Educational Statistics III Project:

Increasing the Use and Positive Perceptions of Assistive Technologies in Inclusion Classrooms through Professional Development

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**The Research Topic**

Upon further research on the inclusion model, it is suggested that teachers are reluctant to teach in an inclusion setting. Also, research has shown that the attitude educators hold toward the practice of inclusion is an important determinant of the success of inclusive education for students with disabilities (Burack et al.,1997; Segall, 2007). There have been studies conducted involving students with disabilities and the improving of communication and social skills in these students. The majority of such studies also involve assistive technologies as our society moves forward in the technological age. The argument persists that argumentative and alternative communication (AAC) provided by such technologies will continue to improve the social and communication skills of autistic children (Burnden, Tinnerman, Lunce, & Runshe. 2010). Existing methods involve participation by the teacher, but lack concern for teacher training and professional development using such tools and practices with children diagnosed with autism spectrum disorder (ASD) (Hwang. 2011). Therefore, the main purpose of this study answers the following research questions:

* Do use of assistive technology and teacher perception of benefits of using assistive technology differ by professional development training (teachers that completed professional development vs. teachers that did not complete professional development)?
	+ Ho: Use of assistive technology and teacher perception of benefits of using assistive technology do not differ by professional development training (teachers that completed professional development vs. teachers that did not complete professional development).
	+ Ha: Use of assistive technology and teacher perception of benefits of using assistive technology differ by professional development training (teachers that completed professional development vs. teachers that did not complete professional development).

Purpose:

The purpose of this study is to provide a deeper look into the relationship between the training of general education teachers in an inclusion classroom and the use of assistive technologies, specifically students diagnosed with autism. This study will specifically look at how much off an effect professional development has on the use, motivation, and perception of benefits of the use a given assistive technology in an inclusion classroom setting by observing a group of general ed. elementary teachers that complete a training or professional development (experimental group) versus a group of teachers that do not receive training on how the use that technology (control group). Data will be collected based how many times the teachers are using and implementing the technology on a daily basis throughout the time of the training. Furthermore, the research will include specific assistive technology incorporated into the inclusion classrooms participating in the study and will use the TPACK model with both teachers and students involved.

**Review of Literature**

 Before Public Law 92-142, the needs of students with disabilities were met through self-contained special-education classes. Public Law 94-142, enacted in l975, specified that all handicapped children between the ages of 3 and 18 must have a free and appropriate public education. The Individuals with Disabilities Education Act (IDEA) came next in1990 and was reauthorized in 1997 and 2004. The main purpose of the IDEA is to ensure students with disabilities are given a free appropriate public education (FAPE), regardless of ability (National Research Center for ADHD. 2013). According to recent statistics from the National Center for Education Statistics (2009), “95 percent of 6- to 21-year-old students with disabilities were served in regular schools; 3 percent were served in a separate school for students with disabilities; 1 percent were placed in regular private schools by their parents; and less than 1 percent were served in one of the following environments: in a separate residential facility, homebound or in a hospital, or in a correctional facility (U.S. Department of Education, National Center for Education Statistics (2012).”

*1.1 History of Inclusion:*

 With that knowledge comes the increase of the inclusion classroom model. The inclusion classroom setting involves students with disabilities being serviced in the general education classroom with the primary teacher being the general education teacher. There is no pullout or alternative classroom. Implementation of these practices varies by school. Students with special needs are being put in the ‘least restrictive environment’ (LRE). There two basic types of inclusion: push in or full inclusion. The "Push In" model has the special education teacher come into the regular classroom to provide instruction and support to children. The push in teacher will bring materials into the classroom. The special education teacher in this model mostly provides instructional support to the general education teacher. "Full Inclusion" places a special education teacher as a full partner in a classroom with a general education teacher. The general education teacher is the teacher of record, and is responsible for the child, even though the child may have an IEP. Inclusion is becoming increasingly more common in public education. By 1995, 891 school districts in 50 states reported offering inclusive education programs (National Center on Educational Restructuring and Inclusion, 1995).

