An Analysis of Best Practices and Assistive Technology Tools for Students with Learning Disabilities

Sadie Aronson, Betsy Orr, *University of Arkansas, United States*

Abstract—**Incorporating special education students into the general education classrooms has become increasingly common in today's classrooms. According to the U. S. Department of Education, nearly 99% of students with learning disabilities are receiving "special education and related services" in a general education classroom. This paper addressed what forms of assistive technology are being utilized and how this technology is used in conjunction with general education teaching methods. Best practices are also discussed.**

Index Terms—**assistive technology, best practices, inclusion**

I. INTRODUCTION

INCORPORATING special education students into the general education classrooms has become increasingly common in today's classrooms. According to the U. S. Department of Education, nearly 99% of students with learning disabilities are receiving "special education and related services" in a general education classroom. According to the National Dissemination Center for Children with Disabilities (2013) a learning disability occurs when a person has specific kinds of learning problems most often in reading, writing, listening, speaking, reasoning, and doing math. In the past, it was more common for schools to keep students with learning disabilities in strictly special education classrooms.

The Education for All Handicapped Children Act mandated that all students should be educated in the least restrictive environment. Mainstreaming was considered a least restrictive environment, which meant students were placed in selective general education classes for only part of a school day. A movement referred to as the "Regular Education Initiative" (REI) occurred with the passing of this act. This was a model that stated students with learning disabilities will be educated in a regular class without any other placement options. REI addressed several main issues: a) the exclusion of students in need of special education, b) the absence of special programs until a student failed rather than making the service accessible so that failure could be prevented, c) no promotion of the relationships between parents and educators and d) the use of pullout programs to service special education students instead of adapting the general education setting (Warner, 2009). The Education for All Handicapped Children Act was later renamed the Individuals with Disabilities Education Act of

1997 and focused on the need for students with disabilities to be taught with the same high standards as students without learning disabilities (IDEA). Prior to the passing of this law, schools educated only one in five students with disabilities (Warner, 2009). The general education classroom is now considered the Least Restrictive Environment for students with learning disabilities. Therefore, it is becoming more common for schools to practice complete inclusion. Inclusion is the full-time placement of students with disabilities into a general education classroom. Under inclusion, except in extreme situations, students with learning disabilities will no longer be removed from the general education environment. Inclusion factors include classroom composition, staff, professional development, instruction, and school characteristics (Warner, 2009).

By practicing inclusion in the classroom, general education teachers are becoming the main source of instruction for the students with learning disabilities. While some general education classrooms still have a special education teacher assisting the general teacher, the general education teacher is responsible for presenting the content of the class to all students. Teachers must modify curriculum to fit these special education students into their classroom, or the inclusion model will not be effective. Teachers must also be aware of other needs that come along with inclusion, including the use of Individualized Education Plans (IEP). IEPs are written documents that create the education program necessary for the student with learning disabilities to benefit from education (MacCarthy, 2010). General educators and special education teachers are mandated by law to attend IEP meetings (Ellington, 2009).

There are several best practices that have been established in order to aid general education teachers in adapting to this new classroom dynamic. Teachers should be aware of these practices because it is becoming inevitable that teachers will be practicing inclusion in the classroom due to the increase of students with learning disabilities. Teachers must also find a balance between teaching students with learning disabilities, as well as those without. Inclusion should not harm either group of students; each group of students should receive equal attention and equal chance at succeeding in the classroom. The issue becomes not where to educate, but how to educate. Traditional, previous teaching methods teachers may have used do not always translate well when converting to an inclusion classroom. Therefore, teachers must adapt to use

practices that best meet the diversity that is present within the classroom.

