

The Effects of Reading Mastery Plus on the Beginning Reading Skills of Students with Intellectual and Developmental Disabilities

Abstract: This study explored the effects of *Reading Mastery Plus* in grades K-2 at a Title 1 school with six students with intellectual and developmental disabilities (IDD). Two students in each of grades kindergarten, 1, and 2 participated. *Diagnostic Indicators of Basic Early Literacy Skills (DIBELS)* spring fluency probes were used to assess changes in students' beginning reading skills and risk status. Results indicated students made large overall gains on fluency measures. Additionally, there were several improvements in the *DIBELS* risk status categories. The implications for future research are discussed.

Of all curricular areas, reading is the most important for students to master. It is closely related to other content areas such as mathematics, spelling, and writing. Reading at a higher level correlates with continuing education past high school, increasing the chance of attending colleges and universities, finding successful employment, and lowering the chance of becoming a school dropout (Reed,

Marchand-Martella, Martella, & Kolts, 2007; Snow, Burns, & Griffin, 1998). The National Center for Education Statistics (NCES, 2005) found that 36% of fourth graders and 27% of eighth graders did not meet the basic requirements provided by the National Assessment of Educational Progress in reading. Learning to read is an important acquisition for all students. Unfortunately, reading is the primary area where students with disabilities qualify for special services (Meese, 2001; Reed et al.).

Students with intellectual and developmental disabilities (IDD), also called mental retardation, learn to read at a much slower rate compared to other students, and those with mild IDD can master reading skills up to the sixth-grade level (Heward, 2006). Approximately 85% of students with IDD have IQs ranging from 50-55 to 70, which is considered to be "mild." The majority of students who are classified as having mild IDD read at levels lower than expected for their mental age (MA), and comprehension seems to be the most difficult aspect of reading for this population to grasp (Beirne-Smith, Patton, & Kim, 2006).

When reading is taught to students with IDD, two general approaches are used. The first approach focuses on the use of sight words. When these students acquire sight words, they obtain skills that will enhance their daily lives. "Students with mental retardation, for example, need print-based information presented with graphic depictions, free from unnecessary

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clutter and with key information repeated or highlighted” (Wehmeyer, 2006, p. 228). Sight-word instruction involves the use of drill and practice exercises until mastery of the words is obtained; it is an effective form of instruction for many students and is best given in a natural setting where the sight words would normally occur (Schloss et al., 1995). Current practices in sight-word reading instruction include incidental teaching and programming for generalization to promote learning. However, research on the effectiveness of these strategies with learners with mental retardation is lacking (Rohena, Jitendra, & Browder, 2002).

The second approach to reading instruction for students with IDD focuses on teaching decoding skills. The National Reading Panel (NRP) noted the importance of systematic (i.e., taught in a logical order) and explicit (i.e., clear modeling and practice opportunities for students) instruction when teaching beginning reading skills to students, even those who struggle learning to read (National Institute of Child Health and Human Development [NICHD], 2000). Students are taught to pronounce the sounds for individual letters in isolation and then to blend the sounds to form words; this instruction involves the use of phonics. Further, the NRP noted that effective reading instruction includes teaching students to manipulate sounds in words (phonemic awareness), having them practice reading aloud with guidance and feedback (fluency building), and teaching students strategies for reading with understanding (vocabulary and comprehension) (NICHD). “Students with mental retardation learn best when instruction is explicit and systematic and instructional methods are derived from empirical research” (Heward, 2006, p. 159). This type of instruction is designed to evoke correct responses and to allow for mastery of skills with ample opportunities for review (NICHD). Halle, Chadsey, Lee, and Renzaglia (2004) noted “it is important to use a systematic-instruction approach with students with severe disabilities. ... Most compelling is that students with

severe disabilities are unlikely to learn with other, less precise types of instruction” (p. 55).

One approach that teaches decoding skills in a systematic and explicit manner is Direct Instruction. Direct Instruction was initially used in Project Follow Through to teach low-income, at-risk youth (Kennedy, 1978; Stebbins, St. Pierre, Proper, Anderson, & Cerva, 1977; Watkins, 1997). An earlier version of *Reading Mastery (Distar Reading)* was used. Project Follow Through compared nine different educational programs to see which would be most effective for this population. Results of this large-scale evaluation showed that “the Direct Instruction model for teaching reading, language, and arithmetic had significant positive effects on basic, cognitive-conceptual, and affective skills” (Kinder, Kubina, & Marchand-Martella, 2005, p. 5). A further examination of Project Follow Through data conducted by Gersten, Becker, Heiry, and White (1984) found students with IQs lower than 70 were able to make consistent progress equal to those with higher IQs when Direct Instruction was used.

