converted the student's participation into a percentage. I used the total student's participations and the total opportunities to determine the percentage of participation. Participation was based on visual observations. Opportunities for

participation consisted of when the teacher asked a question or for volunteers to read and checked for understanding by having students raise their hand or other visual means. Basically, anytime the teacher was trying to get students involved in their learning was considered an opportunity to participate. When the student participated visually, by possibly raising their hand, it was considered participation.

To measure comprehension, I used the student's scores on assignments. Scores are given with a letter grade (i.e. A, A-, B+, etc.) which coincides with a percentage (see Appendix B). I collected two assignment grades and the unit test grade before using Kurzweil and after using Kurzweil. The worksheets and tests were not the same since the study was conducted during two different chapters. I chose assignments that were similar in format and number of questions. Chapter tests are setup in the same format (i.e. fill in the blanks, true/false, multiple choice, etc.)

Using a pre and post questionnaire (see Appendix C) I surveyed the student to receive feedback on his/her feelings (ranging from like, okay or dislike) about science, reading the textbook with no assistance, and participating in class. Only the post questionnaire asked about his/her feelings with using the Kurzweil Software, preferred features of Kurzweil, and his/her preference of whether she/he would choose to use Kurzweil versus other accommodations (ex. reading the textbook with a person versus Kurzweil and completing assignments by hand versus using Kurzweil). There was also an opportunity for additional comments on the post questionnaire.

Research Design and Procedures

Action research was the guiding practice for conducting my research. Action research is defined by Johnson, A. (2005) as "...the process of studying a real school or

classroom situation to understand and improve the quality of actions or instruction” (p. 21). I observed and collected assignments from a real classroom situation to try and improve accommodations for special education students in the science classroom.

Prior to beginning the use of Kurzweil, data was collected for participation and comprehension and the pre questionnaire was also given. Participation data was collected for five days. Two assignments and the test scores were collected. The pre questionnaire was administered by a fellow special education teacher. All special education students had been introduced and instructed on how to use Kurzweil and many of the features.

The use of the Kurzweil software began when a new chapter was started. Participation was documented for five days. Kurzweil was used to complete two assignments and the chapter test (see Appendix D for examples). The student used the text-to-speech and test taking features to complete the assignments and test (see Figure 1). Worksheets were scanned in order to use Kurzweil to complete them. The student would have the computer read the questions and answer choices. The student might refer to the textbook using Kurzweil to find the answer and then return to the worksheet to answer the question. The assignments were printed and submitted to the teacher. The student filled out the post questionnaire.

Figure 1. Student using Kurzweil.



Statistical Analysis

I collected data using various methods (i.e. tallying participation, assignment percentages, and questionnaire). The data was analyzed by comparing the information obtained prior to and after or during using Kurzweil. The average of the percentages of participation before and during the study was compared to determine improvement in participation. The percentage on the assignments and tests with and without using Kurzweil were compared to show improvement in comprehension. The findings from the survey determined the student's perception of the effectiveness of using Kurzweil.

These techniques were used due to the nature of the Action Research being primarily qualitative (Johnson, 2005). It is more appropriate to observe the student in the classroom setting and compare information that was pertinent to the study. It was not necessary or applicable to include statistically analyzed data.

To come to a conclusion on the impact Kurzweil had on participation I looked for changes in participation percentages while using Kurzweil. To determine the impact on

comprehension I looked for how scores compared, before and during using Kurzweil, on assignments or tests. Based on the questionnaire, I looked for changes in the attitude on the pre and post questionnaires. towards science and participation in class and the student's feedback about using Kurzweil to determine the effectiveness of using Kurzweil as an accommodation.

