

## Special Education Teacher Candidates' Use of Evidence-based Practices and Their Impact on Student Learning

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The purpose of this study was to demonstrate special education teacher candidates' ability to impact their students' learning. Candidates selected and implemented evidence-based interventions while in their clinical practice placements. A university supervisor provided online support as candidates designed and implemented the instructional project with their students. Single-subject design methodology and calculations of the percentage of non-overlapping data points (PND) for each project were used to evaluate the effectiveness of each intervention. Results indicated that the teacher candidates were able to select appropriate evidence-based interventions and that the interventions had a positive impact on student learning.

The emphasis on identifying teacher quality in terms of teachers' impact on student performance has become increasingly pronounced. Initially, the *No Child Left Behind (NCLB) Act* (2001) provided a specific directive that teachers use evidence-based practices to improve outcomes for students. More recently, The Interstate Teacher Assessment and Support Consortium (InTASC), in its Model Core Teaching Standards (2011), explicitly stated that "The teacher knows a range of evidence-based instructional strategies... and how to use them effectively" (InTASC 2011, p. 16). Similarly, the Council for the Accreditation of Educator Preparation (CAEP) requires educator preparation program providers to present evidence of their teacher candidates' effectiveness with their learners. In its newly published accreditation standards (CAEP, 2013), as well as in its associated evidence guide (CAEP, 2014), CAEP emphasizes that the value of a teacher preparation program is largely determined by the positive impact its clinical educators and its completers have on

student learning. All educator preparation programs that seek CAEP accreditation are required to provide data, gathered through valid and reliable measures, that confirm that program participants positively impact student learning (CAEP Evidence Guide, 2014).

The mandate to use evidence-based practices has sparked discussions (see Cook, Landrum, Cook, & Tankersley, 2008) as well as research on evidence-based practices in special education. More specifically, research on the use of evidence-based practices in special education teacher preparation programs has focused on the frequency with which evidence-based practices are being used in the field (Burns & Ysseldyke, 2009), teacher attitudes about using evidence-based practices (Boardman, Arguelles, Vaughan, Hughes, & Klingner, 2005; Jones, 2009), and teaching teachers how to use evidence-based practices (Bain, Lancaster, Zundans, & Parkes, 2009; Dieker et al., 2009; Heckaman, Thompson, Hull, & Ernest, 2009).

## **Purpose**

There are at least two critical components that special education teacher preparation programs must emphasize when preparing their teacher candidates to use evidence-based practices: (1) teacher candidates need to be able to select appropriate interventions and implement the interventions with fidelity (Cook, Tankersley et al., 2008; Jones, 2009; Kretlow & Blatz, 2011); and (2) teacher candidates need to be able to evaluate the effectiveness of the interventions that they use with their students (Cook, Tankersley et al., 2008; Cook, Tankersley, & Landrum, 2009; Heckaman et al., 2009). The purpose of the present study was to address these two critical components. We analyzed data from teaching projects conducted by teacher candidates during their clinical practice, focusing on the following questions:

1. Are teacher candidates able to select appropriate interventions and implement the interventions with fidelity?
2. Are the evidence-based interventions selected by the teacher candidates effective in improving student learning?

## **Method Participants**

The 19 participating teacher candidates were enrolled in a blended early childhood special education teacher preparation program at a regional comprehensive university, which provided certification in both early childhood and special education pre-kindergarten through fifth grade. Seventeen of the teacher candidates were female, two were male, and seven of the nineteen candidates were non-traditional students. Candidates were placed in eight different school districts, and all but two of the clinical practice placements were in Title 1 schools. The teacher candidates selected students to be the focus of their

teaching project based on goals indicated on students' IEPs as well as on their mentor teacher's recommendation. Of the 40 students in pre-kindergarten through fifth grade who were included in the teaching projects, 30 were identified with a specific learning disability; three were identified with development delays; two were identified with specific learning disabilities and attention deficit hyperactivity disorder; two were English Language Learners who were also identified with specific learning disabilities; one was identified with mild disabilities, one was identified with emotional/behavioral disorders, and one was identified with other health impairments and attention deficit hyperactivity disorder.

## **Procedure**

Following the identification of participating students and target skills, candidates operationally defined the skill targeted for improvement. They then reviewed the research literature to identify evidence-based interventions for addressing the skill and selected a single-subject design study to systematically replicate. They collected student performance data through each phase of the intervention, and also collected interobserver agreement data as well as procedural integrity data at least once during baseline and twice during the intervention. Mentor teachers or classroom paraprofessionals served as reliability observers.

