A Comparison of Two Curricular Models of Professional Development to Increase Teacher Repertoires for Instructing Students with Autism

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Abstract

This study compared the effectiveness of two curricular models of professional development to increase teacher repertoires for instructing students with autism. Specific focus was on the use of a Blended Model of professional development in comparison to a Behavioral Model of professional development in regard to increasing teacher knowledge, teacher self efficacy, teacher self report and teacher application of instructional methods, strategies, and learning supports with students with autism. The findings suggest that when the goal is to specifically increase teaching repertoires for applying instructional methods, strategies, and learning supports to students with both mild/moderate and severe autism the blending of both behavioral and socio-emotional approaches for teaching students with autism may be more effective.

A Comparison of Two Curricular Models of Professional Development to Increase Teacher Repertoires for Instructing Students with Autism

Autism is one of the fastest growing disorders and within the last ten years annual growth in the diagnosis of the disorder has increased by 17% (Autism Society of America, (ASA) (2006). According to Centers for Disease Control and Prevention (CDC) (2007) 1 in every 150 children are diagnosed with autism. The current prevailing view of autism considers it to be a spectrum disorder in which symptoms and characteristics are defined by a certain set of behaviors that present themselves in a wide variety of combinations and degrees ranging from mild to severe (ASA, 2005; APA, 1994). This heterogeneity of autism in which symptoms and characteristics in the areas of social interaction, communication, and restricted, repetitive, and stereotyped patterns of behavior manifest in a wide variety of combinations and degrees ranging from mild to severe (ASA, 2005; APA, 1994; WHO, 1992) has made it difficult to conduct research to determine appropriate educational treatment for individuals with autism. Given this heterogeneous nature of the disorder a singular method that is either a behavioral approach or socio-emotional approach may not be effective for a particular behavior, skill, or individual (ASA, 2005).

Implementation of any instructional method or intervention requires that teachers be trained in its effective application to meet the needs of students with autism. Although some teachers may receive training in a specific singular method they are often not required to have specific training in evidence-based practices specifically designed for individuals with autism (National Research Council, 2001). The teaching certifications

required for teaching students with autism vary according to each state's specific requirements. Although some states have recently added certification requirements which require specific university coursework to be completed in autism others have minimized special education requirements. In many states, special education certifications are no longer a standalone certificate and teachers need to hold a general education certificate with an endorsement appropriate to the subject or grade level to be taught. This trend has further limited the qualifications of teachers for teaching students with autism. Therefore, teachers may not have the teaching repertoire needed to address the heterogeneous learning needs of students with autism.

This study investigated the relative effectiveness of a behavioral model of professional development versus a blended model of professional development that draws upon multiple approaches for teachers of students with autism. The heterogeneity of autism, the scarcity of specialized preparation for special education teachers in teaching students with autism, and the traditional use of singular approaches provide the rationale for evaluating the relative effectiveness of a blended model relative to a singular behavioral model for teachers to increase their repertoire of skills for teaching students with autism. The purpose of this study was to compare an intervention designed to train teachers in a Blended Model with an intervention designed to train teachers in a Behavioral Model.

Specific focus was on the use of a blended model in comparison to the behavioral model in regard to increasing teacher knowledge of autism, teacher self efficacy of use of instructional methods, strategies and learning supports, teacher self report of use of instructional methods, strategies and learning supports, and teacher application of instructional methods, strategies and learning supports with hypothetical cases of students with autism. Specific research questions were: Do treatment groups differ significantly on posttest measures of (a) teacher knowledge, (b) teacher self efficacy, (c) teacher self report of use of instructional methods and strategies and learning supports, (d) teacher application of instructional methods, strategies, and supports to hypothetical cases of students with autism? Does application of instructional methods, strategies and supports by teachers differ significantly for students with mild/moderate and severe levels of autism? Are there any significant interactions among the effects of type of treatment and severity of autism in terms of teacher application of instructional methods, strategies, and supports to hypothetical cases of students with autism? Are there significant correlations between (a) teacher knowledge, (b) teacher self efficacy , (c) teacher self report of use of instructional methods and strategies and learning supports, (d) teacher application of instructional methods, strategies, and supports to hypothetical cases of students with autism?

Method

Participants

There were 48 participants in this study. All were teachers recruited from various school districts and school settings throughout New Jersey, New York and Pennsylvania. Recruitment of teachers was conducted by advertising with local school districts, educational agencies, and universities and included teachers who taught in various

settings including school-based specialized classes and programs, inclusion programs, preschool integrated school settings, center-based early intervention programs, and home-based programs. A screening questionnaire was administered to determine demographic variables for each participant.

