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Nancy Douglas
University of Mississippi

Jerilou Moore
University of Mississippi

Kevin Stoltz
University of Central Arkansas

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Nancy E. Douglas
University of Mississippi

Jerilou J. Moore
University of Mississippi

Kevin B. Stoltz
University of Central Arkansas

Abstract

Over the last decade, the federally mandated "push" for full inclusion has changed the dynamics of general education classrooms to the extent that teachers no longer feel adequately prepared to teach. Teacher preparation programs are vested with the responsibility to prepare preservice teachers so they can provide a learning environment that meets the federal mandate of Least Restrictive Environment (LRE). A lack of preparation may affect the pre-service teachers' attitude and perception of students with disabilities in a general education classroom. The purpose of this quantitative cross-sectional study was to explore preservice and first year teacher beliefs about preparation concerning inclusion classrooms. The results indicate that attitudes toward inclusion are moderately correlated with candidates or teachers efficacy beliefs about teaching in an inclusion classroom. Additionally, results include a drop in efficacy of teaching in an inclusion classroom with first year teachers. Implications are presented for consideration in training teachers for inclusion classrooms.

Until recently, general and special education services were provided in two separate and distinct settings with different teachers and instructional strategies. As part of the 2004 reauthorization of Individuals with Disability Education Act (IDEA, 2004), the first educational placement for all students, including those with disabilities when appropriate, is mandated as the general education classroom. The federally mandated change requires that students with disabilities (diverse students) be educated in the general education classroom and exposed to the same curriculum as general education students. Thus, general education teachers are now required to provide educational experiences to all students, including those with disabilities, within the framework of the new federal mandates.

According to Stodden, Galloway, and Stodden (2003) with the directive for the Least Restrictive Environment (LRE), teachers are vested with the responsibility of teaching students with disabilities, even though they may have little or no preparation in addressing those students' individual needs or assisting them with standards-based criteria. In addition, school districts that implement full inclusion in district schools expose preservice teacher candidates to the diversity of the general education classroom even though they may have little preparation to work with students with disabilities (Sze, 2009). These practices, along with the federal mandate, suggest that teachers may need additional training to prepare for full inclusion. Additionally, teacher education programs may need to develop curricular experiences that prepare preservice teachers to meet the needs of

all students. According to Burke and Sutherland (2004) this will require much more knowledge, experience, and expertise to provide appropriate accommodations and related services to help students with disabilities reach their full potential in a general education classroom.

Along with classroom changes for inclusion (e.g., configuring the room to improve the learning environment, and actualizing positive behavior planning and support in the classroom; Obiakor, Harris, Mutua, Rotatori, & Algozzine, 2012) there are expanded responsibilities for general education teachers (e.g., making time for special education training, adapting and modifying programs, and collaborating with special education teachers; Doorn, 2003). Studies (Burke & Sutherland, 2004; Doorn, 2003; Jobling & Moni, 2004; Jung, 2007) indicate that general education teachers may not possess the attitudes, or professional preparation needed to meet the expanded responsibilities of teaching in an inclusive classroom. Although professional development for in-service teachers remains a prominent approach in preparing for inclusion, increased emphasis is being placed on the roles and responsibilities of teacher preparation programs to prepare new educators for teaching in inclusive settings (Van Laarhoven, Munk, Lynch, Bosma, & Rouse, 2007).

Current research (Boling, 2009; Bradshaw & Mundia, 2006; Fajet, Bello, Leftwich, & Mesier, Shaver, 2005) suggests that preservice teacher candidates and teachers report they are not prepared professionally with the knowledge and skill for an inclusion classroom. Several issues have been identified that may add to this view of a lack in professional preparation [e.g. lack of field experience with students that have disabilities (Campbell, Gillmore & Cuskelly, 2003; Richards & Clough, 2004); the need for specialized skills and knowledge of teaching in an inclusion classroom (dual certification) (Ford, Pugach, & Othis-Wilborn, 2001; Hadadian & Chiang, 2007; Jenkins, Pateman, & Black, 2002; Shippen, Crites, Houchins, Ramsey, & Simon, 2005),; preservice teachers' preconceived attitudes and perceptions toward inclusion (Jobling & Moni, 2004; Jung, 2007; Palmer, 2006); and confidence and teaching self-efficacy levels of in-service teachers and preservice teacher candidates (Berry, 2010; Campbell et al., 2003; Palmer, 2006; Sari, Ceiloz & Secer, 2009)]. Better understanding of these issues is imperative to helping change teacher education programs and produce teachers who are more equipped to provide effective educational experiences in an inclusion environment. The purpose of this study was to measure preservice teacher candidates' and first year teachers' attitudes toward inclusion and teacher self-efficacy for inclusion practices.. Additionally, we sought to investigate relationships between these constructs and to explore teaching self-efficacy of inclusion practices in candidates and first year teachers.

Teacher Preparation

Teacher preparation institutions have the opportunity to influence the way preservice teacher candidates are prepared for 21st century classrooms (Campbell, et al, 2003; Forlin, Loreman, Sharma, & Earle, 2009; Jenkins, Pateman, & Black, 2002; Richards & Clough, 2004; Strayton & McCollum, 2002). Inclusion mandates are causing teacher education programs to examine the way curriculum is designed to assist teacher candidates in meeting the needs of all learners in the classroom. In many teacher education programs, the preservice teacher candidates choose between elementary education, special education, and secondary education with very little integration or overlapping of classes between the program areas, especially, in the program field experience. Many universities are struggling with the need to revise their curricula and

pedagogy to better prepare teacher candidates for inclusion requirements (Forlin, Loreman, Sharma, & Earle, 2009). A study by Sze (2009) measuring preservice teachers' attitudes toward inclusion exposed a possible connection between attitudes and teaching performance. She determined that a preservice teacher with a positive attitude toward inclusion, and who has been trained in the appropriate skills and knowledge needed for an inclusive classroom, should have successful academic outcomes for all students.

Preservice Teachers Attitudes, Perceptions, and Self-Efficacy of Inclusion.

Preservice teacher candidates' attitudes and perceptions toward inclusion can influence the success of an inclusion classroom (Berry, 2010). These candidates come into the field of education with a variety of values and attitudes based on their own k-12 experiences and other social influences. With the changing requirements concerning inclusion, these previous experiences and social influences may have a negative effect on preservice teacher candidates' perception of teaching students with disabilities. Outcomes in inclusion classrooms are more positive when the teachers possess attitudes toward working with students that have disabilities (Burke & Sutherland, 2004). Burke and Sutherland credit the positive attitude with contributing to the overall success of an inclusion program. Jobling and Moni (2004) found that research on preservice teacher candidates' perception of inclusion was inconclusive, but stated that measuring the perceptions and attitudes of preservice teacher candidates toward inclusion is a starting point for redesigning teacher education curricula to enhance effective instruction in an inclusive general education setting.