Throughout the project, candidates had online support from a tenure-track university faculty supervisor. Candidates received detailed instructions for each step of the project and were required to obtain approval from their supervisor before moving to the next step. Once the literature review was submitted, including a detailed description of the study to be replicated, supervisor feedback/approval was provided after each step of the project: Step 1: brief

description of the student(s) and setting, and a definition of the targeted skill in observable and measurable terms; Step 2: a description of the method for measuring student performance, including when and where data will be collected, a sample data collection sheet, and a working graph to visually monitor students' progress; Step 3: the experimental design being used and a detailed description of the procedures for implementing baseline and intervention; and Step 4: explanation of and instructions for collecting interobserver agreement data and procedural integrity data. Candidates graphed their students' data daily and submitted their graph to their university supervisor. If the data indicated that a student was not improving, the university supervisor and candidate would discuss whether any modifications were needed for that student.

### **Data Analysis**

We determined the efficacy of the interventions selected by the candidates by visually analyzing their graphs (Smith, 2012) and by calculating a non-parametric estimate of effect size. We calculated the percentage of non-overlapping data points (PND) as a supplement to the visual analysis (Gresham, 2014), as the PND has been promoted as a tool for gauging the effect of an intervention in single-subject design research (Kavale, Mathur, Forness, Quinn, & Rutherford, 2000; Scruggs, Mastropieri, & Casto, 1987; Scruggs & Mastropieri, 2001). For interventions that are designed to increase a behavior, the PND is calculated by identifying the highest baseline point, counting the number of intervention data points that do not overlap the highest baseline point, and dividing the number of non-overlapping intervention data points by the total number of data points in intervention, and then multiplying by 100 (Scruggs & Mastropieri, 2001). Scruggs et al. (1987) offered general interpretational guidelines of

PND that identified a PND of less than 50% as having no effect; a PND of 50 - 70% as minimally effective; A PND of 70 – 90% as moderately effective; and a PND of greater than 90% as highly effective. We calculated the PND for each teaching project and, using the criteria for effectiveness suggested by Scruggs et al. (1987), we then rated the effectiveness of each project.

### **Results**

This study focused on special education teacher candidates' ability to select and implement an evidence-based intervention and evaluate its effect, using single-subject design methodology, to improve their students' learning. The research questions addressed were: (1) are teacher candidates able to select appropriate interventions and implement the interventions with fidelity? and (2) are the evidence-based interventions selected by the teacher candidates effective in improving student learning?

All of the targeted skills selected by the teacher candidates focused on improvements in reading; either letter recognition, sight word recognition, or reading fluency (i.e., number of words read correctly per minute). The evidenced-based strategies chosen by the teacher candidates included constant time delay to teach letter and sight word recognition (e.g., Hughes & Fredrick, 2006; Keel, Slaton, & Blackhurst, 2001; Knight, Ross, Taylor, & Ramasamy, 2003; Wolery, Anthony, Caldwell, Snyder, & Morgante, 2002); and repeated reading to increase reading fluency (e.g., Alber-Morgan, Ramp, Anderson, & Martin, 2007; Nelson, Alber, & Gordy, 2004; Musti-Rao, Hawkins, & Barkley, 2009; Therrien, 2004; Therrien & Kubina, 2006; Vadasy & Sanders, 2008).

Table 1 provides demographic information as well as the design, targeted skill, reliability and fidelity measures, and

Table 1

*Demographics, Design, Reliability, and Effects for Constant Time Delay*

Candidate	Age	Gender	Title 1 School	No. of Students	Grade	Identified Disabilities	Design and Targeted Skill	IOA	Procedural Integrity	No Effect	Minimal 50-70%	Moderate 70-90%	Highly >90%
1	35	F	Yes	2	P	DD	Multiple Probe Letter Recognition	100%	100%				2
2	23	F	Yes	2	K	SLD	Multiple probe Sight Word Recognition	100%	100%				2
3	24	F	Yes	2	1	1- MID 1- SDD	Multiple Probe Sight Word Recognition	100%	100%			1	1
4	22	F	Yes	1	1	SLD	Multiple Probe Sight Word Recognition	99%	100%				1
5	27	F	Yes	3	1	SLD	Multiple Probe Sight Word Recognition	99%	100%				1
6	22	F	Yes	2	3	SLD	Multiple Baseline Across Students Sight Word Recognition	100%	100%				3
7	26	F	Yes	2	3	SLD	Multiple Probe Sight Word Recognition	92%	100%				2
8	23	F	Yes	2	4	SLD & ELL	Multiple Probe Sight Word Recognition	100%	100%				2

Note. DD = Developmental Disabilities; SLD = Specific Learning Disabilities; MID = Mild Disabilities; SDD = Significant Developmental Delays; ELL – English Language Learners