LITERATURE REVIEW

Introduction

Various methods were used for identifying and locating sources for this paper. The databases used included Reading Online and ERIC. The descriptors used were *electronic text, text-to-speech, ebooks, electronic text, learning disabilities, literacy, reading difficulties, reading improvement, reading processes, reading research, and Kurzweil.*

Initially I evaluated sources on their value to my research. Then further analysis of the content, currency, the source, extent of coverage and relevance allowed me to focus on the more valuable sources. In regards to content I was looking for information that would help answer my research questions and enable me to have a grasp on the research that has already been done. The information needed to be current. When looking at the source I looked for authors that were frequently mentioned in similar sources. When determining reliability I analyzed where the source was found: journal article, educational website, etc. The extent and detail of the information provided by the source helped to determine if it was useful. Relevance to the research questions, significance or importance to the context, and credibility allowed me to compile the research.

Organization of Research

I have categorized my research of the literature into three sections: What is Electronic Text?; Electronic Text in the Classrooms; and Issues with Implementation. First, I began researching the broad category of electronic text, in which Kurzweil would be considered along with several other options. Secondly, I began researching the use of

electronic text in classrooms. It was evident that there are three identified benefits to using technology/electronic text in the classroom. Lastly, I wanted to find out what issues arise with the use of the technology. Cost was one issue along with others I had not considered.

Analysis and Discussion

What is Electronic Text?

Anderson-Inman and Horney (1998) have specified seven features of electronic text that distinguishes it from traditional print: electronic text is (a) malleable, it can be (b) enhanced, (c) programmed, (d) linked, (e) modified (f) quickly searched, and (g) shared over long distances instantaneously. The characteristic that most electronic texts have in common is that they are malleable; can be modified, enhanced, programmed, and linked to instruction in order to promote comprehension and independent reading (Roblyer, 2004).

Electronic text encompasses a variety of technologies. These technologies include: (a) computer-enriched textual presentations, (b) online texts, (c) e-books, and (d) optical character recognition software, to name a few. Then there is software that presents text electronically and also has text-to-speech (TTS) abilities. Some examples are ReadPlease 2003 and HelpRead which are available on the Internet, CAST eReader and TextHelp which are moderately priced, and Kurzweil 3000 and WordSmith which are more expensive and include more features (Balajthy, 2005).

The characteristics of electronic text (as opposed to traditional paper-based text) and the benefits that computer presentation of text has to offer is a reason to use computers with struggling readers (McKenna, Reinking, Labbo, & Kieffer, 1999).

Horney and Anderson-Inman (1999) showed that children can be taught to use the scaffolding offered by electronic text, such as computerized speech, online glossaries, graphics, and note-taking capabilities, in order to achieve success in school tasks.

Electronic Text in Classrooms

Research on the use of electronic text is fairly new, but the findings have been promising. The findings and determinations of computer technology and reading instruction from the National Institute of Child Health and Human Development (2000) stated, “The use of hypertext (highlighted text that links to underlying definitions or supporting or related text, almost like an electronic footnote), while technically not reading instruction, may have an instructional advantage” (p. 21). The availability of computer technology to help struggling readers to accomplish goals provides opportunities for classroom success in content area studies despite these students’ reading difficulties (Bruce & Hogan, 1998). There is a place for the technology in the classroom with obvious benefits.

The three benefits identified with integrating technology are: motivation, positive impact on comprehension and attention to text. Each of these topics will be discussed in the following section.

Motivation

Motivation may be the most important variable in determining the extent of success of students with or without learning disabilities. Anderson-Inman (1999) researched the motivating factors of using electronic text. Her research found varying factors that influenced students’ behavior and their level of success—personal and environmental factors. The students who wanted to learn embraced the strategies and

found them to be worthwhile. Yet, what might motivate one student may not have any effect on another, as noted by Case and Truscott (1999). However, the opposite was also true with students who were no longer motivated. The environmental factors of a dysfunctional home or associating with antisocial peers seemed to take precedence over possibly succeeding in school. The technology was not motivating enough under these circumstances (Anderson-Inman, 1999).