Jung (2007) stated that along with changed attitudes and perceptions of inclusion, preservice teacher candidates need to increase their confidence levels and self-efficacy when dealing with special needs students. Hoy (2000) found that preservice teachers' self-efficacy was strong during their student teaching experience, but when they transitioned into their own classroom, these first year teachers experienced a drop in teaching self-efficacy. Hoy's results indicated that this drop was accompanied by a feeling of inadequacy toward teaching students with special needs. A study by Richards and Clough (2004) found that preservice teacher candidates reported feeling prepared for an inclusion classroom until they actually started teaching; when they recounted a lack of skills needed to meet the needs of all the learners. This literature indicates that teacher candidates may benefit from additional exposure to skill building experiences focused on knowledge, skills, and dispositions concerning inclusion classrooms. In addition, according to Berry, teacher candidates' attitudes toward inclusion may influence the self-efficacy of the teacher leading to increased or decreased overall teaching efficacy.

The challenges associated with the implementation of the mandate for inclusion in public schools led us to conduct a study using preservice teacher candidates and first year teachers measuring inclusion self-efficacy and teacher efficacy. The purpose of this study is to explore the relationship between attitudes and self-efficacy, and compare preservice teacher candidates' to first year teachers' on these two variables.

Method

Participants

The sample participants used for this quantitative cross-sectional study were senior preservice teacher candidates in the areas of elementary and secondary education that graduated in May 2013, and first year teachers that graduated in May 2012, from a four-year

public research institution in the southeastern United States. We used a convenience sampling method for choosing participants for this study. The participants consisted of women (n= 76) and men (n=15), with an average age (26 years-old).

Instruments

The Sentiments, Attitudes, and Concerns about Inclusion Education - Revised (SACIE-R; Forlin, Earle, Loreman, & Sharma, 2011) measures preservice teachers' perceptions on three constructs of inclusive education. The SACIE-R includes a demographic section which is comprised of six questions: gender, age, highest qualification obtained, prior contact with individuals with a disability, previous training in the area of students with disabilities, and amount of experience teaching students with disabilities (Forlin, Loreman, Sharma, & Earle, 2009). The second portion of the instrument directs respondents to indicate answers to questions (e.g., I am concerned that students with disabilities will not be accepted by the rest of the class; I am concerned that it will be difficult to give appropriate attention to all students in an inclusion classroom) on a 4-point Likert scale (i.e., Strongly Disagree, Disagree, Agree, Strongly Agree).

There are three psychometric constructs measured by the SACIE-R that are relevant to aspects underlying a teacher's beliefs and support of inclusive education (Forlin et al., 2011). The first construct is the sentiments scale (S), which is the sentiment or comfort level when engaging with people who have a disability. The attitudes scale (A) represents teacher's outlook or willingness toward having students with disabilities included in a general classroom setting. The final scale, concerns (C), represents the implementation or adaptation of teaching strategies to meet the educational needs of students with disabilities.

The original Sentiments, Attitudes, and Concerns about Inclusive Education scale (SACIE; Loreman, Earle, Sharma, & Forlin, 2007) was tested using factor analysis with (n = 996) preservice teachers from five institutions. A revised version, SACIE-R, was developed by Forlin, Earle, Loreman, and Sharma (2011). The revised version was tested using a four-stage process: Stage 1 was the initial review and consisted of a sample of (n = 297) preservice teachers from four institutions in three countries (Canada, Australia, & Singapore) and the province of Hong Kong; Stage 2 consisted of testing the revised scale which included the removal of 4 items followed by testing with a different sample of (n = 227) preservice teachers from three institutions in Hong Kong, Australia, and Singapore; Stage 3 included another minor revision and further testing with (n=186) preservice teachers from Canada and Hong Kong; and Stage 4 was the final validation study using the 15-item, three-factor scale with (n = 542) preservice teachers from 9 institutions and four countries. These studies demonstrated consistent loadings on the specified factors indicating empirical support for the construct validity of the scale.

In SACIE-R validation study (Forlin, Earle, Loreman, & Sharma, 2011), the reliability coefficients (Cronbach's alpha) resulted in the subscales of Sentiments (.75), attitudes (.67), and concerns (.65) with a combined scale (.74) indicating acceptable internal consistency reliably of the instrument. Results from the present study revealed internal consistency reliability coefficients (Cronbach's alpha) of Sentiments (.65), Attitudes (.63), Concerns (.68), and a total scale coefficient of (.78) again indicating marginally acceptable internal consistency.

The Teacher Efficacy for Inclusive Practice Scale (TEIP; Sharma, Loreman, & Forlin, 2012) measures perceived teacher

efficacy to teach in an inclusive classroom. The TEIP consists of 18 items representing three factors. The factors are: Efficacy in Using Inclusive Instruction (EUII), Efficacy in Collaboration (EC), and Efficacy in Managing Behavior (EMB) (Sharma et al., 2012). The first scale, EUII, measures individual perceptions for the ability to use inclusion instruction in classrooms. The second scale, EC measures the individual's perceptions of abilities to consult with parents and other professionals. Factor three; EMB measures self-perceptions of skills and abilities to respond to disruptive behaviors in the classroom. Participants respond to questions (e.g., I can make my expectations clear about student behavior; I can accurately gauge student comprehension of what I have taught) using a six-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = disagree somewhat; 4 = agree somewhat; 5 = agree; 6 = strongly agree).

This instrument was created using an exploratory factor analysis on 26 items to establish the factors (Sharma et al., 2012). Of the original 26 items, 18 met criteria for inclusion in the scale. The 18-item scale was developed from a sample of (n = 609) preservice teachers selected from three countries (Australia, Canada, and India) and the province of Hong Kong. Inter-correlations used to identify items that were highly correlated (>.80). Also, items that loaded on more than one factor were deleted. Three factors accounted for 64.5% of the variance. Alpha coefficients were; total scale (.89), EUII (.93), EC (.85), and EMB (.85) (Sharma et al., 2012). Internal reliability analysis indicated good internal consistency reliability for the scale. Internal consistency reliability results from the present study were: total scale (.92), EUII (.83), EC (.75), and EMB (.84).

Procedures

Forty-six survey packets were given to University Supervisors to distribute to the student teacher candidates that included elementary (n=37) and secondary (n=9) education majors. Forty survey packets were returned (n=31 elementary; n=9 secondary) with a response rate of 86.9%. According to the Instructional Assessment Resources (2011) an acceptable response rate for this type of survey administration is anything greater than 50%. The response rate of 86.9% is well above the acceptable range.

To collect first year teacher data, 132 surveys were emailed using the online software program, Qualtrics (Qualtrics, Provo, UT). Of these, 56 surveys were attempted, with 51 surveys completed. This is a 37.5% response rate. The acceptable response rate for on-line surveys is 30% per the Instructional Assessment Resources (2011). Therefore the response rate of 37.5% exceeds this minimum threshold.

