THE USEFULNESS OF ALTERNATIVE TESTING ENVIRONMENTS WITH STUDENTS WITH A SPECIFIC LEARNING DISABILITY IN MATHMATICS

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Abstract

The study validates the usage of the accommodation employing an alternative testing environment with 8th grade students with a specific learning disability in mathematics. The students tested the content of order of operations in both the general education classroom and the special education classroom. The special education classroom served as the alternative testing environment. The test scores of the students were compared to validate the usage of an alternative testing environment. The scores of all students increased in the alternative testing environment. The study supports the usage of the alterative testing environment as an accommodation included within a student with a specific learning disability in mathematics' IEP.

Introduction

Background, Issues and Concern

In 2004, George W. Bush signed the reauthorization of the Individuals with Disabilities Act (IDEA) into law. The effects of the reauthorization became operative July 1, 2005. The document made vital changes to IDEA 1994. Some of the major changes in the IDEA 2004 pertained to specific learning disabilities. These changes included: adding measures for finding children with specific learning disabilities (SLD), mandate additional stakeholders within students with SLD educational meetings, added criteria for deeming admissibility in special education for SLD, and outlined the proper documentation and observations to determine eligibility of students being observed for a SLD (U.S. Department of Education, Office of Special Education Programs, 2006).

Children with learning disabilities "have significant differences between the expected success from their mental potentials and their current school success" (Polat et al., 2012 p.3244). There is a gap between what the expected achievement and the current functioning. These differences are usually manifested in the areas of math, written expression, and reading. The students do not have similar testing results as peers. In 2010, there were reported 1,680,000 people (ages 3-21) with a specific learning disability. The most common types of learning disabilities are dyslexia, which is having problems with reading, spelling and writing, dyscalculia, which is having problems with numbers and mathematical concepts, and dysgraphia, which is having problems with hand writing (Polat et al., 2012).

When a student is identified as having a specific learning disability under IDEA 2004, a team of teachers, special education personnel, parents and other local education

agencies meet to review evaluations, observations, and data about the student. Based on this information, the team sets goals, benchmarks, accommodations, and modifications for the students. These items are outlined within the Individual Education Plan (IEP). The IEP is an individualized document that outlines the services and supports that each child within special education will receive (Polat et al., 2012).

Many students are given testing accommodations within their IEP. At the middle school level, students are required to advocate for themselves in order to invoke the usage of the accommodations. The accommodations may pertain to testing environment, testing times, and testing modifications. The accommodation altering the testing environment takes the student out of the least restrictive environment (LRE) and places them in a special education room or other modified setting. Students who do not advocate for themselves and ask for the testing accommodation will stay in the LRE and take the test alongside their nondisabled peers.

Practice under Investigation:

Alternative testing environments aids students with specific learning disabilities, and decreases the discrepancy of students with disabilities and students without disabilities' test scores. The article, "Accommodations: Results of a Survey of Alabama Special Education Teachers" reported that a survey given to Alabama special education teachers showed 2/3 of the teachers reported that students within their class with a disability had an accommodation allowing them to test in the special education room, alternative setting, and/or giving them extra time. The testing accommodations are included within the IEP to level the playing field for students with a disability and their nondisabled peers. In this case, the content of the test is not modified, but the

environment surround the test is modified. In the article, Alabama teachers reported assessment accommodations were devised based on effective classroom accommodations, and the content being taught and tested played into the accommodations provided for the student (Altman, et al., 2010).

This survey followed the teacher's opinions of the successfulness of accommodations for assessment and instruction when the student was mandated to utilize the accommodations. The following study aims to show students the effectiveness of utilizing the accommodations include in the IEP. The results will motivate students to self-advocate, and prove to mainstream teachers that the modifications will increase test scores of students with a specific learning disability.

School Policy to be Informed by Study:

Individualized Education Plans are a mandated document for all students serviced in the special education program. These plans help the student with a disability be successful in the school setting. Most IEPs contain testing accommodations for students with specific learning disabilities. These accommodations are rights that the student is entitled. They cannot be denied access to the accommodations as the IEP is a legal document enforced by the law. But as the student matures, the student needs to advocate for himself or herself. Therefore, the study aims to prove the validity of the alternative testing environment accommodations in hopes for the 8^{th}-12^{th} grade students to advocate this service for themselves.