Given the ideal situation and student, the technology has been found to motivate students to want to learn (Anderson –Inman, 1999). The technology itself may not be the only motivating factor. Therefore teachers should consider other motivators (i.e. grades) that would encourage students to desire to do well (Anderson-Inmann, 1999; Case & Truscott, 1999).

Positive Impact on Comprehension

Studies have found that because of the combination of the visual text and auditory presentation electronic text with TTS software improves comprehension. Elkind (1998) found that the most benefit from the assistive software was for students who read the slowest or with the poorest comprehension. Montali and Lewandowski (1996) found that struggling readers performed as well as average readers when text was presented using TTS and the visual of the text.

Based on the findings, students have the potential for improving in comprehension. Some improvement is possible, but more probable with students who have greater needs. Since the content areas (social studies and science) greatly depend upon a readers' understanding of the text, using electronic text with TTS would allow

struggling readers another opportunity to comprehend and make meaning of the text (Elkind, 1998; Montali & Lewandowski, 1996).

Attention to Text

Paying attention to text is an area struggling readers, especially students with attention disorders, faced. Hecker, Burns, Elkind, J., Elkind, K. and Katz (2002) commented that students, "...may lose their place, have trouble keeping what they read in short-term memory, and have to read the same paragraph repeatedly to get any meaning out of it" (p. 5). In the study by Hecker et al. (2002), based on student questionnaires, students reported that they could concentrate longer, their thoughts wandered less, they were distracted less, and they skipped less material when using assistive software.

Issues with Implementation of Electronic Text

Issues with implementing electronic text were discussed by Anderson-Inman (1999) and Balajthy (2005). The four issues were: access to the technology, effectiveness, classroom integration, and funding.

Access Issues

Anderson-Inman (1999) found when relying on computer-based tools a high degree of student access to computer technology is a requirement: ideally as close to constant access as possible. Just as a person with a physical disability requiring a wheelchair would not have access occasionally to their wheelchair the same is true for students with learning disabilities. Anderson-Inman relayed this by stating, "...the computer is a 'wheelchair for the mind.' Just as we would never expect 5-10 students to share a single wheelchair, we should not expect 5-10 students to share a single computer," (1999). In order for this constant access to computers to be possible it would

be necessary not only to have the equipment, but also to have a teacher or staff available for guidance and help with using especially electronic readers (Balajthy, 2005).

Effectiveness Issues

Effectiveness varies according to the attributes of each student and the extent of use of software, class time and teacher guidance to learn software operation, and frequency (Balajthy, 2005). Anderson-Inman (1999) found that the software may be too effective, "With sufficient access to supportive technology, and sufficient instruction on how to use it...students with learning disabilities can achieve up to normal expectations," (p. 5). This may even lead to special education students to be dismissed from special education services.

Classroom Integration Issues

Various issues that arise and need to be addressed focus on insuring benefits to students, compatibility with use in the classroom, teacher support, and class time for instruction on how to use the software, and actual use. Balajthy (2005) found that there needs to be a conscious and significant commitment in order to benefit students. Teachers already have at their disposal more simplistic, low-tech options, such as books-on-tape, but find little or no time to use them (Balajthy, 2005). So, unless teachers make a conscious and significant effort to use the technology it does not make having it beneficial.

Anderson-Inman (1999) stated that the integration strategies of using computer supports need to fit the "...frenzy and fast-paced schedule in which they [the students] are expected to survive," (p.4). Implementation of computer supports must fit the demands students face. Another area impacting the success of the use of any support for

special education students is communication and teacher support. Success depends on teacher support and communication with all involved (Anderson-Inman, 1999). The actual use of the software requires instruction with the students. Prior instruction with the software involves class time and therefore prior planning on the teachers' part (Anderson-Inman, 1999).

Funding

In regards to funding, Balajthy (2005) recommended that planning precede purchase. Expenses such as scanning materials, upkeep with software, etc. should be considered and taken into account. Due to the time needed to scan resources users should consider developing a formal library to save and make available relevant documents (Balajthy, 2005).