Results

Data Analyses

To explore the use of the SACIE-R and the TEIP with this sample we first tested the means of our samples to the population parameters. Next we explored relationships between these two constructs. Finally, we tested for differences between the two groups (preservice teacher candidates, first year teachers) using scores from each set of scales.

A one-sample *t*-test was used to compare the mean population parameter to the combined sample of preservice teacher candidates and first year teachers for the Sentiments Scale of the SACIE-R (μ=10.584). A significant difference was found, ($t(90) = 4.681$. $p = .000$ with the sample mean ($\bar{x}$ =16.088) being significantly higher than the population mean. The same test was conducted

to compare the sample mean for the Attitudes Scale to the population parameter ($\mu = 14.317$). There was a significant difference found, $t(90) = -3.778$, $p = .000$ with the sample mean ($\bar{x} = 13.40$) being significantly less than the population mean. For the Concerns Scale one-sample *t*-test, the population value ($\mu = 13.0805$) was used. There was a significant difference found, $t(90) = -1.694$, $p = .094$ again, showing the sample mean ($\bar{x} = 12.83$) significantly less than the population mean.

Population parameters for the *Teacher Efficacy for Inclusive Practice* (TEIP) Scale was compared to a study done by Peebles (2012) using a one sample *t*-test on the sample of student teacher candidate (n=141) for the EUII ($\mu = 25.87$). A significant difference was found, $t(39) = 12.149$. $p = .000$ with the sample ($\bar{x} = 31.65$) being significantly higher than the population mean. The same test was conducted to compare the sample mean for the EC to the population parameter ($\mu = 25.94$). There was a significant difference found, $t(39) = 9.52$, $p = .000$ with the sample mean ($\bar{x} = 30.48$) being significantly higher than the population mean. For the EMB one sample *t*-test, the population value (N = 24.54) was used. There was a significant difference found, $t(39) = 8.57$, $p = .000$ again, showing the sample ($\bar{x} = 30.06$) significantly higher than the population mean.

For analyzing the relationships among the variables we used bivariate correlations. The results indicated that all variables related significantly except for the correlation between attitudes (SACIE-R) and efficacy towards inclusion (TEIP) (Table 1). The only correlation not showing a significant relationship was the Attitudes Scale and Efficacy in Managing Behavior Scale.

The final analysis consisted of an ANOVA to compare groups (level of teacher) by mean scores of the SACIE-R and the TEIP. The results (Table 2) indicated no differences between teacher groups on the SACIE-R. However, there were significant differences between groups on the scores of the TEIP.

Effect Size

The results of the between groups effect size includes; Sentiments Scale, .0022; Attitudes Scale, .0031; and Concerns Scale, .0039; EUII, .1542; EC, .1428; and EMB, .0897. Based on Cohen's (1988) interpretation, there is small to little effect noted in the results.

Discussion

The purpose of this study was to explore relationships among the variables to demonstrate that attitudes toward inclusion and teacher self-efficacy concerning inclusion practice are related. Additionally, we investigated changes in teacher self-efficacy reported in previous research (Freytag, 2001; Hoy, 2000; Palmer, 2006).

The results of the correlation analysis demonstrated that scores on the SACIE-R and TIEP were related in this sample. These significant relationships underscore that when teacher candidates or first year teachers believe that children with disabilities should be included in regular classrooms (Attitudes), their perceptions of self-efficacy for inclusion practices are higher. There were also two positive relationships with the Sentiments scale. Those teacher candidates or first year teachers that indicated comfort with being around individuals with a disability (Sentiments) also scored higher on the EUII and EC scales for inclusion practices. There was not a significant correlation with the EMB scale indicating that managing behavior in the classroom is not related to a teacher's sentiments about being around students with a disability. In essence, a teacher may not need to have positive sentiments to feel comfortable managing a classroom that

includes students with a disability. Additionally, the Concerns scale was significantly related to all the scales on the TEIP. Again, this indicates that those teacher candidates and first year teachers with higher concerns about students with disabilities being accepted by the class, or concerns about the teacher's own abilities to meet the added workload and provide appropriate attention to all students, also demonstrate higher amounts of self-efficacy for inclusion practices. This result indicates that an overall consciousness toward students with a disability may promote confidence in working with students that have a disability.

In the second analysis, we compared the teacher candidate's scores of self-efficacy for inclusion practices to those of the first year teachers. The results showed a decline in self-efficacy for inclusion practice in the first year teachers. This is consistent with previous studies (Campbell, et al., (2003); Hoy, 2000; Palmer, 2006) and demonstrates that when teachers begin working in a full inclusion classroom without a dual certification (special education accompanied with specific grade level training) these teachers may experience a drop in self-efficacy. According to the National Commission on Teaching and America's Future (2007), up to 50% of teachers leave the profession within the first five years. Richards and Clough's (2004) study found that most preservice teacher candidates believe they are prepared for an inclusive classroom until they actually start teaching and then they experience self-doubt toward their ability to help all students succeed. Additionally, Johnson (2006) states that we lose teachers due to poor working conditions and lack of proper instruction for the large achievement gap found in today's classrooms.

The findings of this study do provide specific insights, yet these are limited by specific constraints. The sample was small and limited to one university. Additionally, the sample was selected based on convenience. These sample characteristics limit the generalizability of the study. Additionally, the use of a cross-sectional design does not account for possible differences in self-efficacy of the two samples (teacher candidates and first year teachers). Future researchers may focus on longitudinal designs to test for developmental differences with teachers concerning self-efficacy for inclusion practices.

Finally, inclusion is a reality for general classroom teachers. Teacher candidates come to the profession with attitudes, sentiments, and concerns that may influence their overall self-efficacy toward teaching in an inclusion classroom environment. The results of this study suggests that teacher preparation program may need to address teacher candidate dispositions toward inclusion practices to better prepare teacher candidates for the reality of the general classroom environment.

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Nancy E. Douglas is an Assistant Professor of Education in the Teacher Education Department at the University of Mississippi. She teaches Special Education, Reading, and Mathematics. Her research focuses on teacher beliefs, efficacy, and dispositions concerning inclusion of students with disabilities in a general education classroom. **Dr. Douglas** is the corresponding author on this article and can be contacted at douglasn@olemiss.edu .

Jerilou J. Moore is an Associate Professor of Education in the Teacher Education Department at the University of Mississippi. She teaches Reading, Technology, Language Arts, Differentiated Instruction, and the Arts. Her research interests are focused on methodology and modeling theory to practice.

Kevin B. Stoltz is an Associate Professor in the Department of Leadership Studies at the University of Central Arkansas. His areas of research interest include, career development and counseling, teacher career development, and quantitative research methods. Kevin has published in national and international journals regarding, career development and counseling. He also serves on the editorial board of several journals and is chair of the research committee for the National Career Development Association.