Conceptual Underpinning

Alternative testing environments will increase student achievement. The No Child Left Behind (NCLB) Act of 2002, aimed to hold teachers and schools accountable.

According to the law, the state must test students annually in math and reading from grades 3-8 and once in grades 10-12. In addition, the state must test in science once in grades 3-5, 6-8, and 10-12. The school has to publicize the report. The report is broken into subgroups as well, and one subgroup is students with disabilities. According to the law, the state must make adequate yearly progress toward meeting the goal of all student proficient in math and reading by the year 2014. Due to these national standards, teachers have turned to testing as a way to evaluate students and monitor growth. The tests yield data that shapes teacher instruction. In order for teacher instruction to be meaningful, the data produced must be reliable and valid. Therefore, no other testing constraints should factor into the data yielded (Federal Education Budge Project, 2014).

High stakes testing, as encouraged by No Child Left Behind (NCLB),has left students with test anxiety. Students with a specific learning disability have more test anxiety and require accommodated testing environments outside of the least restrictive environment to produce reliable test scores that yield data on comprehension of content. Alternative testing environment will eliminate many of the other variables, thereby, increasing achievement on students with disabilities.

Statement of the Problem

Alternative testing settings are common accommodations that students receive with an IEP are given. At the middle school, the students are encouraged to advocate for themselves and ask for their specific accommodation. The accommodations are in place to relieve the student of test anxiety, and produce reliable scores that truly measure students' educational understanding. Many students do not see the benefit to testing

within an alternate environment. Therefore, they do not advocate for themselves and stay within the LRE with their peers.

Purpose of the Study

The purpose is to test the effectiveness of alternative test settings when a student with a specific learning disability is testing in the subject of mathematics. In order for the student to advocate for themselves, they need to find value within the accommodation. Students need to see the effectiveness of the alternative testing environment in statistical data. When the student can numerically see the advantage to testing within the accommodated classroom versus the regular testing environment, then the student will self-advocate to test in the accommodated setting.

Research Question

When the IEP meeting is set and accommodations and modifications are set, the IEP should question the validity of the accommodations and modifications included within the legal document. A common accommodation alters the setting in which the student tests. This study aims to answer the question: Is there a difference in special education student achievement in mathematics between alternative testing settings compared to traditional testing settings?

Null Hypothesis

Focused by way of the research question, this study aims to prove to students that alternative testing settings do help students with a disability achieve at higher levels. Therefore, the students need to advocate for their right to test in such settings. While doing so, the study aims to disprove the null hypothesis. The null hypothesis states, there

is not a difference in special education student achievement in Math between alternative testing settings compared to traditional testing settings.

Anticipated Benefits of the Study

The outcomes of the study will illustrate the benefits of testing in an alternative test setting compared to testing within the regular education classroom. Thus, the study will provide evidence to students with a specific learning disability the benefits of advocating for the right to test in alternative settings. While providing evidence to the students to advocate for themselves, the study will validate the need for the accommodation for students to test in alternative settings included within an IEP.

Definition of Terms

The information included within this study is pertinent to the special education field of study. Therefore the acronyms and jargon included within this study can be quite confusing. First and foremost, the Individuals with Disabilities Act of 2004 (IDEA) determined eligibility for special education services. In addition, the act outlines the rights of a student with a disability. One of their rights is an IEP. An IEP, or individualized education plan, is personal educational plan that each student within special education has to tailor to their needs in order to be successful. There are accommodations and modifications to keep them within the least restrictive environment at all time. An accommodation differs from a modification in that an accommodation does not reduce or change the learning goal. Whereas, a modification does have change the learning goal or reduce the content in some way. Both of these are put in place to education the student in the least restrictive environment (LRE). Within IDEA, it states the students with a disability will be educated alongside their peers without disabilities.

The students will only be pulled into a separate environment when the disability prevents education within the general education classroom with supplementary supports to yield satisfactory results.

Summary

According to IDEA, students with a learning disability will be educated alongside their peers with accommodations and modifications in place. The accommodations are outlined within the student's IEP. One common accommodation included within IEPs of students with specific learning disabilities alters the testing environment. As No Child Left Behind (NCLB) has made high stakes testing a common practice, the anxiety of students with learning disabilities has increased. This alternative testing environment accommodation aims to relieve anxiety and help student with specific learning disabilities achieve at a higher level.