Some options for purchasing software and the equipment were cited by Anderson-Inman (1999). "Legally schools need to provide the equipment a student with a learning disability needs to achieve in the general education curriculum," (p. 6). Individuals with Disabilities Education Act (IDEA 97) guarantees students with disabilities a free public education, P.L. 105-17 makes provisions for guaranteeing students the assistive technology necessary for education in the general classes if included in a student individualized education program (Anderson-Inman, 1999). However this process is time-consuming. One possible solution may be to ask a student's parents to purchase the needed equipment (Anderson-Inman, 1999). Anderson-Inman (1999) suggested another option is to contact the office of Vocational Rehabilitation. They assist individuals with disabilities in obtaining work, or education, leading to employment. They may have access to funds for technology documented as necessary for success during education or

vocational training. That leads one to consider what technology is available and whether the possible benefits and assistance is worth the money and time involved in using the technology.

Conclusion

Textbooks are primarily used in classrooms and, for some students, are difficult to read, comprehend, and use. Cousin (1989) points out that to address this problem texts need to be adapted and special strategies or techniques used for students with learning disabilities. Reading is a fundamental skill. Students with a deficit in the area of reading may be more successful in the general education setting when allowed to focus their time on the content rather than on the physically difficult task of reading (Anderson-Inman, 1999). In order to allow L.D. students every opportunity to succeed in the general and special education setting there are many options, alternatives, and considerations in deciding to use technology, specifically electronic text with TTS. Electronic text, including Kurzweil 3000, is one technology that accommodates for reading difficulties to allow equal access to the curriculum (Anderson-Inman & Horney, 1998; Horey & Anderson-Inman, 1999; McKenna, Reinking, Labbo & Kieffer, 1999; Roblyer, 2004).

Research shows the possible factors; motivation, comprehension, and attention to text, supports the use of this technology with L.D. students in the educational setting. The benefits identified would assist L.D. students in providing them with a more advantageous learning environment. Each documented research area showed support for assisting students and at the same time acknowledged that not all students showed the same progress. I found that the research supports the use of electronic text in the

classroom (Anderson-Inman, 1999; Elkind, 1998; Hecker et al., 2002; Montali & Lewandowski, 1996).

The issues revealed with using electronic text included: access, effectiveness, classroom integration, and funding (Anderson-Inman, 1999; Balajthy, 2005). There are many things to think about when integrating technology, but considering the relevant information and suggestions provided prior to integration would benefit all involved.

I feel I have sufficiently answered the question: What is electronic text? I found many examples and a distinction between traditional print and electronic text. The seven features of electronic text were defined by Anderson-Inman and Horney (1998). Electronic text is also available in many forms and at varying prices. The literature indicates that choosing the appropriate software should be based on the needs, funding, and intended use (Anderson-Inman, 1999; Balajthy, 2005).

The literature review influenced and assisted my research on the effectiveness of Kurzweil software on improving participation and comprehension with special education students in the science classroom. After conducting the data collection, I evaluated my findings. The results of my research and discussion of findings including my conclusions and recommendations follow.

RESULTS

The research questions that were addressed were:

1. Will using Kurzweil improve special education students' participation and comprehension?
2. Is Kurzweil an effective accommodation for special education students with reading deficits?

To answer the question of whether Kurzweil improves special education students' participation and comprehension I used the data from the participation percentages and the student's assignment scores.

Participation

Student participation was documented for ten days total, five before using Kurzweil and five during the use of Kurzweil. The percentages were averaged. Table 1 shows the comparison of the student's percentage of participation before and during the study. The findings show an improvement in the student's participation during the use of Kurzweil.

Table 1

Percentage of Participation Before and During the Use of Kurzweil

	Before	During
Student's average participation	28.6%	57.6%

Comprehension

The student's percentages on six assignments, three without the use of Kurzweil and three using Kurzweil, were compared. Table 2 shows the percentage and letter

grades on the assignments. Based on the information the student improved in comprehension of the material using Kurzweil. The student basically went from earning Cs and Ds to earning As on assignments.