Appendix

Table 1: Correlation Between SACIE-R and TEIP Scales

Variable	Sentiments	Attitudes	Concerns	EUII	EC	EMB
Sentiments	1	-	-	-	-	-
Attitudes	.210*	1	-	-	-	-
Concerns	.581**	.302**	1	-	-	-
EUII	.326**	.243*	.441**	1	-	-
EC	.394**	.213*	.371**	.800**	1	-
EMB	.307**	.096	.277**	.732**	.702**	1

Note. Sentiments = Sentiments Scale, Attitudes = Attitudes, Concerns = Concerns Scale, EUI = Efficacy in using inclusion, EC = EMB= Efficacy in managing behavior. *Correlation is significant at the .05 level. **Correlation is significant at the .01 level.

Table 2 – ANOVA Table

					95% Confidence Interval for Mean			
		N	Mean	Std. Deviation	Lower Bound	Upper Bound	F	Sig.
Attitudes Scale	ST	40	13.4000	2.01023	12.7571	14.0429	.275	.601
	FYT	51	13.6225	2.00772	13.0579	14.1872		
Sentiments Scale	ST	40	16.2000	2.38800	15.4363	16.9637	.196	.659
	FYT	51	16.0000	1.91833	15.4605	16.5395		
Concerns Scale	ST	40	12.8250	2.74458	11.9472	13.7028	.346	.558
	FYT	51	12.5294	2.05283	11.9520	13.1068		

Efficacy in Inclusion	ST	40	31.6500	3.00896	30.6877	32.6123	16.220	.000
	FYT	51	*28.7333	3.72380	27.6860	29.7807		
Efficacy in Collaboration	ST	40	30.4750	3.01269	29.5115	31.4385	14.822	.000
	FYT	51	*27.9216	3.23631	27.0113	28.8318		
Efficacy in Behavior	ST	40	30.0250	4.04771	28.7305	31.3195	8.774	.004
	FYT	51	*27.4706	4.11025	26.3146	28.6266		

Note. * = statistically significant difference

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Improving Preservice Teachers' Knowledge of Response-to-Intervention (RTI): How Online Professional Development Modules Can Help?

Nai-Cheng Kuo
Georgia Regents University

Abstract

Response-to-intervention (RTI) is "a multi-tier approach to the early identification and support of students with learning and behavior needs" (RTI Action Network, 2014). RTI began to be recognized around 2004, when the Individuals with Disabilities Education Act (IDEA) was reauthorized. In the midst of a national movement toward increasing uses of RTI, the development of knowledge of RTI for preservice teachers who will be engaged in its implementation is of high importance. This study examined the impact of a set of online professional development modules—IRIS modules—on preservice teachers' knowledge of RTI. Many federal dollars have been invested in the IRIS Center and these modules have been widely used. Yet, little is known about the learning outcomes for preservice teachers in response to these modules. A total of 55 preservice teachers enrolled in a special education teacher preparation program at a large Midwest public university participated in the study. Each participant spent approximately 20 hours on completing eight assigned modules. The results indicate that the experimental group performed significantly better than the control group on the *RTI-Reading Knowledge Assessment*, providing evidence that the intervention was beneficial. Implications and limitations of using online professional development modules are discussed.

Response-to-intervention (RTI) is known as a multi-level prevention and intervention approach (National Center on Response to Intervention, 2013). With the support of the federal laws—the No Child Left Behind Act (NCLB, 2002) and the Individuals with Disabilities Education Act (IDEA, 2004)—more than 60% of K-12 public schools nationwide are currently implementing RTI.

To prepare teachers for implementing RTI, there are several government-sponsored online professional development programs available for public use. For example, the IDEA '04 and Research for Inclusive Settings (IRIS) Center, sponsored by the U.S. Department of Education, Office of Special Education Programs (OSEP), has developed several modules about RTI. Although over 470,000 teachers and teacher educators have participated in online learning through IRIS, there is little empirical research to support its impact on preservice teachers. To fill the gap in this literature, this study examined how effective IRIS modules are for improving preservice teachers' knowledge of RTI.

Literature Review

Response-to-Intervention (RTI)

Typically, RTI is represented by a three-tiered triangle model with Tier 1 represented as green, Tier 2 as yellow, and Tier 3 as red (See Figure 1). According to leading RTI scholars (e.g., Fuchs and Fuchs, 2006), all students receive differentiated instruction and evidence-based instruction provided by general education teachers in Tier 1. It is expected that Tier 1 can meet 80 to 85 percent of students' needs in general classes [the percent is slightly different in different RTI models]. Students who do not appropriately respond to Tier 1 instruction will be provided with more intensive, strategic and evidence-based interventions within small groups in Tier 2. Depending on school budgets and resources, Tier 2 can be conducted by general education teachers who have been trained in RTI or conducted by intervention specialists (e.g., subject specialists, paraprofessionals, Title I teachers, or special education teachers) within or outside the general classroom. It is expected that approximately 10 to 15 percent of students who do not adequately

respond to Tier 1 instruction should make appropriate progress in Tier 2. Those who still fall significantly behind their peers will be provided with the most intensive interventions in Tier 3, which are tailored to meet the specific needs of students (Fuchs & Fuchs, 2006).

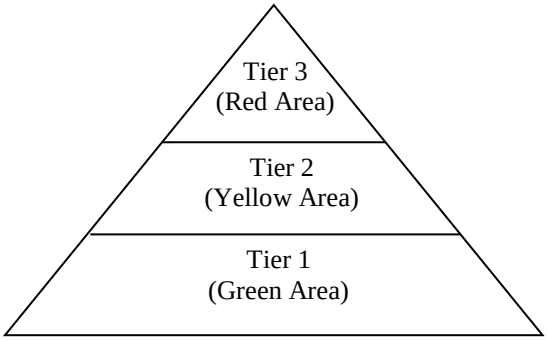

Figure 1. A typical RTI model

The IDEA '04 and Research for Inclusive Settings (IRIS) modules

As of 2013, the IRIS Center has developed a total of 53 modules for public use. These modules are categorized into different topics by the IRIS Center, including accommodations, assessment, assistive technology, behavior and classroom management, collaboration, content instruction, differentiated instruction, disability, diversity, learning strategies, math, leadership, response-to-intervention (RTI), and so on. Some modules are overlapped across topics. Each IRIS module consists of five components which are designed based on the evidence-based cycle of a learning theory created by Dr. Bransford and his colleagues (Bransford, Brown, & Cocking, 1999).

- *Challenge* – a realistic scenario relevant to education professionals
- *Initial Thoughts* – questions that allow students to explore and consider what they currently know about the scenario presented in the Challenge
- *Perspectives and Resources* – nuggets of information (e.g., text, movies, audio interviews, activities) that allow students to actively engage in learning the module's main content
- *Assessment* – an evaluation tool that offers students the opportunity to apply what they know and to evaluate what topics they need to study further
- *Wrap Up* – a summary of the information presented in the previous components

(IRIS, 2013a)

According the IRIS Center, a field test data was collected from a total of 1,744 preservice teachers. The majority of the preservice teachers were in general education (71.7%); the others were in special education (9.5%), counseling (2.5%), psychology (0.9%), and other areas of study. The results show that "the majority of students responding to the survey felt they had learned something from the module," and "most respondents rated the module as being of high quality and relevant" (IRIS Center, 2013b).