Table 2

*Demographics, Design, Reliability, and Effects for Repeated Reading*

Candidate	Age	Gender	Title 1 School	No. of Students	Grade	Identified Disabilities	Design and Targeted Skill	IOA	Procedural Integrity	No Effect	Minimal 50-70%	Moderate 70-90%	Highly >90%
1	23	M	Yes	1	5	SLD	Alternating Treatments Reading Fluency		100%				
2	23	F	Yes	3	4	1 - SLD 2 - SLD & ADHD	Alternating Treatments Reading Fluency		100%				
3	23	M	Yes	2	3	SLD	Multiple Baseline Across Students Reading Fluency		100%				
4	27	F	No	3	3	SLD	Alternating Treatments Reading Fluency		100%				
5	22	F	Yes	2	3	SLD	Multiple Baseline Across Students Reading Fluency		100%				
6	22	F	Yes	2	3	SLD	Multiple Baseline Across Students Reading Fluency		100%				
7	33	F	Yes	2	3	1 - SLD 1 - EBD	Alternating Treatments Reading Fluency		100%				
8	23	F	Yes	3	5	2 – SLD 1 – OHI & ADHD	Alternating Treatments Reading Fluency	99%	100%				2
9	25	F	No	2	1 and 2	SLD	Multiple Baseline Across Students Reading Fluency	100%	100%				3
10	22	F	Yes	2	3	SLD	Multiple Baseline Across Students Reading Fluency	100%	100%			1	2
11	26	F	Yes	2	1	SLD	Multiple Baseline Across Students Reading Fluency	100%	100%				1

Note. SLD = Specific Learning Disabilities; ADHD = Attention Deficit Hyperactivity Disorder; EBD = Emotional/Behavioral Disorders

effectiveness rating of the intervention for each teacher candidate who implemented constant time delay. The data show that the eight candidates who implemented the constant time delay procedure were able to implement this procedure with fidelity; mean percentage of procedural integrity was 100%. With respect to effectiveness of the procedure, the data for 15 of the 16 students taught with constant time delay indicated that the procedure was highly effective. For the remaining student, constant time delay was moderately effective. Reliability measures indicated that the mean percentage of interobserver agreement was 98.75% (range = 92% - 100%).

Table 2 provides demographic information as well as the design, targeted skill, reliability and fidelity measures, and effectiveness rating of the intervention for each candidate who implemented repeated reading. Eleven teaching projects focused on repeated reading to increase reading fluency with a total of 24 students, and the data on procedural integrity indicate that all of the candidates implemented this procedure with fidelity (mean percentage = 100%). For 22 of the 24 students, repeated reading was a highly effective procedure and for 2 students, the procedure was moderately effective. Reliability measures indicated that the mean percentage of interobserver agreement was 99.72% (range = 99% - 100%).

### **Discussion**

Special education teacher preparation programs need to ensure that they are preparing their teacher candidates to become active consumers of research and that they are providing their candidates with opportunities to determine whether proposed interventions for targeted skills have an evidence base. The candidates in this study reviewed the research literature after selecting students and identifying skills that were in need of improvement, and there are

also several online databases and websites available to assist in identifying evidence-based interventions for specific skills (cf. Kretlow & Blatz, 2011; The IRIS Center). Our candidates' unanimous selection of reading skills as target skills for improvement was not surprising, given the grade levels and types of disabilities represented, as well as the preponderance of clinical practice placements in Title I schools.

Teacher candidates also need to have opportunities to practice implementing evidence-based interventions, with coaching and feedback, until they can implement the interventions with fidelity (Cook, Tankersley et al., 2008; Jones, 2009; Kretlow & Bartholomew, 2010; Kretlow & Blatz, 2011). The strategies selected by the candidates in this study, constant time delay and repeated reading, had been introduced and practiced in earlier methods classes. We found that the teacher candidates were able to implement these interventions with fidelity, as evidenced by the high percentages of procedural integrity.

Finally, and we believe most importantly, special education teacher preparation programs must ensure that their candidates know how to evaluate the effectiveness of the interventions they use with their students. Our candidates used an iterative process of data-based decision making (daily visual inspections of the graphed data), with support from their university supervisor, to determine if the intervention was having a positive impact on their students' learning.

Our candidates typically reported that, having seen the changes in their students' learning, they would use the method they selected again, once they are in their own classroom. These reports support prior work (Ernest et al., 2011; Jones, 2009; Klingner, Arguelles, Hughes, & Vaughn, 2001) that has shown that evidence-based practices are more likely to be sustained

when teachers can see the results of their efforts. A number of our teacher candidates also reported that their mentor teacher planned to continue using the strategy after the candidates' clinical practice had ended, due to the student performance outcomes that the teacher candidate had obtained. Further research should consider the issue of maintenance of evidence-based strategies. That is, do special education teacher candidates continue to use an evidence-based strategy once they have exited their teacher preparation program?

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