The demographic characteristics measures were coded to form nine categorical variables. Equal numbers of subjects were randomly assigned to groups – two experimental and one control, using a JavaScript random number generator. Each group contained 16 participants. Pearson Chi-Square tests were conducted to compare groups on each of the categorical demographic variables. The results for each categorical demographic variable (level of education ($\chi^2 = 1.592$, 6 *df*, p=.953), years of teaching experience ($\chi^2 = .821$, 6 *df*, p =.991), specialized training ($\chi^2 = 7.714$, 14 *df*, p =.904), teacher certification ($\chi^2 = .750$, 6 *df*, p =.991), type of disability taught ($\chi^2 = 1\ .872$, 10 *df,* p =.997), family member with disability ($\chi^2 = .671$, 2 *df*, p =.715), age ($\chi^2 = 1.882$, 6 *df*, p =.930), gender ($\chi^2 = .000$, 2 *df*, p =1.000), and geographical location of teacher ($\chi^2 = .263$, 4 *df*, p =.992) were not statistically significant. All participants who completed the pretesting went on to complete the training and post testing for both groups. The control group completed the pre-testing and six weeks later completed the post-test.

Materials

The Blended Model curriculum was divided into 10 lessons. Lessons 1-3 provided background information of autism and a review of the diagnosis of autism including diagnostic components, symptoms, and characteristics associated with autism. These lessons were intended as a review for teachers and/or to establish foundational knowledge and information needed to participate in the proceeding lessons of the training.

Lessons 4-9 provided teachers with knowledge and instruction in using a blended model to teach students with autism. These lessons focused on instructing teachers in a pedagogical approach that blends of key elements of behavioral approaches and socio-emotional approaches to instruct students with autism. Specific aspects covered are instructing teachers in use of positive and differential reinforcement (Cooper, Heron, & Heward, 1987; Snell, 1983), selecting reinforcement to meet individual student needs (Cooper, Heron, & Heward, 1987; Snell, 1983; Deci & Ryan, 2002), use of prompting procedures (Cooper, Heron, & Heward, 1987; Snell & Brown, 2006; Schopler, et al., 1995),calibrating teaching language and interactive teaching style (Greenspan & Weider, 1997, Prizant et al. 2002; Prizant et al. 2006), teaching students self-regulation (Wehmeyer, Agran, Hughes, 1998; Agran, 1997) and joint attention skills (Mundy et al. 1994; Mundy et al. 1996; Hobson, 2005) and use of the three-term contingency and a trial format of instruction (Skinner, 1953; Baer, Wolf & Risley, 1968; Hart & Risley, 1968, 1974; Lovaas, Koegel, Simmons, & Long, 1973; Koegel & Schreibman, 1977; Lovaas, 1987; Koegel & Koegel, 2006), to facilitate student engagement and learning. Lesson 10 was an overall summary of the curriculum.

The Behavioral Model curriculum was also divided into 10 lessons. Lessons 1-3 provided background information of the current crisis of autism and a review of the diagnosis of autism including diagnostic components, symptoms, and characteristics associated with autism. These lessons were intended as a review for teachers and/or to establish

foundational knowledge and information needed to participate in the proceeding lessons of the training. Lessons 4-10 provided teachers with knowledge and instruction in using a behavioral model to teach students with autism. Lessons focused on instructing teachers in selecting and defining target behaviors, data collection procedures (Cooper, Heron, & Heward, 1987), use of the three-term contingency, a trial format of instruction (Skinner, 1953; Baer, Wolf & Risley, 1968; Lovaas, Koegel, Simmons, & Long, 1973; Koegel & Schreibman, 1977; Lovaas, 1987; Koegel & Koegel, 2006), prompting, reinforcement and schedules of differential reinforcement practices (Snell, 1983; Cooper, Heron, & Heward, 1987). Lesson 10 was a summary of the curriculum.

Assessment instruments (*Teacher Knowledge of Autism and the Educational Treatment of Autism Questionnaire, Teacher Self-Efficacy of Use of Instructional Methods, Strategies, and Supports for Students with Autism, Teacher Self Report of Use of Instructional Methods, Strategies, and Supports for Students with Autism* and *Performance Assessment of Application of Use of Instructional Methods, Strategies, and Supports*) were initially developed by the researcher based on literature about each treatment approach. To test for face validity all four assessments were presented to thirteen reviewers including teachers, clinicians, and experts experienced in both behavioral and socio-emotional approaches of instructing students with autism. Reviewers shared and aided in the revision of each item of all four assessments. Revisions made each item and assessment more specific to each dependent variable of the study. To determine validity and reliability for testing measures a split-half reliability and coefficient alpha was computed.

To measure the dependent variable of teacher knowledge the *Teacher Knowledge of Autism and the Educational Treatment of Autism Questionnaire* pretest was administered. This assessment consisted of 30 multiple choice questions that measured teacher knowledge of the diagnosis and classification of autism, symptoms, and characteristics associated with the disorder, and educational approaches used for students with autism. Each question was answered with either a correct response or an incorrect response and a dichotomous scale (1 = correct response and 0 = incorrect response) was used to score responses. The maximum score for this assessment was 30 points. In summary for Teacher Knowledge the split-half reliability was .77, and coefficient alpha was .846.

To measure the dependent variable of teacher use of instructional methods, strategies, and supports the *Teacher Self-Efficacy of Use of Instructional Methods, Strategies and Supports for Students with Autism* was administered. This instrument was a 30-item checklist in which teachers rated their efficacy of their knowledge and instructional skills in teaching students with autism using a Likert scale. Scoring was as follows: 3=I feel I have the knowledge and skills needed, 2=I feel I have some knowledge and skills needed in this area, 1=I feel knowledgeable in this area but I do not feel I have the skills needed, 0=I do not feel knowledgeable or skilled in this. The maximum score for this assessment was 90 points. In summary on use of instructional methods and strategies and learning supports as measured by the self-efficacy instrument, the split-half reliability was .94, and coefficient alpha was .97.