As a student progresses in their educational career, the need to advocate for themselves is an emphasis. This starts with students at the middle school age. Students do not feel the need to advocate for themselves, unless they can visually see the differences in outcomes. This study aims to prove to students that alternative testing environments will increase achievements. While providing evidence to students, the test will validate the need to implement the alternative testing environment accommodation on future and current IEPs.

Review of Literature

In 1975, the Education for All Handicapped Children Act (P.L. 94-142) was signed into law. This was the first set of legislations that gave students with disabilities the right to a free and appropriate education. Before the law, students with disabilities were discriminated based upon their differences and held out of public schools. In 1992 and 2004, this law was widen to better clarify the disabilities and outline the rights of individuals with disabilities. These laws were termed: Individuals with Disabilities Act (IDEA). As previously stated, the most current reauthorization of IDEA better outlined the procedures and rights of students with a specific learning disability. Specific learning disabilities are currently manifested within the areas of math, written expression, and reading (U.S. Department of Education, Office of Special Education Programs, 2006).

Students with a specific learning disability can be very good in all subjects of school but struggle within one subject, like math. It is not that the students are trying less or slacking off in math, but they have a specific learning disability in math. Scientifically this is known as developmental dyscalculia, which can be compared to dyslexia in reading. Students who struggling with a hard math concept do not have a disability of dyscalculia. People with dyscalculia struggle with number sense in general. Early diagnosis and intervention is the key to success for students. The student will never be "healed" from the math struggle, but can be given coping methods to overcome barriers (Flora, 2013).

Students with a specific learning disability in math need differentiated instruction to be successful within the least restrictive environment. The study by The Society for

Research on Educational Effectiveness in partnership with H. Swanson. C. Lussier, and M. Orosco reviewed ways to instruct student with a specific learning disability in mathematics. First, it was pointed out that there is a problem with the working memory that leads to deficits in mathematical disabilities. The study placed students in three groups. One group was instructed by verbal strategies, one group received verbal and visual instructional strategies, and the other group received visual instructional strategies only. It was found that students did best when instructed with both visual and verbal strategies (Swanson, et al., 2011).

Though differentiated instruction does aid students with comprehension of content material, it does not bridge the deficit between test scores of students with disabilities when compared with their nondisabled peers. In order to make test scores truly reflective of the student with a disability's learning, the testing environment needs to accommodate for the differences in students with disabilities and students without disabilities. According to the article, "Test anxiety Research: Students with Vision Impairments and Students with Mild Intellectual Disabilities," students with intellectual disabilities and students with visuals impairments disabilities scored high in fear/worry over the test and had greater emotional, physical reactions to the test. Students with these impairments were tested on test anxiety according to Speilberger's Test Anxiety questionnaire. There was a discrepancy between the genders of the students, but the main goal of the study looked at test anxiety. The findings showed that greater supports were needed for students with visual impairments and intellectual disabilities when testing when compared to their nondisabled peers (Datta, 2014).

To combat this test anxiety, the testing environment can be altered. When making accommodations and mortification to a test, first, the administrator needs to look at the unchanged construct. A test is used to measure a target skill or knowledge base. The unchanged construct simply means that the goal or target skills is not affected. Then, the administer needs to look at the individual needs. The differential effect states that the students with the disability would benefit more from the change than the student without the disabilities. Finally, the administrator looks at the sameness of inference. This means that the results are more comparable between the two groups with the modification. These definitions were proposed by Hollenbeck and colleagues in the article, "Testing Accommodations: Theory and Research to Inform Practice". The article bases a case study that looks at the extended time accommodation, read aloud during math accommodation, and package accommodations off the definitions by Hollenbeck and Colleagues. All of the accommodations previously listed had mixed findings when looked at under the scope of Hollenbeck and colleagues. The students with disabilities and students without disabilities benefited from all of the three accommodations, then the differential effect was put into questions. This alone brings us the questions of validity of the said accommodations (Kettler, 2012).

To farther comment on the fairness and validity of the testing accommodations we look to the article by Lang and Colleagues entitled, "The Effects of Testing Accommodations on Students' Performance and Reactions to Testing". This article reviews accommodations for testing of students with disabilities and students without disabilities. It takes into account the validity for using such accommodations. The accommodations are not meant to increase scores, but rather increase motivation and

other personal factors, thus the scores are indirectly affected. The researchers tested for predictions dealing with the fairness of alternative testing, and the affective outlook of the testing. It was found that using accommodated testing for students with and without disabilities on the TerraNova Battery, the scores were higher scores. The score differentiation had a larger discrepancy for students with disabilities than students without disabilities. Thus, the accommodations made the scores of students with disabilities and students without disabilities more comparable (Lang et al., 2008).