*1.2 Assistive Technology Implications*

 Assistive technology can be defined as "any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities."(Wikipedia, 2014). With in increase in inclusion settings in school systems today, Dr. Cavanaugh of the University of North Florida, states the importance of general education teachers need to become familiar using assistive technologies in order to include students with disabilities in the regular education setting.

 This is where the implementation of the TPACK model of instruction would come into play. Before teachers can implement the use of new and existing technologies, they need to learn not only how to teach their students how to use them, but become familiar with all aspects of the technologies themselves. TPACK is an emergent model of knowledge and the basis of effective teaching with technology. This method requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones (Koehler& Mishra, 2009).

*1.3. Inclusion and Teacher Training*

Research has shown special education teachers and school psychologists have a higher knowledge of strategies and methods used to teach students with disabilities. This is due in large part to literature that suggests many general educators would not able to successfully state what an efficient inclusion classroom looks like (Kilanowski, Foote, & Rinaldo, 2010). Teachers, especially general education teachers, need to be aware of the fast growing numbers of students with disabilities many schools face today. Other research further indicates the support by federal law for inclusion settings with all special needs students. Dr. Cavanaugh at the University of Florida (2013) suggests that all teachers at some point are likely to encounter students with disabilities throughout the course of their career. Such research suggests a lack of pre-service an in-service training among general education teachers set to work in an inclusion setting. Are pre-service teachers introduced to the idea of an inclusion setting? What, if any, types of services are offered to general education teachers already working in an inclusion setting? For these reasons, it is crucial to implement TPACK into professional development and university courses when preparing pre- and in- service teachers are learning to implement assistive technologies in their classroom.

Other authors have focused on the importance of assistive technologies in working with students with disabilities. One particular study discusses how computer-assistive technologies (CAT) can help improve the social, communicative, and language skills of students with autism (Ploog, Scharf, Nelson, &Brooks, 2013). One of the most common aspects of the autism spectrum disorder has to do with poor social and communication skills. Sam Carlson (2012), Executive Director of World Links, states in his research how important it is for teachers to become properly trained in using educational technologies in order to students to receive the most beneficial instruction from using such tools. World Links program suggests that at least eighty (80) hours of professional development are required before teachers can really begin to integrate technology into their teaching.

**Methodology and Design:**

Research Design:

This study consists of a mixed method with a focus on qualitative design due to the focus on teacher experience and perception of using assistive technology in the classroom. This multiple-case study that uses a quasi-experimental design using pre and post- test results in order to observe teachers prior to the actual study will be used. The groups of the participants are pre-existing from already formed inclusion classrooms within the Canonsburg School District in Canonsburg, Pennsylvania. One group will be the experimental group in that the regular education teachers received training through professional development in using specific assistive technology using the TPACK model and the other group will be the control group that did not participate in the training provided for this particular assistive technology.

Sampling Procedure and Intended Sample:

Cluster sampling is used with specific inclusion classrooms from school districts in the Southwestern Pennsylvania area. The intended samples are teachers already working with students whom have been diagnosed with mild to moderate autism in an elementary school setting. Students are in primary grade levels (K-2). The study will be conducted over a full school year, starting with pre-service trainings. The IRB application process consists of appropriate release forms from administration, teacher participants, student participants, and parents to ensure privacy protection.

Population for generalization:

Population for generalization is limited to a specific location in Southwestern Pennsylvania, particularly in the Pittsburgh area. Also limited is the willingness from teachers to participate in the study. This, along with the training from the experimental group of teachers limits the population. Lastly, the technology resources available are considered in the population used for the study. Certain school districts may have limited access to assistive technology resources or may not be willing to allow certain resources to be used. Therefore, this study chose schools that had access to iPads with the Able ACC Free App.

Instruments:

Instruments used must be conducive to student ability and tolerance. Multi-touch tablets or iPads used in training or professional development had to be available to the teachers and student participants involved in the study. This study will look at the iPad App ‘Able AAC Free’. This app is designed specifically for children with autism. It works on communication, behavior interventions, social skills, and language. Limitations of location and experience using such technologies can affect the validity of this study. Ipad accessibility must be available to the teachers involved in the intervention.