To measure the dependent variable of teacher use of instructional methods, strategies, and supports the *Teacher Self-Report of Use of Instructional Methods, Strategies, and Supports for Students with Autism* was administered. This instrument was a 30 item checklist in which teachers reported on the frequency in which they utilized instructional methods, strategies, and learning supports with their students with autism using a Likert scale. Scoring was as follows: 4=Always, 3=Most of the time, 2=Sometimes, 1=Rarely, 0=Never. The maximum score for this assessment was 120 points. In summary on use of instructional methods and strategies and learning supports as measured by the self-report instrument, the split-half reliability was .94, and coefficient alpha was .97.

To measure the additional independent variable of level of autism as it relates to teacher application of instructional methods, strategies, and supports the *Performance Assessment of Application of Use of Instructional Methods, Strategies, and Supports* was administered. This instrument measured teacher application of instructional methods, strategies, and supports to teach students identified as having autism in the mild to moderate range versus the moderate to severe range. This instrument consisted of four case studies in which two depict hypothetical students with mild to moderate autism and two case studies depict students in the moderate to severe range. Teachers were presented with a consistent set of six questions across all four case studies which were designed to measure their capacity to apply instructional methods, strategies, and supports with students with autism. Responses were categorized as follows: 0= Response indicates insufficient understanding, no appropriate answers, and/or major errors. 1= Response indicates limited understanding, is incomplete, and/or contains major errors. 2=Response indicates substantial and appropriate understanding but may have minor errors. 3= Response is correct and the underlying reasoning process is appropriate and clearly communicated. Response may contain minor errors if any. The four case studies and their corresponding questions were grouped into two categories: mild and severe. Each category received a categorical score. The maximum score for each category was 36 points. Both scores were totaled yielding one composite score for a grand total. The maximum score for this assessment was 72 points. In summary for Supports for Students with Autism and Performance Assessment of Application of Use of Instructional Methods, Strategies, and Supports the split-half reliability was .88, and the coefficient alpha was .95.

Given that the teacher application of instructional methods, strategies and learning supports to hypothetical cases was scored by two raters an inter-rater reliability score was calculated to assess the level of consistency between the two raters. The inter-rater reliability was calculated by using the Kappa statistic to determine consistency among raters. Each rater rated 24 items for the pre-test and 24 items for the post test. The inter-rater reliability for the pre-test was found to be Kappa=.90 ($p<0.001$), 95% CI (0.504, 0.848), while the inter-rater reliability for the post-test was found to be Kappa=.91 ($p<0.001$), 95% CI (0.504, 0.848).

Design and Procedure

The independent variable of primary interest in this study was type of training. An additional independent variable, which relates specifically to the dependent variable listed below of application of instructional methods, strategies and learning supports to hypothetical cases, is level of autism. There were three groups in total with two being experimental groups and one a Control group. One experimental group received training in the Blended Model and the other received training in the Behavioral Model of instruction. The Control group did not participate in training.

There are two levels of autism: mild/moderate and severe. The dependent variables of primary interest were (a) teacher knowledge, (b) teacher self-efficacy, (c) teacher self report of use of instructional methods, strategies, and supports, and (c) teacher application of instructional methods, strategies, and learning supports to hypothetical cases.

A one-way analysis of variance design comparing the three treatment groups was used for the dependent variables of teacher knowledge, teacher self-efficacy, and use of instructional methods, strategies, and learning supports. In addition a 3X2 factorial analysis of variance with repeated measures on the second factor was used to measure differences on the dependent variable of application of instructional methods, strategies, and supports to hypothetical cases by teachers in regards to mild/moderate and severe levels of autism.

Pretesting for the Blended group was completed during a group session in a classroom setting. The Behavioral group completed pretesting during a separate group session in a classroom setting. The Control group completed pretesting in a group session separate from both the Blended group and the Behavioral group in a classroom setting. Once the pretesting phase of the study was completed participants in each of the experimental groups (Blended group and Behavioral group) participated in training sessions.

Training sessions consisted of ten group instructional sessions, 10 on-line discussions and 10 follow-up sessions on Blackboard. All sessions were two and half hours long, and were taught by the investigator in a classroom setting at a local university. During each in-person training session participants listened to a lecture, received and viewed a PowerPoint presentation, and participated in a discussion on the topic. As follow-up to each in-person training session participants participated in an on-going on-line discussion via Blackboard Discussion Board. Each participant also was able to access PowerPoints and references via the Assignment section of BlackBoard.

All participants in the Blended group and the Behavioral group completed post testing upon completion of the training sessions. Post testing for both the Blended group and the Behavioral group was administered during separate final sessions. The Control group completed post testing in a single session separate from both the Blended group and the Behavioral group.