There are a variety of testing accommodations. Some accommodations alter the way they test is given, or the test looks. Other accommodations alter the way a student responds on the test. Still other accommodations alter the time, setting, or scheduling. There are specialized alternative accommodations for the linguistically based accommodations as well. In the article, "Determining Appropriate Testing Accommodations" in the *Teaching Exceptional Children* education journal, the process in which the accommodations are chose is outlined. The accommodations are be outlined in the IEP meeting and comprised by the multidisciplinary team. The multidisciplinary team looks at the resources the schools has, and makes the accommodation fitting to the student and resources available. After the accommodation is used, the accommodation should be evaluated. The team should look at the scores of the student and the success of the student. In addition, the perceptions of the teachers, parents and students should be considered when evaluating the accommodation. This is not a one shot try. The IEP team can phase old accommodations out and replace with new ones; it is a trial process (Salend, 2008).

The need for an adaptive environment for test taking is far from perfect. With the new technology advances, the utilization of computers has been studied. The study described in the article, "Development and Evaluation of a Confidence-Weighting Computerized Adaptive Testing", looked at the usage of computer adaptive testing (CAT). The CAT gives randomized multiple choice questions based off of the responder's previous remarks. If the test taker answers wrong, then the computer will give an easier question to increase self-efficacy. CAT was introduced in efforts to help self-confidence of test takers and the easy of grading. The study looked at the self-efficacy of a student who takes a multiple choice test versus taking a CAT. Two different types of CAT were administered and the findings showed there was not a difference in the achievement of the male, 12th graders on either of the CAT tests when compared to the multiple choice test. The study did not show that there was an increase in confidence by low test takers either. The precision and confidence may be a something to look at in the future (Yen et al, 2010).

The study by Lee, Osborn and Carpenter looked at the new advances of technology and computerized testing and looked at the standard accommodations of extended time. Their findings were very interesting. The study looked at the alternative testing environments through computer based testing such as the CAT, and using the age-old extended time testing accommodation. The study was done with college age students. Through the study there were no conclusive accommodation aids. Rather, the study showed the most beneficial environmental factor was a "quiet" environment with "low distractibility", a "comfortable environment" with "a window with natural light", and a "comfortable temperature" (Lee, Osborne, Carpenter, 2010).

Research Methods

Research Design

The study questioned the validity of alternative testing environments as an accommodation for students with a specific learning disability in mathematics. Prior to both, the experimental and control test, the students received the same instruction within a co-teaching classroom. The control test was given within the least restrictive environment. The students with disabilities tested alongside their peers without disabilities. The test was comprised of five questions covering the content of order of operations. Each of the questions was worth four points. Thus, the total of the test was 20 points. Then, the same group of students was given an alternative, experimental test. The same operations were asked of the student, but the order was mixed and the numbers were changed. The test totaled 20 points with five questions valued at four points. This aided in the reliability and validity of the tests when comparing. The experimental test was given in the special education room with natural lighting and no disruptions. The room included the five students and the case manager. These controlled variables ensured the dependent variable of the test scores, was only affected by the independent variable. The independent variable was the environment in which the students tested.

Study Group Description

The eighth grade class at the middle school where the study was conducted has 152 students. Of those 152 students 12 students are identified with a disability under IDEA. The study took into account all the students within the eighth grade identified with a specific learning disability in mathematics. The students were taught in the LRE of a co-taught classroom with the special education teacher and math content teacher.

The study population was comprised of five students with a specific learning in mathematics. All five of the students are instructed in the same co-teaching classroom. The five students had the same case manager that handles the implementation of their IEP and sees to compliance. The students took the control test within the same math classroom with the same peers. The students took the experimental test within the same special education classroom with the same lighting, distractions, and proctor.

Data Collection and Instrumentation:

After the eight days of instruction, the students were given the same quiz to test their knowledge. The test was given on a Thursday in the regular education classroom. The students with a specific learning disability in mathematics were given the test alongside their peers without disabilities. The students were not given any accommodations, such as, the test was read to them, use of notes, or alternative seating. The test was the same for all students with and without disability.