Furthermore, another two IRIS module studies were conducted during the 2004-2005 and 2005-2006 academic years. In the first study, a total of 620 students were assigned to a module group and a non-module group, respectively. The study was to examine the participants' performance on the Initial Thoughts questions (as a pretest instrument) and on the Final Thoughts questions (as a posttest instrument). The responses were scored. "To perform well, students would need to apply content that was covered by the text and/or the module" (IRIS Center, 2013b). The results indicated that "the average posttest score for students who viewed the module was significantly higher than for students who did not" (IRIS Center, 2013b). In the second study, a total of 480 students were assigned to an Independently Viewed group and the Instructor-Enhanced group. Both groups received multiple-choice and open-ended questions. The results show that "although students did gain in their factual knowledge about self-regulation [in both conditions], more involvement by the instructor did not result in enhanced performance" (IRIS Center, 2013b).

While some of the other modules continue to be embedded in coursework in different universities, and instructors and students consider the modules to be practical and helpful (e.g., Rodriguez, Gentilucci, & Sims, 2006; Smith et al., 2005), there are limited experimental or quasi-experimental studies that used a set of IRIS-RTI modules. Therefore, this study attempted to provide information about what the participants' actual performance was after using eight assigned IRIS modules.

Preservice Teacher Online Learning

Online approaches to teacher preparation have become an important issue in two- and four-year institutions. University professors in general education often integrate or infuse special education issues through online learning modules or web-based distance education (Smith, Smith, & Boone, 2000). Smith and his colleagues' (2000) quasi-experimental study showed that although preservice teachers performed equally well in traditional and online instructional settings, online learning provided "ongoing access to instruction in a flexible accessible environment," which offers "potential advantages to student comprehension and ongoing application across teacher preparation curricula" (Smith, Smith, & Boone, 2000, pp. 28-29).

Another benefit of online learning is that it can help teacher educators understand preservice teachers' reflective thinking through embedded media, such as videodisc cases (Abell, Bryan, & Anderson, 1998). Smith and his colleagues (2000) pointed out that because online learning provides more comfortable space for preservice teachers to express their thoughts, teacher educators can observe their students' reflections through online learning.

A similar technique was also found in the IRIS modules' *Initial-and-Final Thoughts* questions. Because there is little research addressing preservice teacher learning related to online learning through a set of IRIS modules, there is a need to continue studies in this area.

Methods

Participants

The participants of the present study included juniors, seniors, and interns who were enrolled in a special education teacher preparation program at a large Midwest public university. Of 140 enrolled students, 81 students (58%) voluntarily participated in this study. All participants completed the written consent forms prior to participating in the study, and they all completed a pre-assessment before the intervention of the modules. The majority of the participants were white (90%) and female (93%).

Grouping

Based on the results of the *RTI-Reading Knowledge Assessment* (the instrument will be introduced later), the 81 participants were grouped into a control group and an experimental group. The participants were stratified into three subgroups: juniors, seniors, and interns. The reason for the stratification was to ensure that both the control group and the experimental group had an equal (or close to equal) number of juniors, seniors, and interns, so the impact from the coursework should have been similar. The participants were then randomly assignment into a control (comparison) group and an experimental group. In the end, 40 participants were assigned to the control group (including 13 juniors, 21 seniors, and 6 interns) and 41 participants were assigned to the experimental group (including 13 juniors, 22 seniors, and 6 interns).

Data Collection Procedures

Each participant was asked to spend two to three uninterrupted hours on each module; eight modules were assigned. All participants were provided a navigation video clip developed by the IRIS Center. After completing all the modules, the participants were given a post-assessment. This study adopted ANGEL, an online management system that assisted the researcher in collecting, monitoring, and analyzing the data. One sample of the ANGEL web pages used in this study is shown in Figure

2 (following reference pages). Because all modules were provided online, there was no risk related to the differences of interventions across conditions.

Instruments

Pre- and post-assessment instruments. The *RTI-Reading Knowledge Assessment*, consisting of 66 Teacher Knowledge Survey (TKS) test items, 29 IRIS test items, and 25 Literature test items, was used for the pre- and post-assessment instruments. The TKS, developed by Dr. Louise Spear-Swerling and her colleagues, has been tested multiple times and the results have been published in peer-review journals (Spear-Swerling and Cheesman, 2012). The TKS includes questions in three areas: RTI, assessment, and the five components of reading. The Cronbach's alpha indicated that the test items of TKS were internally consistent and had high reliability (Spear-Swerling and Cheesman, 2012). With the permission of Dr. Spear-Swerling, the 66 TKS test items were used in the present study.

In addition to the TKS test items, the IRIS module open-ended questions were turned into multiple-choice questions as part of the pre-assessment instrument to investigate the participants' knowledge of RTI prior to the intervention. When turning the IRIS module's open-ended questions into multiple-choice questions, it was more likely that the participants would complete the pre-assessment within two to three hours. These multiple-choice questions may not test exactly what each initial IRIS module open-ended question intended to test. However, these questions could still provide an initial understanding of the participants' knowledge of RTI before they received the intervention of the study.

Furthermore, 25 questions, involving essential knowledge related to RTI, such as cultural diversity (Donovan & Cross, 2002; Klingner & Edwards, 2006; Orosco and Klingner, 2010; Rinaldi & Samson, 2008; RTI Action Network, 2014) and teacher quality (Cochran-Smith, 2003; Brownell, Sindelar, Kiely, & Danielson, 2010; Fenstermacher & Richardson, 2005; Fuchs, Fuchs, & Compton, 2012; Murawski & Hughes, 2009) were developed. By including the TKS and Literature questions, the *RTI-Reading Knowledge Assessment* assessed participants' knowledge of RTI more comprehensively.

The 54 multiple-choice questions (29 IRIS test items and 25 Literature test items) were reviewed by three writing consultants at a university writing center, using Wollack's (2003) criteria to examine each of these multiple-choice questions. The criteria include:

- Each item should be concise and uncomplicated.
- The answer to each question should be really correct and not just the best answer among all options.
- Each item should be independent from other items, so the examinee cannot get the answer from the alternatives of another item or from the clues.
- Each item should have only one objective to avoid being misunderstood by the examinee.
- Questions should use positive statements and avoid trickery.

Two university faculty members who were knowledgeable about RTI also critically reviewed these questions. Changes and adjustments were made based on discussions. For the pre-assessment (n = 81), Cronbach's Alpha indicated that the internal consistency of the pre-assessment items within each sub-area (TKS, IRIS, and Literature) was adequate. The internal consistency was .828 for TKS, .762 for IRIS, and .710 for Literature. The *RTI-Reading Knowledge Assessment* is available upon request.