Results

This study compared three treatment groups on the dependent variables of (a) teacher knowledge, (b) teacher self efficacy, (c) teacher self report of use of instructional methods, strategies and learning supports, (d) teacher application of instructional methods, strategies and learning supports to hypothetical cases in regards to mild and severe levels of autism. The results are presented in the following sections: preliminary analyses, followed by the main analyses, which includes posttest data addressing each research question. Results pertaining to each research question are reported using the following statistical procedures: one-way analysis of variance, analysis of covariance, a general linear model with repeated measures, and Pearson product-moment correlations.

Preliminary Analyses

To begin the analysis of the pretest data, descriptive statistics were run to obtain the means and standard deviations (SD) for each measure. Results are displayed in Tables 1 (see Table 1 & Figure 1).

One-way ANOVAs were used to determine if significant initial differences existed between the three groups (Blended, Behavioral, and control) on pretest measures of teacher knowledge, teacher self-efficacy, and teacher self report of use of instructional methods, strategies and learning supports.

A General Linear Model 3(group) x 2(severity) factorial ANOVA with repeated measures on the second factor was used to determine if there were significant differences among the three treatment groups and whether the teachers' application of instructional methods, strategies, and supports to hypothetical cases differed significantly for students with mild/moderate and severe levels of autism. The one-way ANOVA on teacher knowledge indicated that the three groups differed significantly on the teacher knowledge pretest ($F(2, 45) = 6.056$, $p < .05$). Using the Bonferroni method for Post Hoc Tests, it was determined that the mean teacher knowledge score for the Control group ($M = 18.678$) was significantly ($p < 0.05$) higher than the mean for the Blended group ($M = 13.187$) and Behavioral group ($M=12.187$). The Blended group ($M=13.187$) and the Behavioral group ($M=12.187$) did not differ. On the teacher self-efficacy pretest, the one-way ANOVA indicated that there was no statistically significant difference among the three groups, however the Control Group had the highest mean ($M = 45.875$). The Blended Group had the second highest mean ($M = 37.562$), and the Behavioral Group had the lowest mean ($M = 32.437$) (see Table 1).

On teacher self-report of use of instructional methods, strategies and learning supports as measured by the self-report pretest the one-way ANOVA indicated a statistically significant difference amongst the three groups ($F(2, 45) = 9.157$, $p<.01$). Using the Bonferroni method for Post Hoc Tests, it was determined that the mean self-report of use score for the Control group ($M = 48.937$) was significantly ($p < .05$) higher than the mean for the Blended group ($M =34.687$). However, the mean difference between the Behavioral group ($M = 53.875$) and the Control group ($M =48.937$) was not statistically

significant. On the other hand, the mean score for the Behavioral group (M = 53.875) was significantly ($p < .05$) higher than the mean for the Blended group (M = 34.687). The results of the between groups and within groups ANOVA pretest for teacher knowledge, teacher self-efficacy, and teacher self-report are displayed in Table 2 (see Table 2)

A General Linear Model 3(group) x 2(severity) factorial ANOVA with repeated measures on the second factor was used to determine if there were significant differences among the three groups and whether the teachers' application of instructional methods, strategies, and learning supports to hypothetical cases differed significantly for students with mild/moderate and severe levels of autism on the pre-test. The between-subjects effect for *groups* ($F(2, 45) = .590$, $p > .05$) was not statistically significant. The within-subjects effect for severity level ($F(1, 45) = 13.429$, $p < .05$) was statistically significant. The *Severity*Group* interaction ($F\ 2, 45) = 1.980$, $p > .05$) was not statistically significant. Results are displayed in Table 3 (see Table 3).

For the pretest and post measures of (a) teacher knowledge, (b) teacher self efficacy, (c) teacher self report of use of instructional methods, strategies and learning supports, and (d) teacher application of instructional methods, strategies and learning supports to hypothetical cases, Pearson *r* correlations were run to determine if there were any significant relationships between the pre and post-test scores on each dependent variable. Although the pattern of pre- to post- correlations for the total sample generally supports the assumption of linearity of regression, there was not sufficient support for the assumption of an ANCOVA analysis. Therefore, a decision was made to use an ANOVA for the main analyses. The data displayed in Table 4 shows the correlation coefficients between the variables for the pre-test measures (see Table 4).

Main Analysis

To analysis for the posttest data for the question: Do treatment groups (Blended Model training vs. Behavioral Model vs. Control) differ significantly on posttest measures of: (a) teacher knowledge, (b) teacher self efficacy , (c) teacher self report of use of instructional methods and strategies and learning supports, (d) application of instructional methods, strategies, and learning supports to hypothetical cases of students with autism?; descriptive statistics were run to obtain the means and standard deviations for each measure (see Table 1).

ANOVAs were used to determine if significant increases occurred on post-test measures of teacher knowledge, teacher self-efficacy, and teacher self report of use of instructional methods and strategies and learning supports, after the Blended group received the Blended Model training, and the Behavioral Group received the Behavioral Model training. A General Linear Model 3(group) x 2(severity) factorial ANOVA with repeated measures on the second factor was used to determine if there were significant increases among the two treatment groups and whether the teachers' application of instructional methods, strategies, and supports to hypothetical cases differed significantly for students with mild/moderate, and severe levels of autism.