Table 2

Assignment Scores Without Using Kurzweil and With Using Kurzweil

Type of assignment	Without Kurzweil		With Kurzweil	
	Percentage	Grade	Percentage	Grade
Worksheet	63%	D	100%	A
Worksheet	75%	C	92%	A
Chapter test	60%	D-	92%	A

Effectiveness of Kurzweil

To answer the question of the effectiveness of Kurzweil as an accommodation for special education students with reading deficits; I relied on the participation data, student assignment scores, and results from the questionnaire. Based on the participation and comprehension findings for this individual student, Kurzweil is an effective accommodation for this special education student.

The questionnaire allowed for more affective input (see Table 3). The student's answers to questions one, two and three remained the same from the pre and post questionnaire. The student's feelings towards the subject were not changed with using Kurzweil. Based on the student's grade prior to using Kurzweil and the improved grades with using Kurzweil, I expected improved feelings towards the subject. The student did not perceive participation as a problem area based on the questionnaire (the student liked

to raise their hand in class), yet the observed percentage of participation was low (28.6%). It was clear the student disliked reading independently from the textbook, most likely due to the student's difficulty in this area. Kurzweil assisted with the student's reading of the textbook when completing assignments. The student reported they liked using Kurzweil.

Table 3

Pre/Post Questionnaire Answers

Question	Pre	Post
1. How do you feel about science?	okay	okay
2. How do you feel about raising your hand in science class?	like	like
3. How you feel about reading from the textbook, with no help from the computer or another person.	dislike	dislike
4. How would you rate the Kurzweil Software?	N/A	like

Five open-ended questions were asked.

- The first question was: What feature(s) of the Kurzweil Software did you use the most? The student reported they liked the word spelling feature (the word prediction feature).
- The second question was: What feature(s) of the Kurzweil Software did you find the most helpful? The student reported that it read the words and helped to write words.
- The third question asked the student to choose between reading the textbook with a person and using Kurzweil. The student chose having the textbook read by a person.

- The fourth question asked the student to choose between writing assignments and using Kurzweil to complete them. The student chose using Kurzweil.
- The final question asked for additional comments. The student reported they would like to play a game on Kurzweil.

The student's response to the open-ended questions show they used the features of Kurzweil to assist them with completing assignments, but if given the task of reading the textbook the student would choose a person versus a computer. The student's participation and comprehension increased/improved. The results from the questionnaire, participation percentages and comprehension scores show Kurzweil is an effective accommodation for this student with a reading deficit.

DISCUSSION

Conclusions

Inclusion of special education students in the general education setting is not a choice but required by IDEA. Teachers need to accommodate for all students in order to allow them to access the same educational opportunities (Roblyer, 2004). One particular area students with disabilities struggle is reading which is not isolated to just reading class, but a fundamental skill in all areas including science (Anderson-Inman, 1999; Gambrell, Morrow, Neuman, & Pressley, 1999). Given the amount of reading required in the classroom setting, accommodations are necessary for students with reading deficits (Anderson-Inman, 1999).

The purpose of this study was to determine if Kurzweil is an effective accommodation for students with reading deficits. Research of the literature supported the use of electronic text based on the following factors; motivation, comprehension, and

attention to text (Anderson-Inman, 1999; Elkind, 1998; Hecker et al., 2002; Montali & Lewandowski, 1996). The benefits identified would assist L.D. students in providing them with a more advantageous learning environment.

The findings were based on one student's information; therefore the information cannot be generalized. More research is necessary in order to apply the findings to a larger population.

The findings showed improvement in the student's participation and comprehension. The student reported they liked using Kurzweil, but would prefer a person to the computer to read the textbook. Based on the findings Kurzweil is an effective accommodation for this student with reading disabilities. Kurzweil assisted the student with the difficult task of reading in order to complete assignments.