The following day, Friday, the students with a specific learning disability in mathematics were give a similar test in an alternative testing environment. As previously mentioned, the same operations were asked of the student, but the order was mixed and the numbers were changed. The point value, scoring, and scorer were the same for both tests.

Statistical Analysis Method

The study looks at the difference of test scores between the experimental setting, or the alternative setting, and the control setting, or the co-taught classroom. In order to evaluate the difference between the alternative testing environment and the least restrictive environment of the co-taught classroom, a t-test was used. The t-test looks at

the averages or means of the experimental test given in the alternative setting and the control test given in the LRE, co-taught classroom. Then, the t-test evaluates the means by the range of variability of the data established from the experimental test and control test. This estimation produces the standard error of difference. The formula for a t-test divides the difference of means by the standard error difference to yield the t-test score. The t-test method is best used to compare to sets of data. The specific t-test utilized in the study was the matched t-test. This ensured that the answers were compared within each setting to find the significant difference.

Findings

After the tests were scored by the regular education teacher, they were input into the Statistical Analysis program. The program compared student's test taken within the regular education classroom with the tests taken in the alternative testing environment. The groups were matched pairs with five students participating in the tests.

Table 1

t-Test Analysis Results for Test Given in the Classroom and Test Given in the Alternative Testing Environment

Source	Mean	Mean D	*t*-test	df	*p*-value
Control Test (n=5)	13				
Experimental Test (n=5)	15.2	-1.8	-3.09	4	.037

Note: Significant when p<=0.20

When using utilizing the alternative testing environment it was suggested that the alternative environment does, in fact, yield higher reading comprehension scores. As shown in in Table 1, there is a very significant difference (t-test= -3.09; p=0.037) between utilizing the alternative testing environment with students with a specific learning disability in mathematics when compared to the alpha level of .20. The null hypothesis stated: there is not a difference in special education student achievement in Math between alternative testing settings compared to traditional testing settings. The null hypothesis can be rejected with over an 80% confidence level. This shows the significant difference of utilizing the alternative testing environment and remaining within the LRE to test. The mean of the students given the test within the regular education classroom was 13, while the mean for the same students given the test within

an alternative testing environment was 15.2. Thus, the difference of the means (Mean D) was -1.8, and there were 4 data points that were free to vary. The data supports the accommodations frequently used within at IEP that students with a specific learning disability in mathematics may test in an alternative testing environment.

Conclusions and Recommendations

The data shows that students with a specific learning disability test better in an alternative environment, free from distraction and with natural lighting. Every students' scores improved in the alternative setting when compared to the least restrictive testing environment. The test was not modified, but the students' needs were accommodated for. Therefore, the test yielded reliable scores to reflect student learning that can be compared with nondisabled peers.

The findings are concrete evidence for students and teachers to validate the reasoning behind the accommodation included within the individualized education plan. Within a secondary school setting, the students must advocate for themselves. The IEP usually reads, "Per student request". This study shows that the students should advocate for themselves, and request to test in an alternative testing environment. The alternative testing environment yields higher scores given the same content covered on each of the tests with a very high confidence level. In addition, this study shows teachers the alternative testing environments will be more reflective of students' with disabilities knowledge, than testing in the least restrictive environment, or general education classroom. The alternative testing environment eliminates distractions and produces an environment that tests only the content, not other emotional or social distractions. The teacher can better reflect on a test that is free from variability, when looking at student growth and teacher instructional practices.

Accommodations and modifications are utilized to help students with disabilities' test scores become more comparable with their nondisabled peers. It was noted previously that the accommodations are used to level the playing field, and not to give the

students with disabilities an advantage. In farther studies, it would be interesting to compare the test scores of the students with a specific learning disability in mathematics in both context, the general education classroom and the alternative testing environment, with their nondisabled peers. This would test the fairness of the alternative testing environment from a nondisabled peer's perspective.

All in all, the students with disabilities scored higher when tested within an alternative setting. All students increased their scores given the same content, the same grader, and the same instruction. The study shows the validity of the testing accommodation frequently included in and IEP. In addition, the study gives concrete data to validate the need for students with such accommodations to advocate for themselves and utilize their right to an alternative testing environment. The study shows teachers advantages to utilizing the alternative testing environment with students with a specific learning disability in mathematics in order to gain reflective, comparable data.

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