Teacher Knowledge.

The ANOVA on teacher knowledge indicated that the mean teacher knowledge score for the Blended Group increased from a pre-test mean (*M* = 13.187) to a post-test mean (*M* = 22.812). The Blended Group mean increase was 9.625 points, which was the highest mean increase of the three groups. The Behavioral Group had the second highest mean increase. The Behavioral Group increased from a pre-test mean (*M* = 12.187) to a post-test mean (*M* = 20.937). The Behavioral Group mean increase was 8.75 points. The Control Group had the lowest mean increase. The Control Group increased from a pre-test mean (*M* = 18.687) to a post-test mean (*M* = 19.062). The Control Group mean increase was .375 points (see Table 1).

Self-Efficacy.

On the teacher self-efficacy post-test, the ANOVA indicated that the mean score for the Blended Group increased from a pre-test mean (*M* = 37.562) to a post-test mean (*M* = 66.312). The Blended Group mean increase was 28.75 points, which was the highest mean increase of the three groups. The Behavioral Group had the second highest mean increase. The Behavioral Group increased from a pre-test mean (*M* = 32.437) to a post-test mean (*M* = 56.687). The Behavioral Group mean increase was 24.25 points. The Control Group had a negative mean increase. The Control Group decreased from a pre-test mean (*M* = 45.875) to a post-test mean (*M* = 45.187). The Control Group mean decrease was -.688 points (see Table 1).

Self-Report of Use of Instructional Methods, Strategies, and Learning Supports.

On teacher self-report of use of instructional methods and strategies and learning supports as measured by the self-report post-test the ANOVA indicated that the mean score for the Blended Group increased from a pre-test mean (*M* = 34.687) to a post-test mean (*M* = 84.437). The Blended Group mean increase was 49.75 points, which was the highest mean increase of the three groups. The Behavioral Group had the second highest mean increase. The Behavioral Group increased from a pre-test mean (*M* = 53.875) to a post-test mean (*M* = 85.062). The Behavioral Group mean increase was 31.187 points. The Control Group had a negative mean increase. The Control Group decreased from a pre-test mean (*M* = 48.937) to a post-test mean (*M* = 44.937). The Control Group mean decrease was -4 points (see Table 1).

A General Linear Model 3(group) x 2(severity) factorial ANOVA with repeated measures on the second factor was used to determine if there were significant differences among the three treatment groups and whether the teachers' application of instructional methods, strategies, and learning supports to hypothetical cases differed significantly for students with mild/moderate and severe levels of autism on the post-test. The between-subjects effect for *groups* ($F(2, 43) = 35.740$, $p>.05$) was statistically significant.

The mean for teachers' application of instructional methods, strategies, and learning supports to hypothetical cases differed significantly for students with mild/moderate

levels of autism indicated that the mean score for the Blended Group increased from a pre-test mean (M = 8.062) to a post-test mean (M = 25.5). The Blended Group mean increase was 17.438 points, which was the highest mean increase of the three groups. The Behavioral Group had the second highest mean increase. The Behavioral Group increased from a pre-test mean (M = 9.937) to a post-test mean (M = 15.937). The Behavioral Group mean increase was 6 points. The Control Group had no mean increase. The Control Group had a pre-test mean (M = 11.375) and a post-test mean (M = 11.375) (see Table 1).

The mean for teachers' application of instructional methods, strategies, and learning supports to hypothetical cases differed significantly for students with severe levels of autism indicated that the mean score for the Blended Group increased from a pre-test mean (M = 7.250) to a post-test mean (M = 25.5). The Blended Group mean increase was 18.250 points, which was the highest mean increase of the three groups. The Behavioral Group had the second highest mean increase. The Behavioral Group increased from a pre-test mean (M = 6.5) to a post-test mean (M = 15.5). The Behavioral Group mean increase was 9 points. The Control Group had no mean increase. The Control Group had a pre-test mean (M = 9.625) and a post-test mean (M = 9.625) (see Table 1).

In regard to the second question of: Does application of instructional methods, strategies and supports to hypothetical cases by teachers differ significantly for hypothetical cases of students with mild/moderate and severe levels of autism? A General Linear Model 3(group) x 2(severity) factorial ANOVA with repeated measures on the second factor was used to determine whether teachers' application of instructional methods, strategies, and supports to hypothetical cases differed significantly for students with mild and severe levels of autism (see Table 5). The within-subjects effect for *severity* ($F(1, 43) = .255$, $p>.05$) was not statistically significant.

In regard to the third question: Are there any significant interactions among the effects of type of treatment and level of autism in terms of application of instructional methods, strategies, and learning supports to hypothetical cases of students with autism? A General Linear Model 3(group) x 2(severity) factorial ANOVA with repeated measures on the second factor was used to determine whether there was a significant group*severity interaction for teachers' application of instructional methods, strategies, and supports to hypothetical cases (see Table 5). The *Severity*Group* interaction ($F(2, 43) = .575$, $p>.05$) was not statistically significant. Results are displayed in Table 5 (see Table 5).