Figure 1. *Able AAC Free App*

Description of data/variables:

This study uses observed variables, how many times does the student use the app on a daily basis. Data was collected using a feature on the iPads denoting when the app was used as a part of daily lessons. Teacher participants were asked to regularly record this data to ensure accuracy. The researcher also accessed the data on a weekly basis to check or outliers. Independent variables were the two groups: teachers that went through the training program and the group of teachers that did not go through the training program. The criterion variable is the amount of hours recorded using the Able ACC Free App during class. Surveys were also created and used a data to measure teachers’ perception of the benefits of the assistive technology and motivation on implement the assistive technology into their classroom.

Analysis techniques: Two types of analysis are used in this study involving exploratory factor techniques. The researcher will look for patterns in communication of students, teacher experience, and presentation of how to use assistive technology tools. The researcher will also look for patterns in experimental group, where teachers have had intervention training in using the Able ACC Free app versus the control group where the teachers did not receive the training prior to having students use the iPad App. *Are teachers with more experience and training presenting information to students differently? How? Is this affecting how students are using the tools and in turn affective their improvement in communication?*

**Data Analysis:**

Upon defining the basis for this study, the researcher used statistical techniques in order to determine how many participants were necessary to have the strongest effect size and the strongest power. More specifically, the more statistical power that a study has, the greater the probability of rejecting the null hypothesis when it is false. This simply means that the power of a statistical test is the probability of making the correct decision. Similarly, the stronger the effect size, the greater extent to which the groups differ on the dependent variable prior to the treatment. G\*Power 3.1.2 statistical software was used to find the appropriate number of total participants needed to maintain strong power (0.80) and a small effect size (0.25). Results found that 128 total participants were needed to maintain these statistics. The researcher divided this number evenly into the 2 groups (control group, N=64, experimental group, N=64)

To examine the research question, a multivariate analysis of variance (MANOVA) will be conducted to assess if mean differences exist.  The MANOVA is an appropriate statistical analysis when the purpose of research is to assess if mean differences exist on more than one continuous dependent variable by one or more discrete independent variables.  For this research question, the continuous dependent variables are the use of assistive technology and teachers’ perception on the benefits of using assistive technology; the independent variable have the following groups (teachers that completed the professional development, teachers that did not complete the training). MANOVA assesses whether mean differences among groups on a combination of dependent variables are likely to have occurred by chance.  The MANOVA creates a linear combination of the dependent variables to create a grand mean and assesses whether there are group differences on the set of dependent variables.  The MANOVA uses the *F* test; the ratio of two independent variance estimates of the same population variance.  The *F*-test allows researchers to make the overall comparison on whether group means differ.  If the obtained *F* is larger than the critical *F*, the null hypothesis is rejected.  The assumptions of normality and homogeneity of variance/covariance matrices will be assessed.  Normality assumes that the scores are normally distributed (bell shaped) and will be assessed using the one sample Kolmogorov Smirnov test.  Homogeneity of variance assumes that both groups have equal error variances and will be assessed using Levene’s test.

A one-way MANOVA was conducted to evaluate the relationship between teacher training through professional development (factors) and the effect is has on use, motivation, and perception of benefits of using the technology (dependent variable). The factors had two levels (training versus no training). The level of significance was set at .05. The  is typically set this low so the researcher can minimize the probability of type 1 error (saying the groups differ when they do not.).

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| --- |
| **Table 1.** Descriptive Statistics |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ProfessionalDevelopment | Mean | Std. Deviation | N |
| HouresofUseofTechnology | AttendedProfessionalDevelopment | 59.1200 | 18.15107 | 125 |
| DidNotAttendProfessionalDevelopment | 7.3520 | 5.69558 | 125 |
| Total | 33.2360 | 29.20438 | 250 |
| PerceptionofBenefit | AttendedProfessionalDevelopment | 1.9680 | 1.81808 | 125 |
| DidNotAttendProfessionalDevelopment | 3.3920 | 1.73622 | 125 |
| Total | 2.6800 | 1.91213 | 250 |

**Results**

 The one-way MANOVA was chosen because more than one dependent variables (type of teacher) with two factors exist, testing the differences among the levels of factors (training versus no training).