The significance of these findings shows Kurzweil was an effective option as an accommodation for this student with a reading deficit based on the improvement in participation and comprehension. General education teachers and special education teachers may use the information in this study and literature review to decide whether Kurzweil is an appropriate for their needs. The data supports the use of using electronic text, yet the issues revealed (i.e. access, effectiveness, classroom integration and funding) need to be considered (Anderson-Inman, 1999; Balajthy, 2005). Using technology to accommodate for students is an area that is not widely researched, but current research has shown it has potential.

Recommendations

The findings support the use of Kurzweil with special education students, particularly ages 9-10. I would recommend the use of Kurzweil to accommodate students

with reading deficits. There is evidence showing a potential for students to improve participation and comprehension with the use of Kurzweil. Yet, what works with one student may not be ideal for another. In addition to the findings, supporting the use of electronic text, the issues revealed should also be considered before purchasing.

Based on my experiences I would advise teachers choosing to use Kurzweil to have the software available in the classroom. Ideally, Kurzweil would be used simultaneously in the classroom setting (i.e. in the science classroom during science class). Instead of reading from the traditional textbook students could refer to the electronic version while extracting text creating an outline which may assist with completing assignments or studying for tests.

There are limitations to this study. My research only consisted of one student. The limited number of participants and therefore limited data is not as informative as several participants and more extensive data would have been. Further studies would need to be conducted with more participants in varying age groups. Perhaps Kurzweil is better with a particular age group, ages 9 and older. Data was collected from different assignments. Perhaps in another study similar versions of the same assignment could be completed by students, one not using Kurzweil and one completed using Kurzweil.

Kurzweil software was chosen for this study. Yet, Kurzweil is only one example of electronic text. It is not the only option and may not be the best for all students and situations. Further studies using other technology may show similar results. Additional research in the area of electronic text is necessary in order to determine the best and most effective option(s).

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APPENDIX A

Participation Documentation Table

Participation Documentation			
Date:	Tally(ies)	Total	Percentage (divide student total by opportunities)
Student			
Opportunities*			

* Opportunities to participate are when the teacher: asks a question, for volunteers to read, checks for understanding by raising hand or other visual means, etc.

APPENDIX B

Norwoodville Elementary School Grading Scale

Percentage	Grade
92-100	A
90-91	A-
88-89	B+
82-87	B
80-81	B-
78-79	C+
72-77	C
70-71	C-
68-69	D+
62-67	D
60-61	D-
59 below	F

APPENDIX C

Pre/Post Questionnaires

PRE-INTERVIEW QUESTIONS ABOUT KURZWEIL

Circle the face.

1. How do you feel about science?



Like



Okay



Dislike

2. How do you feel about raising your hand in science class?



Like



Okay



Dislike

3. How you feel about reading from the textbook, with no help from the computer or another person.



Like



Okay



Dislike

POST-INTERVIEW QUESTIONS ABOUT KURZWEIL

Circle the face.

1. How do you feel about science?



Like



Okay



Dislike

2. How do you feel about raising your hand in science class?



Like



Okay



Dislike

3. How you feel about reading from the textbook, with no help from the computer or another person.



Like



Okay



Dislike

4. How would you rate the Kurzweil Software?



Like



Okay



Dislike

- 6. What feature(s) of the Kurzweil Software did you use the most?**

- 7. What feature(s) of the Kurzweil Software did you find the most helpful?**

- 8. If you had a choice between reading the textbook with a person or using Kurzweil, what would you choose?**

- 9. If you had a choice between writing assignments or using Kurzweil to complete them, what would you choose?**

- 10. Do you have any other comments about Kurzweil you would like teachers or students to know?**

APPENDIX D

Chapter test completed using Kurzweil. Page one of two.

E 23
Study Guide A

What Are Physical and Chemical Properties of Matter?

Main Idea Matter has different physical and chemical properties. Physical and chemical properties are used to describe and classify matter.