In regard to the fourth question: Are there significant correlations between (a) teacher knowledge, (b) teacher self efficacy , (c) teacher self report of use of instructional methods and strategies and learning supports, (d) application of instructional methods, strategies, and supports to hypothetical cases of students with autism? A Pearson r was used to calculate a correlation matrix between teacher knowledge, teacher self efficacy, teacher self report of use of instructional methods, strategies and supports, and teacher application of instructional methods and strategies and learning supports to hypothetical cases to determine if there were any significant relationships between the independent

and dependent variables. The correlation coefficient between the variables post-knowledge and post-efficacy (r= .518) suggest a moderate positive relationship. The correlation coefficient of between the variables post-knowledge and post-performance (r=.428) suggest a low positive relationship. Similar, the correlation coefficient between the variables post-knowledge and post-report (r=.390) also suggesting a low positive relationship. The correlation coefficient between the variables post-efficacy and post-performance (r=.422) suggest a low positive relationship as well. The correlation coefficient between the variables two variables post-performance and post-report (r=.543) suggest a moderate positive relationship. On the other hand, when examining the correlation coefficients of the variables post-efficacy and post-report (r=.690) a high positive relationship is yielded.

These correlation coefficients reveal that there were statistically significant relationships between the dependent variables. Although some of the magnitudes of the correlation coefficients display low positive relationships, most of the relationships were statistically significant, suggesting that there is a low probability that these correlations occurred simply by chance. Results are summarized in Table 6 (see Table 6).

The results of the main analyses indicated that the mean scores of both the Blended group and the Behavioral group increased significantly after the two experimental groups received the Blended Model training and the Behavioral Model of instructional training, were as the Control group had a low or negative mean increase on all four post-test measures: teacher knowledge, teacher self-efficacy, teacher self-report of use, and teacher of application of instructional methods, strategies, and supports to hypothetical cases. Although there were not significant differences between the mean increases of the Blended group and the Behavioral groups' means, on post teacher knowledge, post self-efficacy, or post self-report of use, means for the Blended group were generally higher than those for the Behavioral group. On post-test application of instructional methods, strategies, and supports to hypothetical cases, there was a significant difference between the two groups' means, with the post-test means for the Blended group being higher than the post-test mean for the Behavioral group. There were no significant post-test differences for the severity levels. The correlations among the measures were generally moderate and positive.

Discussion

The results of this study supported the hypothesis that teachers who received training in a Blended Model for teaching students with autism would increase their teaching repertoires. However, teachers who received the Behavioral Model for teaching students with autism also increased their teaching repertoires. Although the increase in teaching repertoires for the participants in the Behavioral group was limited to certain areas, there was still evidence supporting an overall increase in their teaching repertoires.

Both the Blended group and the Behavioral group had mean increases that were significantly higher than the mean increases for the Control group when pre-test and post-test mean increases are compared using the measures of teacher knowledge, teacher self

efficacy, and teacher self report of use of instructional methods, strategies and learning supports. For the post test measures of teacher knowledge, teacher self efficacy, and teacher self report, there were not significant differences between the mean increases for the Blended group and the Behavioral groups' means scores, but the mean increases for the Blended group were generally higher than those for the Behavioral group.

These findings are interesting in that there were not significant differences across experimental groups in regard to training in a singular behavioral approach and a blended approach of teaching which blended singular approaches together into one pedagogical approach to teaching students with autism. The behavioral approaches that were blended were singular in that they are devoted to the implementation of specific teaching strategies and procedures within the educational setting. Both experimental groups obtained increases in means relative to the control group in the areas of teacher knowledge of the diagnosis and classification of autism, symptoms, and characteristics associated with the disorder, and educational approaches used for students with autism, teaching self efficacy of their knowledge and instructional skills in teaching students with autism, and the frequency of use of instructional methods, strategies, and learning supports with their students with autism. It is suggested that both types of training enhanced participant's exposure and awareness of autism and educating students with autism which possibly led to the participants from both groups being highly motivated with stronger self efficacy beliefs regarding their knowledge and instructional skills for teaching students with autism and a greater tendency to use these instructional methods, strategies, and learning supports with their students with autism.

In regard to correlations between teacher knowledge, teacher self efficacy of their knowledge and instructional skills for teaching students with autism, teacher self report of use of instructional methods, strategies and learning supports, application of instructional methods, strategies, and learning supports to hypothetical cases, there were significant relationships. The strongest correlation was the relationship between post teacher self efficacy and post-teacher self report of use of instructional methods, strategies and learning supports. Participants that rated their efficacy of their knowledge and instructional skills in teaching students with autism high also reported a high frequency of use of instructional methods, strategies, and learning supports with students with autism. This finding suggests that teachers who feel and believe they have the knowledge and instructional skills in teaching students with autism are more likely to report that they utilize instructional methods, strategies, and learning supports with their students with autism more frequently. This is supported by the additional correlation between post teacher knowledge and post-teacher self-efficacy which was also positive.