Not only has inclusion become more popular, but assistive technology use is also widely used. Assistive technology is defined as "Any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, improve functional capabilities of individuals with disabilities." (National Dissemination Center for Children with Disabilities, accessed 2013). Assistive technology has also been defined as "devices and software designed specifically for those with learning or physical disabilities" and "powerful tools that support physically challenged students with equal opportunities to more fully participate in the teaching-learning process " (Cobb, 2012). Assistive technology comes in different forms, whether it is through a learning software program or through hardware, such as a Braille keyboard. An example of assistive technology software would be a voice recognition software program that can assist students who are physically unable to type using a keyboard. The technology enables students with learning disabilities to work more efficiently. In previous studies, assistive technology has been shown to enhance life skills and display positive effects for psychological health for students with learning disabilities. Assistive technology can be beneficial because it can be used in the classroom without a lot of obvious attention being placed on the student using the technology. It also allows them to be more active and less isolated during classroom activities.

II. REVIEW OF LITERATURE

Inclusion into the classroom can be difficult due to the complexity at the secondary level, in regard to daily structure (Gadke, 2001). Students have several different teachers and are with different students in nearly every classroom.

Learning disabilities have been on the rise. The range of learning disabilities amongst students greatly ranges. Students with learning disabilities often have at least one processing disorder (Steele, 2008). This may result in difficulties understanding presentations, graphics, lectures, or discussions. Memory disorders are also common in students with learning disabilities (Steele, 2008). This presents an issue when it comes to assessments, problem solving, and application of knowledge. Students with learning disabilities also possess at least one low basic academic skill and may have difficulty with organization and attention (Steele, 2008). Students may have issues completing short-term and long-term homework assignments and maintaining focus during class lectures.

The literature being analyzed in this section describes the benefits and techniques that come from using assistive technology within an inclusion classroom. Literature that discusses the various best practices will also be discussed. Each best practice will be defined and discussed as it is used and applied within the classroom.

A. Incorporating Assistive Technology Tools in the Classroom

By offering computer-mediated learning models in the inclusion classroom, the performance gap can be closed for students with learning disabilities (Seok, DaCosta, Kinsell,

Poggio, Meyen, 2010). Assistive technology can serve as a mindtool for students so that they may be more engaged in critical thinking, and has been proving to enhance academic achievement in the classroom (Seok, DaCosta, Kinsell, Poggio, Meyen, 2010).

Assistive technology can address the variety of learning disabilities that are present in the classroom. Computer learning models has been proven to improve writing skills, stimulate senses, and enhance verbal skills (Seok, DaCosta, Kinsell, Poggio, Meyen, 2010). This technology mediates student's activity and engagement in the learning task and offers immediate positive and negative feedback (Seok, DaCosta, Kinsell, Poggio, Meyen, 2010). Assisted technology creates a learning environment that promotes self-growth, motor skills, oral communication, and participation as well as decreasing the effects of speech and language delays (Cobb, 2012). Students with learning disabilities not only benefit academically from assistive technology, but personally as well. Students who use this technology show an increased enthusiasm and confidence in the classroom. It empowers students due to the increased control they have, develops their social environment, and enhances overall intellectual growth (Kanellis, 2008).

Assistive technology can also be easily transitioned into the general classroom. Teachers can use digital devices into traditional learning centers that are used in the classroom. By using assistive technology, the power can be transferred to the student on the delivery rate of the material (Cobb, 2012). Students can also perform individualized searches on topics being researched, receive a report of their progress, or print out notes taken in class on a Braille document. Assistive technology can allow visually impaired students with audio recordings and provide handouts for hearing impaired students.

B. Incorporating Best Practices in the Inclusion Classroom

Learning disabilities can range from issues regarding information processing, memory, perception, attention, and motivation. It is suggested that these deficits come stem from both brain hemispheres. Therefore, the ideal best practices will apply to both the left and right hemispheres (Seok, DaCosta, Kinsell, Poggio, Meyen, 2010).