Pre- and post-survey questionnaires. The pre-survey questionnaire collected information about the participants' demographic characteristics. The post-survey questionnaire used a Likert scale with sixteen questions to

obtain descriptive data related to social validity for the intervention. The sixteen questions are presented in the result section where participants' acceptability and satisfaction with the intervention are reported.

Data Analysis

Pre- and post-assessment instruments. The paired *t*-test, independent *t*-test, and multivariate analysis of variance (MANOVA) were conducted for the within-group comparison and the between-group comparison regarding the pre- and post-assessment outcomes.

Pre- and post-survey questionnaires. A hierarchical multiple regression analysis was conducted to examine the relationships between the participants' demographic characteristics and their assessment scores.

Table 1 (see Appendix) summarizes how data was collected and analyzed to address the research questions of this study.

Intervention and Comparison Conditions

After taking the online pre-assessment, the participants in the experimental group completed eight IRIS modules related to RTI-Reading assigned in a designated order. The modules used in the experimental group were under the topic of RTI as grouped by the IRIS Center. The control group completed another eight IRIS modules assigned by the researcher. The modules used in the control group met two selection criteria. First, they were *not* under the topic of RTI grouped by the IRIS Center. Second, they did not have a focus on RTI in the academic domain of reading interventions. Except for using different modules, the comparison conditions were exactly the same as the intervention conditions. Because the control group also received a treatment just like the experimental group did, they could still improve their knowledge through the modules, but that was not attributable to the actual intervention. The modules used for the experimental group and for the control group were shown in Table 2 (see Appendix).

Results

Equivalence Examination Before the Intervention

An independent *t*-test was run to examine whether the control and experimental groups were equivalent in terms of their mean scores on the pre-assessment. A *t* value of .549 (p = . 584) indicated that there was no significant difference between the control group and the experimental group. That is to say, the two groups were equivalent for the purpose of this study. Furthermore, a *t* value of .294 (p = . 772) indicated that there was no significant difference between the juniors' mean scores in the control group (n = 13) and in the experimental group (n = 13). A *t* value of .272 (p = . 787) indicated that there was no significant difference between the seniors' mean scores in the control group (n = 21) and in the experimental group (n = 22) ; and a *t* value of .792 (p = . 448) indicated that there was no significant difference between the interns' mean scores in the control group (n = 6) and in the experimental group (n = 6). In short, the control group and the experimental group, including the subgroups, were equivalent.

Attrition

Attrition refers to the dropout of participants from a study. In this study, there were 55 participants who completed the study (completion rate: 68%). A review of the email messages from the participants who decided to withdraw from the study indicated that the dropouts were not due to factors that were directly related to the study. These participants explained that because of other obligations that had come up, they could not complete the study as they had planned. Although the dropouts seemed not to cause any validity issues for the study, it is still important to know whether the dropouts had any significant impact on the initial equivalence status. Therefore, an independent *t*-test was used to evaluate the equivalence.

A *t* value of 1.469 (p = .150) with an effect size of .70 indicated that there was no significant difference between the remaining

participants' (n = 29) and the dropout participants' means (n = 11) in the control group; and a t value of 1.857 (p = . 071) indicated that there was no significant difference between the remaining participants' (n = 26) and the dropout participants' means (n = 15) in the experimental group. In addition, a t value of .726 (p = .471) indicated that there was no significant difference between the remaining participants in the control group (n = 29) and in the experimental group (n = 26). The results showed that the control group and experimental group remained equivalent after attrition.

Research Question 1: Participants' Performance on the *RTI-Reading Knowledge Assessment*

According to the ANGEL user matrix records, more than 90% of the participants spent approximately 20 hours on completing eight assigned modules in three weeks. Approximately 10% of the participants spent a month on completing the eight modules. On average, each participant spent 2.5 hours on each module.

Cronbach's Alpha indicated that the internal consistency of the post- assessment items within each sub-area were adequate. For the post-assessment (n = 55), the internal consistency was .885 for TKS, .820 for IRIS, and .733 for Literature.

The paired t-test was conducted to examine if there were statistically significant differences between the participants' performance on the pre- and post-assessment in the experimental group (n = 26). The t value of 5.155 (p = . 000) with an effect size of . 82 revealed that the experimental group's post-assessment outcomes were significantly higher than their pre-assessment outcomes. An independent t-test was conducted to examine if there was any significant difference existing between the two independent groups' post-assessment outcomes. The t value of 2.032 (p = .047) with an effect size 1.19 revealed that the experimental group' post-assessment outcomes were significantly higher than the control group' post-assessment outcomes, providing evidence that the intervention was beneficial.

To avoid the accumulation of Type I errors from using a t-test, a repeated measures MANOVA test was conducted to test the intervention effect on the experimental group's and control group's knowledge of RTI. The results showed that there was a significant difference in terms of time (pre vs. post) and group (experimental vs. control) in the participants' knowledge of RTI, $F(3, 51)$ = 8.147, p = .000, η^2 = .324, observed power =. 987. Univariate tests further indicated that there was a significant intervention effect on the IRIS test items, $F(3, 51)$ = 18.948, p = .000, η^2 = .263, observed power = .990. However, there was no significant intervention effect on the TKS test items $F(3, 51)$ = .251, p = .619, η^2 = .005, observed power = .078 and on the Literature test items $F(3, 51)$ = .162, p = .689, η^2 = .003, observed power= .068. The results, as seen in Table 3 (see Appendix) showed that the experimental group outperformed the control group, particularly on the IRIS questions, after the intervention.

Research Question 2: Predictors and Participants' Post-Assessment Outcomes

The results of the hierarchical multiple regression revealed that the variable "group (experimental vs. control)" contributed significantly to the regression model, $F(1, 32)$ = 4.050, $p < .05$) and accounted for 7.2% of the variance in the post-assessment outcomes. Introducing the variable "prior knowledge (pre-assessment score)" explained an additional 42.6% of the variance in the post-assessment outcomes, and this change was significant, $F(1, 51)$ = 23.324, $p <$. 001. Adding the variable "GPA" to the regression model explained an additional 6.1% of the variance in the post-assessment outcomes, and this change was significant, $F(1, 50)$ = 21.128, $p <$. 001. In short, the three independent variables (i.e., group, GPA, and prior knowledge) were significant predictors of the post-assessment outcomes, and all together they accounted for 55.9% of the variance in the post-assessment outcomes. The results of the regression statistics are reported in Table 4 (see Appendix).

Research Question 3: Fidelity of Implementation

Social validity questionnaires provided information about the participants' acceptability and satisfaction with the intervention that they had received. Table 5 (see Appendix) shows the participants' satisfaction with the modules.