There was also a moderate positive correlation between post teacher self report of use and post-application, suggesting that increased use of instructional methods, strategies, and learning supports with students with autism may be directly related to the application of instructional methods, strategies, and learning supports to teach students with autism. Also supporting this suggestion were the low positive correlations between post-teacher knowledge and post-application and between post teacher self efficacy and post-application. An additional correlation, although also low, was post teacher knowledge

and post teacher self-report of use which also suggests that when teachers have the knowledge of the diagnosis and classification of autism, symptoms, and characteristics associated with the disorder and educational approaches that can be used for students with autism the frequency of use of instructional methods, strategies, and learning supports with students with autism increases.

In regard to teacher application of instructional methods, strategies and supports to students with mild/moderate versus severe levels of autism there were no significant post-test differences or interactions between the two severity levels of autism. The significant pre-test difference between the two severity levels disappeared on the post-test, largely because of the strong performance of the teachers in the two intervention groups on items pertaining to both levels of severity. However, there was a significant difference between the two treatment groups on the overall mean increase in the application measure. The mean increase of the Blended group was 18.250 points and the mean increase of the Behavioral group was 9 points suggesting that the participants in these two groups applied instructional methods, strategies, and supports to students with autism with more confidence. The larger mean increase of the Blended Group also suggest that the participants in the Blended Model of instructional training did significantly better than the participants in the Behavioral Model of instructional training when it came to applying instructional methods, strategies, and learning supports to teach students with autism. This finding suggests that singular behavioral approaches that are devoted to, the implementation of specific teaching strategies and procedures within the educational setting may not provide teachers with the skills needed to apply instructional methods, strategies, and supports to a range of situations in the instructional setting.

It is suggested that socio-emotional components when blended with behavioral approaches provide teachers with a more comprehensive repertoire of instructional methods, strategies, and learning supports to apply in the instructional setting with students with autism. This may be because the blending of both types of approaches provides teachers with an approach that is a broader model they can utilize to meet the heterogeneous learning needs of students with autism.

This study examined several different variables that have not been previously studied in teachers of students with autism. Assessments were developed to measure the different variables of teacher knowledge of autism, teacher self efficacy of use of instructional methods, strategies and supports, teacher self report of use of instructional methods, strategies and supports, and teacher application of instructional methods and strategies and learning supports with students with mild/moderate versus severe autism. These assessments were developed and identified by consultation with experts in both behavioral approaches and socio-emotional approaches; however this may have been a limitation. In the future a factor analysis for each assessment is warranted to test how the items can be clustered together. Additionally more extensive item analysis should be performed and the construct examined more carefully. It is also possible that the number and content of the items representing each approach is insufficient. Future research should address these validity issues.

Continued research in this area should focus on conducting future studies with a larger sample, more extensive training for participants, inclusion of a component which links findings to student achievement, inclusion of a qualitative component, and inclusion of participants from various regions and internationally. In regard to replicating the study with a larger sample this could allow for the more sensitive detection of other possible differences in the impact of the two training approaches. In regard to increasing the amount of training, more extensive training would provide further information which may produce increased teaching repertoires.

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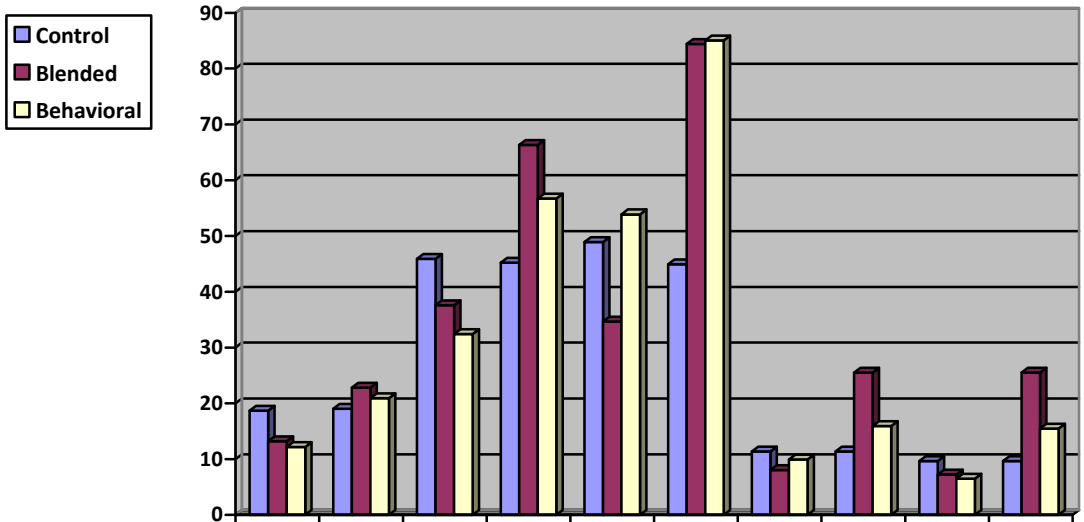
About the Author

Lisa Dille, Ed.D., is an Assistant Professor of Education and researcher in the field of autism and special education. She holds an undergraduate degree in special education, an MA and EdM in special education, and a doctoral degree in Autism and Intellectual Disabilities from Teachers College, Columbia University. Currently, Lisa is the Chair of Special Education Programs and the Director of the Autism Institute at Georgian Court University in Lakewood, NJ in which she teaches and mentors Masters students preparing for careers in the education of individuals with autism. As a research fellow at Teachers College and in her current position at Georgian Court University, Lisa worked on numerous research projects focusing on investigating effective approaches for teaching students with autism. Her current research focuses on developing effective methods of increasing educator repertoires for instructing students with autism. Lisa is a certified special education teacher and administrator who has taught in both the private and public sector. She also is a mother of a teenage daughter with autism.