Best practices to be used in an inclusion classroom can range from small, minor changes to more major changes within the organization and curriculum of the classroom. Individualized instruction is key in the inclusion classroom so that students at varying levels can all meet the educational standards set within the classroom. Best practices in a classroom are implemented in order to not only ensure the success of students with learning disabilities, but also those students without. Researchers have identified a variety of characteristics that best practices will ideally possess. An effective practice should allow students to enhance problem solving skills, by helping students learn how they can apply their knowledge (Seok, DaCosta, Kinsell, Poggio, Meyen, 2010). Best practices should also aid students in the process of storing and retrieving information (Seok, DaCosta, Kinsell, Poggio, Meyen, 2010). Another characteristic identified is that students are able to represent and express themselves,

self-evaluate, and get then get feedback from instructors (Seok, DaCosta, Kinsell, Poggio, Meyen, 2010).

There are many basic modifications and adjustments that can be made to general education classrooms that can lead to a more effective classroom for students with and without learning disabilities. Changing aspects of lecture time, reading and homework assignments, and assessments can all ensure students with learning disabilities can be active within the classroom and succeed.

To emphasize key concepts in daily lectures and class time, general educators can list these on the board so that students may refer to them and draw connections during the lecture. This modification can help those students who struggle with memory, attention, and organization (Steele, 2008). General educators should also provide graphic organizers, handouts, and other visual displays to narrow the focus of the lesson for students who may struggle with information processing (Steele, 2008). By using prompts during a lecture, teachers can provide clues as to what is most vital to learn from the lecture so students who struggle with organization can better focus their attention on key terms and concepts (Steele, 2008). Review of notes and key terms during class time can assist students with learning disabilities involving memory, writing, or processing deficits. Group work and projects can also assist students with memory and attention issues.

Homework and reading assignments can also be a struggle for students with learning disabilities. For intense and long reading assignments, general educators should point out and provide summaries and the key ideas and purposes of selected readings. Developing mnemonic devices can also be a beneficial tool for students who struggle with memorization. When assigning general homework, it is important to provide clear and specific explanations, both verbally and written (Steele, 2008). Breaking down assignments into smaller segments or allowing students to work in small groups can also be beneficial for students with attention and organizational deficits (Steele, 2008).

Assessments are another aspect of the classroom that students with learning disabilities tend to struggle with. Providing ample study time and test preparation can help enforce important study strategies and assist students who have memory, attention, and organizational deficits (Steele, 2008). When it is test time, encourage students to look over the entire test before beginning. This strategy can help those with attention and organizational deficits. Students with learning disabilities with memorization issues should record down all lists and mnemonic devices they know when they first receive their test. It is also beneficial for students with learning disabilities to practice with different types of questions, such as multiple choice or true/false (Steele, 2008). This can help students feel more comfortable and confident with test taking.

Methods that have been proved to benefit students with learning disabilities include offering individual feedback, interacting with peers and teachers, student responses, and providing direct skill instruction (Gadke, 2001). Other practices used include cooperative learning, collaborative team teaching, curriculum-based assessment, direct instruction, and peer instruction/tutoring (Gadke, 2001). All of these practices can ensure that students with learning disabilities become active and successful participants in the general education classroom.

Cooperative learning involves heterogeneous groups of students working together towards a common goal (Gadke, 2001). It is important to ensure the groups are heterogeneous so that there are a variety of skills being used in the task and so that students with learning disabilities do not feel singled out, but included in the activity. Cooperative learning allows students to work at their own individual pace in a positive manner (Gadke, 2001). Specific benefits to students with learning disabilities who learn through cooperative learning include increased self-esteem, improved social skills and communication, and leadership (Gadke, 2001). In order to ensure the success of cooperative learning, teachers should clearly communicate goals, state the guidelines for the groups, model the techniques being used in the lesson to provide the group with some intellect on how to accomplish the task and increase the responsibility of implementing the tasks to the groups of students (Gadke, 2001).