The participants in the experimental group rated the questions that were related to the RTI-Reading modules as more relevant. This might be due to the fact that they were assigned to work on the modules related to RTI-Reading intervention. They rated the questions that were related to the behavioral intervention modules as less relevant. It is likely this has resulted from the fact that they were not assigned to work on any modules that were related to the behavioral intervention. In contrast, the participants in the control group rated the questions that were related to the behavioral intervention modules as more relevant. It is likely that such responses emerged due to the fact that they were assigned to work on the modules that were related to the behavioral intervention. Consistent with the results found in the experimental group, the participants in the control group rated the questions that were not related to the modules assigned to them as less relevant. In sum, the participants were satisfied with the modules they received regarding the improvement of their knowledge.

Although there were statistically significant differences between the responses of the participants in the two groups related to RTI-Reading and behavioral intervention questions, there were no statistically significant differences in the questions related to teacher quality, high-quality reading instruction, and participants' confidence in using RTI.

Summary and Discussion

Previous research on IRIS modules mainly used self-report data, learning outcomes from one single module, or one single-group with a pretest-and-posttest designed to address the impact of IRIS module (Montrosse, 2012; Rodriguez, Gentilucci, & Sims, 2006; Smith, et. al, 2005). While such research methods are meaningful and important in the educational field, there is a need to have empirical data to compare and contrast with the existing literature. Additionally, unlike self-report data, in which participants tend to report positively on their beliefs, knowledge, and abilities (Cook & Campbell, 1979), this quasi-empirical study provided information about what the participants' actual improvement was after the intervention. It is important to note that although the participants significantly improved their knowledge of RTI after the intervention, whether they can actually implement RTI is an empirical question in future studies.

In addition, there are external factors that can contribute to a person's progress after an intervention. Without a control (comparison) group, previous research on IRIS modules may not be able to determine whether a user's progress results from the intervention itself or results from other factors. This study included both within-group comparison data and between-group comparison data, thereby adding a more robust design to explore whether the IRIS-RTI modules could serve as an intervention tool to improve preservice teachers' knowledge of RTI.

The average mean score for the experimental group on the post-assessment showed that the experimental students got 56% of the questions correct on the post-assessment, and the greatest growth in knowledge about RTI was in those questions developed based on the content from the IRIS modules. While it is not surprising that participants showed little improvement on questions that were indirectly or absent in the assigned IRIS modules, there is ample room for the improvement of teacher preparation programs regarding preservice teachers' knowledge of RTI, given the fact that their mean scores on the post-assessment of the TKS test items and Literatures test items were still low. Moreover, the results implied that one-time exposure to the assigned modules might not be sufficient to help the participants get familiar with the topic. Thus, allowing time to re-revisit these modules is needed.

Suggestions for teacher preparation programs using IRIS modules are addressed in the following. First, regarding the learning objectives of the classes, when teacher educators identify preservice teachers' strengths and weaknesses based on the results of pre-assessment(s), they can assign appropriate modules to assist individual students' learning. Second, teacher educators can provide sub-assessments, including both pre- and post-assessments, for each module. These sub-assessment questions can be developed based on the assessment questions or *Initial-and-Final Thought* questions embedded in each module. Next, teacher educators can debrief individual students' progress before and after taking the modules to inform their instruction. These procedures will help preservice teachers build solid knowledge of RTI through the assistance of IRIS modules.

In conclusion, the IRIS modules have been widely used in teacher preparation programs in the United States and around the world. Recent publications in the field of special education recommend IRIS modules as a high-quality online resource for teacher preparation programs (Billingsley, Israel, & Smith, 2011). While these modules provide important resources in helping preservice teachers understand RTI, examining the impact of IRIS modules through a comprehensive assessment measure is highly recommended because it can help teacher educators understand if the modules selected are sufficient to help preservice teachers build solid knowledge of a specific area. In the midst of a national movement toward increasing uses of RTI, the development of knowledge of RTI for preservice teachers who will be engaged in its implementation is of high importance. This study could inform teacher preparation programs using IRIS modules. Future studies could additionally examine the impact of IRIS modules on teaching practice and use mixed models of IRIS modules, including stand alone, IRIS + lecture, and IRIS tied to field-based practicum.

Limitations of the Study

There were several areas in the research design that could have been strengthened. First, internalized knowledge could have been assessed through a follow-up assessment using all or a portion of the *RTI-Reading Knowledge Assessment* one to two months after the conclusion of the study. The time demands of the intervention made this impractical for this group of participants. Second, the sample size of the present study was still considered to be small (n = 55). Thus, examining the *RTI-Reading Knowledge Assessment* with a larger sample size in future studies is recommended. Finally, because it was difficult for the participants of the study to complete all 53 IRIS modules, only eight IRIS modules related to RTI in the domain of reading interventions were used for the present study. It is possible that the participants would have performed better on the *RTI-Reading Knowledge Assessment* if they also completed all other IRIS modules. However, due to the fact that each module takes users approximately 2.5 hours to complete and some overlapping modules across topics, it was meaningful to examine if the eight IRIS modules related to RTI in the domain of reading interventions could help preservice teachers understand RTI and reading interventions. If not, the other modules may be spread out throughout their teacher preparation programs in different courses, such as literacy methods and cultural diversity.

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Nai-Cheng Kuo is an Assistant Professor of Special Education at Georgia Regents University. Her research interests include response-to-intervention (RTI), literacy, autism, and teacher preparation. **Dr. Kuo** can be contacted at nkuo@gru.edu .