Table 1 Means and Standard Deviations (SD) for Pre & Post Test

Pre & Post Test	Control		Blended		Behavioral		Total	
	M	SD	M	SD	M	SD	M	SD
Pre-test Teacher Knowledge	18.687	6.674	13.187	5.166	12.187	4.996	14.687	6.271
Post-test Teacher Knowledge	19.062	6.115	22.812	2.455	20.937	1.611	20.937	4.132
Pre-test Self Efficacy	45.875	28.415	37.562	23.383	32.437	14.823	38.625	23.100
Post-test Self Efficacy	45.187	28.218	66.312	16.660	56.687	10.600	56.062	21.324
Pre-test Self Report of Use	48.937	31.642	34.687	8.514	53.875	34.312	45.833	28.035
Post-test Self Report of Use	44.937	35.630	84.437	11.769	85.062	11.769	71.479	30.414
Pre-test Teacher Application Mild/Moderate Autism	11.375	8.716	8.062	5.720	9.937	10.102	9.791	8.546
Post-test Teacher Application Mild/Moderate Autism	11.375	8.853	25.500	5.977	15.937	5.182	17.604	8.965
Pre-test Teacher Applications Severe Autism	9.625	8.546	7.250	5.686	6.500	8.602	7.791	7.685
Post-test Teacher Applications Severe Autism	9.625	8.507	25.500	6.250	15.500	4.774	16.708	9.155



	Pre-Kno	Post-Kno	Pre-Self Eff	Post-Self Eff	Pre-Self Rep	Post-Self Rep	Pre-Teach App Mild/Mo	Post-Teach App	Pre-Teach App Severe	Post-Teach App
Control	18.687	19.062	45.875	45.187	48.937	44.937	11.375	11.375	9.625	9.625
Blended	13.187	22.812	37.562	66.312	34.687	84.437	8.062	25.5	7.25	25.5
Behavioral	12.187	20.937	32.437	56.687	53.875	85.062	9.937	15.937	6.5	15.5

Figure 1 Pre & Post Test Mean Scores

Table 2 *Analysis of Variance for Pre & Post Test*

		Sum of Squares	Df	Mean Square	F	Sig.
Pre-test Teacher Knowledge	Between Groups	392.000	2	196.00	6.056	.005
	Within Groups	1456.312	45	32.362		
	Total	1848.312	47			
Post-test Teacher Knowledge	Between Groups	112.500	2	56.250	3.667	.033
	Within Groups	690.313	45	15.340		
	Total	802.813	47			
Pre-test Self-Efficacy	Between Groups	1471.625	2	735.812	1.402	.257
	Within Groups	23609.625	45	524.658		
	Total	25081.250	47			
Post-test Self-Efficacy	Between Groups	23.500	34	.691	1.057	.480
	Within Groups	8.500	13	.654		
	Total	32.000	47			
Pre-test Self-Report	Between Groups	14869.042	2	7434.521	9.157	.000
	Within Groups	36535.938	45	811.910		
	Total	52404.979	47			
Post-test Self-Report	Between Groups	16910.167	2	8455.083	14.322	.000
	Within Groups	26565.813	45	590.351		
	Total	43475.979	47			

Table 3 *General Linear Model 3 X 2 ANOVA for Pretest Application Scores*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Group	145.146	2	72.573	.590	.558
Error (between)	5530.688	45	122.904		
Severity	96.000	1	96.000	13.429	.001
Severity*Group	28.313	2	14.156	1.980	.150
Error (within)	321.688	45	7.149		

Table 4 *Correlations of Pre and Posttest Variables*

	Control n=16	Blended n=16	Behavioral n=16	Total Sample n=48
Pre/Post Knowledge	.850**	.324	.548*	.327*
Pre/Post Efficacy	.987**	.765**	.632**	.705**
Pre/Post Use	.983**	-.032	.942**	.597**
Pre/Post Applications	.989**	-.132	.576*	.327*

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 5
General Linear Model 3 X 2 ANOVA for Post Application Scores

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Group	3983.069	2	1991.535	35.740	.000
Error (between)	2396.054	43	55.722		
Severity	1.555	1	1.555	.255	.616
Severity*Group	7.016	2	3.508	.575	.567
Error(within)	262.397	43	6.102		

Table 6 Correlation Matrix of Independent and Dependent Variables

Scale	Post-Teacher Knowledge	Post-Self Efficacy	Post-Performance	Post-Self Report
Post-Knowledge	1			
Post-Efficacy	.518**	1		
Post-Performance	.428**	.422**	1	
Post-Report	.390**	.690**	.543**	1

**Correlation is significant at the 0.01 level (2-tailed).