Collaborative team teaching involves two teachers in the general education classroom. This type of practice is used due to the increase in the number of students that are in an inclusion classroom. General education teachers work with special education teachers in the same general education classroom and simultaneously teach the students. Teachers may either teach at the same time or switch days of teaching. This can be referred to as co-teaching (Gadke, 2001). Sometime the general education teacher may present the bulk of the subject matter, while the special education teacher offers more specialized instruction needed to accomplish the larger tasks, such as how to properly take notes (Gadke, 2001). Co-teachers should plan appropriate teaching strategies based on students' individual situations. Students may benefit from having both teachers present and teaching an equal amount, while others may adapt better when the general educator does the majority of the teaching with the special education teacher assists after the lesson has been presented (Steele, 2008). Successful c-teaching can be achieved when teachers are compatible, there is equity in responsibility, and when the educators provide active individualized instruction to their students (Warner, 2009). Collaborative team teaching can be very beneficial because not all general education teachers possess the proper knowledge, experience, or certification to properly assist students with learning disabilities. Having a special education teacher in the general education classroom can ease this stress being placed on the general educator, with equal ownership of planning and instruction (MacCarthy, 2010). In order for collaboration to be successful, both teachers must know what kind of teaching is needed when, make scheduling a priority, understand that lesson planning is vital, and monitor success and provide feedback (MacCarthy, 2010). There are several different forms of collaborate teaching. The two major forms of collaborative teaching are the direct and indirect method.

The direct method involves a general and special education teacher both delivering instructions in the inclusion classroom (Kanellis, 2008). The two teachers share all responsibility and plan for the class as a team. Successful direct collaboration should include frequent face to face interactions, distribution of leadership responsibilities, and increased social interaction

(Kanellis, 2008). Cooperative teaching is one form of direct collaboration. Cooperative teaching could take the form of a general educator working with an ESL instructor, a gifted teacher or a paraprofessional, as well as the traditional special education teacher (Kanellis, 2008). Collaborative teaching can be achieved through different models. The general educator could do the majority of the teaching, with the special education teacher assisting and supporting as needed. Students could move between two stations in the classroom, with each station being taught by one of the teachers. The two teachers could deliver the lesson separately yet in the same classroom. Small group instruction could be used, with the groups being heterogeneous. Lastly, team teaching is another form of cooperative teaching in which the two teachers present the information together as one joint lesson (Kanellis, 2008).

Indirect collaboration is considered to be the most common collaborative approach (Kanellis, 2008). This type of approach involves two teachers working together outside of the classroom to plan the lessons and instructional material, but only the general educator directly provides the instruction to the inclusion classroom (Kanellis, 2008). Indirect collaboration can be achieved through several different methods. Collaborative consultation is an indirect method in which the special education teacher is available to assist students who seem to still be struggling after the general educator has presented the material alone (Warner, 2009). This consultative method does not require the special education teacher to hold content area certification to provide support within the classroom, unlike other methods such as co-teaching. Peer collaboration is another example of indirect collaboration. This method involves a team of instructors who identify problems, discuss intervention strategies, and evaluate and assesse the student with learning disabilities who struggles within the general education classroom.

Curriculum-based assessment (CBA) is a practice that is used to assess student's needs based on individual school requirements (Gadke, 2001). This type of practice allows teachers to measure the performance of the whole class and can match "student ability to instruction" (Gadke, 2001). CBA is a method in which teachers can observe the performance of the class and can identify which skills have and have not yet been mastered by each student. CBA focuses on the achievement of each individual student, rather than comparing these achievements to other students (Gadke, 2001).

Peer instruction/tutoring is another example of an effective teaching method that can be used within the inclusion classroom. This method can be defined as "a more able child helping a less able child" (Gadke, 2001). Peer tutoring has been shown to not only improve academic achievement in the child with learning disabilities, but also the child without the disability (Gadke, 2001). In order for peer teaching to be successful, teachers should plan structured lessons for the tutors, train tutors to use behaviors that will enable learning, and monitor the performance of both the tutors and the students being tutored (Gadke, 2001).