We can look at the descriptive statistics and see a total mean of 33.24 for hours of use of technology and 2.68 for Perception of Benefits. The standard deviation (total) was equal to 29.20 for hours of use of technology and 1.91 for perception of benefits. The group of teachers who went through the training appears to have a higher mean for hours of use of technology and at 59.12 and the group of teachers who did not participate in the training had a much lower mean score at 7.35. The std. deviations did not have as much difference between the two groups with perception of benefits, as the teachers who went through the training had a std. deviation of 3.39 for and the teachers who did not go through the training had a std. deviation of 1.97.

The Box’s Test of Equality of covariance was used to test the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups. This test showed significance at p ≥ .001. Table 2 below shows the results of the test:

|  |
| --- |
| **Box's Test of Equality of Covariance Matricesa** |
| Box's M | 139.053 |
| F | 45.946 |
| df1 | 3 |
| df2 | 11070720.000 |
| Sig. | .000 |

The Levene’s Test of Equality of Error Variance was conducted to test the null hypothesis that the error variance of the dependent variable is equal across groups. This test showed significance at F (1, 248) =107.40 and p >.001 for hours of use of technology. This test was not significant for the perception of benefits with the results at F (1, 248) =.173 and p >.678 Post hoc tests were not performed for group because there were less than three groups. This may lead to future studies involving additional groups, each completing a different training module on assistive technology to test for the effect of the quality of training and use of assistive technology.

The results of the Wilk’s Lamnda show significance with the Perception of Benefits at F(2, 247)=462.05) at p>.001. We can conclude that the use of assistive technology and teacher perception of benefits of using assistive technology differ by professional development training (teachers that completed professional development vs. teachers that did not complete professional development).

**Table 32,247.** Significance of teaching training with One-Way MANOVA (Wilk’s Lambda)

|  |  |  |  |
| --- | --- | --- | --- |
|  F | d1 | d2 | Sig. |
| Intercept 1222.66 | 2 | 247 | .000 |
| Percep. 462.05 | 2 | 247 | .000 |

**Conclusion**

“We like the pupils, have to build on our own computer literacy skills. Some of these skills will be the same as our pupils”, was a statement made in a paper presented by Hofmeister (1983) at the National Conference on the Use of Microcomputers in Special Education (p.25). He appears to be stating the significance of the professional development of teachers in order to keep up to date on the last technologies shared to students in the classroom.

Now, more that ever, we need to ensure that all children are given an equal opportunity to a free and public education. Sydeski (2013) writes that the Council for Exceptional Children (CEC) is known as the largest professional organization of teachers, administrators, higher education faculty, researchers and others concerned with the education of children with disabilities. The CEC acknowledges technology as a driving force that will shape the future of the nation and that it can “facilitate learning, engage students and create opportunities for adaptation and creativity that benefit all learners” (CEC, 2012). I believe administrators, inclusion teachers, and researchers, such as Sydeski, who believe in the importance of inclusion and the use of assistive technologies can benefit from looking into this study and it’s results, limitations, and future implications.

Limitations:

A lot of factors are being considered in the methodology and research design of this study. Students and teachers may relocate before the conclusion of the stud, which may cause to re-direct the study. Also, students may be unable to communicate or reflect upon instruction given by teachers trained or not trained in using the assistive technology. Other limitations and concerns not mentioned may also affect the design and method of this study. Furthermore, access to participants and facilities may change, which may cause new designs and methods to be implemented. Also, outliers such as inaccurate measures of use may affect the data collected in this study. Lastly, the sample is from one specific area. Samples from other regions in the United States may provide from a more well-rounded study, as well as, a better representation of the target population.

Future Research:

 Reflecting back on the purpose of this study, a few questions arise that may result in future studies or research concerning assistive technology and professional development.

1. Does the quality of training or professional development have an effect on student use of assistive technology?
2. Is the inclusion classroom an appropriate setting for assistive technology, or should it be limited to the special education classroom?
3. What is in impact of assistive technology concerning teacher and student communication?

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