Fill in the blanks with words from the box below.

chemical property physical properties density

1. The amount of matter in a given space, or volume, is called density. (page E25)
2. There are five physical properties that can be used to compare two samples of matter. (page E25)
3. A chemical property is a characteristic of matter that can be observed only when matter is changed into a new kind of matter. (page E27)

Write *true* if the statement is true and *false* if the statement is false.

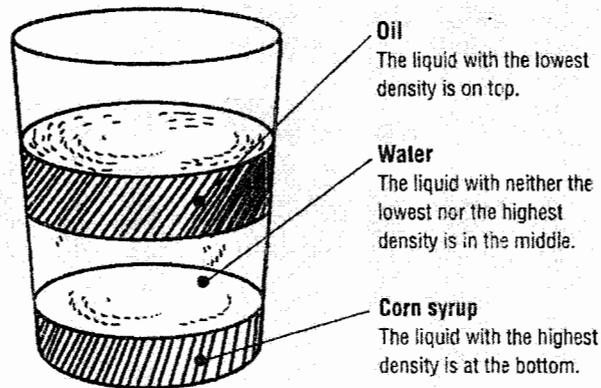
- false 4. Color and shape are the only physical properties that describe matter. (page E24)
- true 5. The texture of an object describes how the object feels. (page E25)
- false 6. A mirror and a piece of black construction paper have the same luster. (page E25)



Name _____ Date _____

E.12.3
Study Guide A

What Are Physical and Chemical Properties of Matter?



- f _____ 7. In the diagram above, the liquid at the top has the highest density. (page E25)
- t _____ 8. In the diagram above, the liquid in the middle has neither highest nor the lowest density. (page E25)
- f _____ 9. The physical properties of matter affect how we use each type of matter. (page E27)
- f _____ 10. A rock floating is an example of a chemical property. (page E27)
- t _____ 11. Chemical properties are often related to how matter reacts with air, heat, and water. (page E28)
- t _____ 12. Chemical properties include the ability to burn, rust, explode, and tarnish. (page E28)
- f _____ 13. You cannot use chemical properties to classify matter. (page E28)

What Makes Up Matter?

Main Idea Matter is anything that has mass and takes up space. It may be a solid, a liquid, or a gas.

Fill in the blanks with words from the box below. Use the words from the yellow sticky note

solid	atom	matter
molecule	states of matter	gas
liquid	physical property	

1. Anything that has mass and takes up space is matter. (page E6)
2. A(n) atom is the smallest particle of matter that has the properties of that matter. (page E7)
3. A(n) molecule is a single particle of matter that is made up of two or more atoms joined together. (page E7)
4. The states of matter are three forms that matter usually takes: solid, liquid, and gas. (page E8)
5. A characteristic of matter that can be observed without changing matter into something new is called a(n) physical property. (page E10)
6. One physical property of a(n) solid is that it always keeps its shape. (page E10)
7. One physical property of a(n) liquid is that it takes the shape of its container. (page E10)
8. One physical property of a(n) gas is that it spreads apart or squeezes together to fit into the space it is in. (page E10)

What Makes Up Matter?

Write *true* if the statement is true and *false* if the statement is false. Highlight the word true or false and drag it to the line.

- true 9. Even things you cannot see, like air, are matter. (page E6)
- true 10. All matter is made up of a single atom. (page E7)
- false 11. Two objects can take up the same space at the same time. (page E7)
- true 12. The smallest particle of water is a molecule made up of three atoms. (page E7)
- false 13. The particles of matter in different states are arranged the same. (page E8)

Fill in the blanks in the table below.

State of Matter	Shape	Example
14. <u>solid</u> (page E10)	Always keeps its shape	Ice
Liquid	15. <u>the shape of the container</u> (page E10)	16. <u>water</u> (page E9)
17. <u>gas</u> (page E10)	Spreads apart or squeezes together to fit into a space	Water vapor