III. SUMMARY

Inclusion is becoming the newest practice in order to achieve the Least Restrictive Environment, as mandated in the Individuals with Disabilities Education Act. Inclusion involves students with learning disabilities learning in the same classroom with the same curriculum as students without learning disabilities (MacCarthy, 2010). Inclusion has been proven to show that students with learning disabilities are provided with encouraging role models and a caring school community, as well as an improvement in areas of self-discipline, self-esteem, language development (Ellington, 2009). Students who learn in inclusion classrooms are also able to avoid the stigma that pullout programs have, as well as richer friendship networks, and peer acceptance (Warner, 2009).

While inclusion offers many benefits to students with learning disabilities, it can also pose challenges for the educators (Berry, 2006). Teachers must know how to adapt their classroom structure and teaching methods. General educators should be sure to construct lesson plans with more material than is expected to be finished, be prepared to improvise, maintain flexibility, and enjoy teaching the students (MacCarthy, 2010).

In order for inclusion programs to be the most beneficial for students is to ensure new teacher training so that educators can be prepared to properly instruct in an inclusion classroom. Education programs should also be redesigned so that educators may be more aggressively trained in learning of differentiated instruction to teach students with learning disabilities (MacCarthy, 2010). Teachers also must view inclusion in a positive and accepting manner.

With the passing of IDEA, the challenge in education becomes how to best incorporate students with learning disabilities into the classroom. Teachers may not be aware of the best practices that could be incorporated into their classroom in order to ease the transition for students with learning disabilities. It is vital for teachers to receive resources and information regarding effective practices for the inclusion classroom so that all students can succeed, regardless if they have a learning disability.

Assistive technology should be and could be one of the most valuable resources for teachers to use in their inclusion classrooms. Using this technology can also ease the transition into an inclusion classroom. However, it is vital that there should be proper training and use of this technology so that is able to benefit students with learning disabilities in the most effective and efficient way.

By schools increasing the number of inclusion classrooms, the variety within the classroom will greatly differ. It is the teacher's responsibility to adopt the proper practices so that each child in the classroom can succeed, regardless of whether or not they have a learning disability. It is also important to ensure students without learning disabilities are not being forgotten or neglected and are receiving the same amount of attention and instruction as students with learning disabilities.

REFERENCES

[1]. Berry, R. A. W. (2006). Teacher talk during whole-class lessons: Engagement strategies to support the verbal participation of students with learning disabilities. 211-220.

[2]. Cobb, A. (2012) Assistive technology: Enhancing the life skills of students with learning disabilities. 8, 47-51.

[3]. Ellington, W. (2009). Teachers' and specialists' views of the impact of the inclusion model of instruction on students with learning disabilities in secondary education. 1-54.

[4]. Gadke, C. A. (2001). Secondary general education teachers' beliefs and use of "best practices" in inclusive classrooms. 1-109.

[5]. Kanellis, A. M. (2008). Collaborative teaching strategies and methods used between special education and general education teachers in collaborative classrooms. 1-42.

[6]. MacCarthy, N.P. (2010). Attitudes towards inclusion of general education teachers who have and have not taught in an inclusive classroom. 1-32.

[7]. National Dissemination Center for Children with Disabilities, Assistive Technology Act (2013). Accessed October 27, 2013. http://nichcy.org/laws/ata and http://nichcy.org/disability/specific/ld#def

[8]. Seok, S., DaCosta, B., Kinsell, C., Poggio, J. C., Meyen, E. L. (2010). Computer-mediated intersensory learning model for students with learning disabilities. *Tech Trends*, 54, 63-71.

[9]. Steele, M. M. (2008). Helping students with learning disabilities succeed. *The Science Teacher*, 38-42.

[10]. Warner, R. (2009). A comparison of teaching models that promote academic achievement in an inclusive secondary classroom. 1-29.

Sadie Aronson is an undergraduate honor's research student at the University of Arkansas USA (e-mail: saronson@uark.edu)

Dr. Betsy Orr is an Associate Professor at the University of Arkansas, USA specializing in business education and career and technical education (e-mail borr@uark.edu)