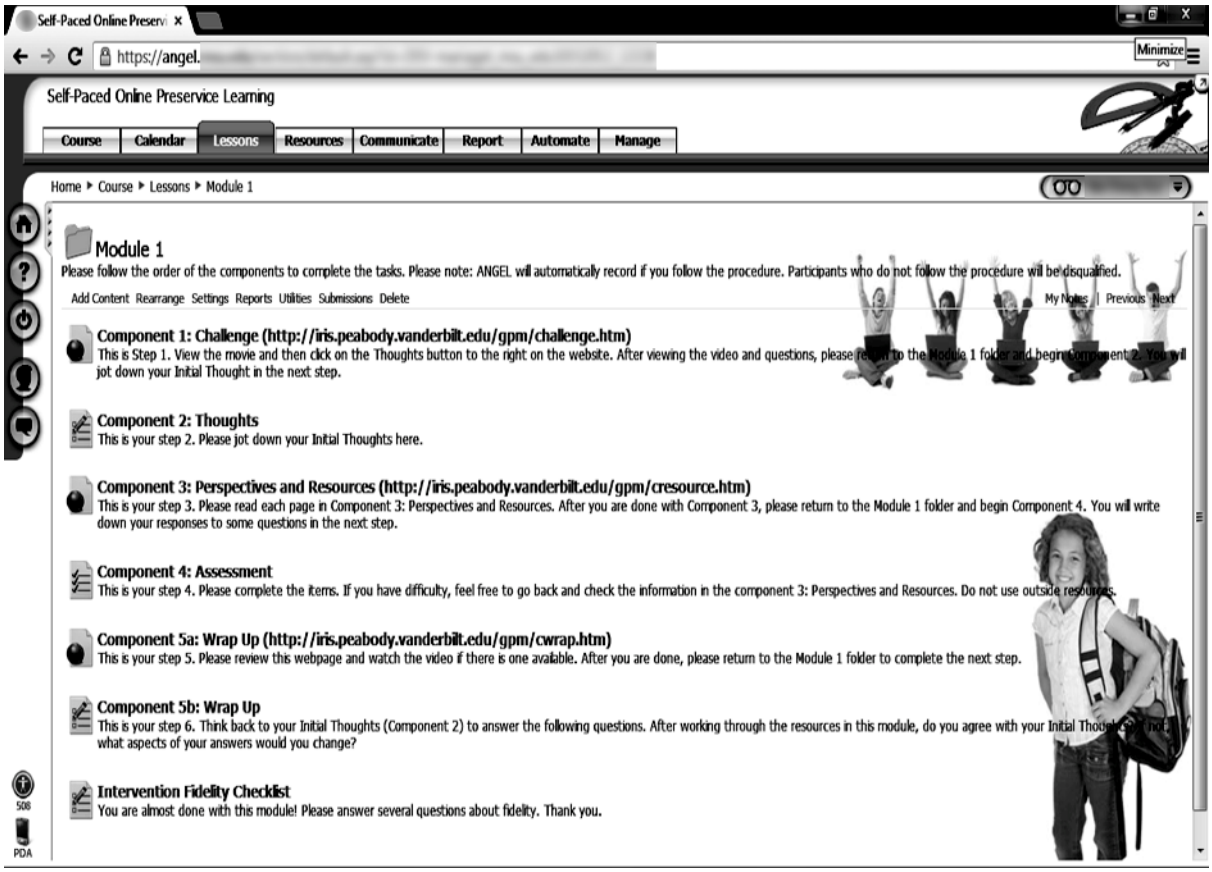

Figure 2. The ANGEL web pages – Module 1 (as an example). Note. The text is meant for visual reference only. This figure helps readers see how the ANGEL web pages look like in the present study. Each web page has seven *icons* to represent different components of the module.

Appendix

Table 1: Profile of ID people who received CBR services

Variable/ ID	Borderline ID (IQ>70)	Mild ID (IQ 69-50)	Moderate ID (IQ 49-35)	Severe ID (IQ 34-20)	Profound ID (IQ<20)
Population					
Tribal	1(0.38%)	42(16.0%)	57(21.7%)	5(13.3%)	5(1.9%)
Non-Tribal	4(1.5%)	37(14.1%)	43(16.4%)	28(10.7%)	10(3.8%)
Gender					
Female	3(1.1%)	39(14.9%)	46(17.5%)	31(11.8%)	5(1.9%)
Male	2(0.8%)	40(15.3%)	54(20.6%)	32(12.2%)	10(3.8%)
Socio Economic Status*					
Very Poor	0(0.0%)	30(11.5%)	36(13.7%)	28(10.7%)	3(1.1%)
Poor	2(0.8%)	35(13.3%)	43(16.4%)	20(7.6%)	5(1.9%)
Middle	3(1.1%)	12(4.6%)	19(7.2%)	14(5.3%)	6(2.3%)
Upper	0(0.0%)	2(0.8%)	2(0.8%)	1(0.38%)	1(0.38%)
Parent Education					
None	1(0.38%)	58(22.1%)	80(30.5%)	52(19.8%)	9(3.4%)
Primary	0(0.0%)	12(4.6%)	4(1.5%)	1(0.38%)	0(0.0%)
Middle school	3(1.1%)	6(2.3%)	8(3.0%)	4(1.5%)	0(0.0%)
High School	1(0.38%)	1(0.38%)	0(0.0%)	5(1.9%)	3(1.1%)
Bachelor	0(0.0%)	2(0.8%)	8(3.0%)	(0.38%)	3(1.1%)

Table 2: Major outcome of the CBR at the 9th year of the program

Variable/ ID	Borderline ID (IQ>70)	Mild ID (IQ 69-50)	Moderate ID (IQ 49-35)	Severe ID IQ 34-20)	Profound ID (IQ<20)
Inclusion					
No	1(0.38%)	25(9.5%)	81(30.9%)	63(24.0%)	15(5.7%)
Yes	2(0.8%)	54(20.6%)	18(6.9%)	0(0%)	0(0%)
Disability Certificate					
No	0(0%)	14(5.3%)	17(6.4%)	6(2.3%)	0(0%)
Yes	5(1.9%)	65(24.8%)	83(31.6%)	57(21.7%)	15(5.7%)
Parent Training					
No	2(0.8%)	13(4.9%)	24(9.1%)	15(5.7%)	4(1.5%)
Yes	3(1.1%)	66(25.1%)	76(29.0%)	48(18.3%)	11(4.1%)

Table 3

The Independent Samples Statistics of the Pre- and Post-Assessments

	Group	N	Mean	Std.	t	Sig.	Cohen's *d*
Pre-Assessment (TKS)	Experimental	26	31.539	9.140	.668	.507	0.18
	Control	29	30.000	7.937			
Post-Assessment (TKS)	Experimental	26	36.346	10.763	.961	.341	0.26
	Control	29	33.655	9.993			
Pre-Assessment (IRIS)	Experimental	26	10.731	5.008	.482	.632	0.13
	Control	29	10.103	4.639			
Post-Assessment (IRIS)	Experimental	26	18.307	5.097	4.427	.000***	1.19
	Control	29	12.345	4.886			
Pre-Assessment (Literature)	Experimental	26	10.039	3.862	.830	.410	0.22
	Control	29	9.172	3.864			
Post-Assessment (Literature)	Experimental	26	12.192	3.919	1.083	.284	0.29
	Control	29	10.931	4.636			

Note: Some missing values were found in the control group. One participant in the control group only completed 62 questions; the other participants in the control group all completed the *RTI-Reading Knowledge Assessment*. These missing values were coded as "exclude cases analysis by analysis." No missing value was found in the experimental group. The significant levels were at .05 (*) and .001 (***), respectively.

Table 4

Summary of Hierarchical Regression Analysis for Variables Predicting Post-Assessment Outcomes

Variable	Beta	*t*	*R*	R^2	R^2 Change	*F*
Step 1			.269	.072	.072	4.050*
Group (exp. vs. control)	.269	2.012*				
Step 2			.706	.498	.426	25.324***
Group (exp. vs. control)	.204	2.044*				
Pre-assessment score	.656	6.581***				
Step 3			.748	.559	.061	21.128***
Group (exp. vs. control)	.235	2.472*				
Pre-assessment score	.613	6.393***				
GPA	.252	2.624*				