The effects of using Direct Instruction programs such as *Distar Reading* and *Reading Mastery* were examined by Schieffer, Marchand-Martella, Martella, Simonsen, and Waldron-Soler (2002). Results from one analyzed study conducted by Gersten and Maggs (1982) showed that 12 adolescents with moderate mental retardation experienced an average gain of 5.8 standard score points in the areas of receptive and expressive language and accuracy of oral reading and literal comprehension. *Distar Reading I, II, and III* and *Distar Language I, II, and III* were used.

Kinder et al. (2005) conducted a literature review on the effects of Direct Instruction programs on the academic skills of students with disabilities. One analyzed study done by Polloway, Epstein, Polloway, Patton, and Ball (1986) found that students with educable mental retardation made significantly greater gains with *Corrective Reading* than when they

had been taught with different materials in previous years. Kinder et al. reported two studies that involved the *Distar Reading* program and students with mental retardation (Bracey, Maggs, & Morath, 1975; Gregory & Warburton, 1983). It was noted that this population could not be expected to learn to read well or at all (e.g., they should only be provided sight words); however, findings were that participants learned to read at higher levels. Overall, these students could learn sophisticated reading strategies such as decoding words and sentences as opposed to sight words. Booth, Hewitt, Jenkins, and Maggs (1979) implemented a 5-year study combining *Distar Reading* and *Language* programs with 12 students with IDD. At the end of the study most of the students read at third- to fourth-grade reading levels. Results across all analyzed studies show that this population of students can experience success using Direct Instruction reading programs.

No studies were found on using the latest edition of the Direct Instruction reading program, *Reading Mastery Plus*, with students with intellectual and developmental disabilities. Thus, the purpose of this investigation was to examine the effects of this program with this population of students.

Method

Setting

Instruction took place at a Title 1 elementary school serving students in preschool to grade 6 located in a suburban setting in the Pacific Northwest. Total enrollment in the school for grades K through 6 was 659. Of these students, 32% received free or reduced-price lunch. Students receiving special education services were given instruction in a separate classroom (resource room). Instruction was provided by a special education/resource room teacher who held a master's degree and had 16 years of teaching experience. Additionally, one paraeducator taught reading groups in the spe-

cial education setting. This paraeducator had a bachelor's degree. She was supervised by the special education teacher and monitored by the Title 1/Learning Assistance Program (LAP) teacher. She had 15 years of teaching experience with Direct Instruction programs.

Participants

Six students classified as having mental retardation (MR) (i.e., IDD), using Washington state classification criteria, were included in this study; these students evidenced IQ scores in the mild range (50-55 to 70). The grade, gender, and ethnicity of the students are presented in Table 1.

Target Curriculum

Reading Mastery Plus was the reading program used. *Reading Mastery Plus* includes seven levels (K-6); for students labeled MR, only *Reading Mastery Plus Levels K, 1, and 2*, were used. *Reading Mastery Plus Level K* (Engelmann, Osborn, Bruner, Engelmann, & Seitz-Davis, 2002) includes language and early reading skills taught in 150 lessons. *Reading Mastery Plus Level 1* (Engelmann, Bruner, Osborn, & Seitz-Davis, 2002) uses 160 lessons. A *Fast Start* option (Engelmann & Bruner, 2002) is available for students who did not complete Lessons 101 through 150 of *Level K*; *Fast Start* covers the same material in 25 lessons. *Reading Mastery Plus Level 2* (Engelmann, Bruner, Engelmann, Seitz-Davis, & Arbogast, 2002) includes 160 lessons.

Table 1
Demographic Information of Participants

Student	Grade	Gender	Ethnicity
1	K	Male	Caucasian
2	K	Male	African American
3	1	Male	Caucasian
4	1	Male	African American
5	2	Male	Caucasian
6	2	Male	Caucasian

Dependent Variables

Students were administered the *DIBELS* fluency probes over the course of the year; fall and spring administrations were used to assess changes in students' beginning reading skills and risk status.

DIBELS (Good & Kaminski, 2002) is a series of tests of the fundamental early literacy skills identified as crucial by the NICHD (2000) and Snow et al. (1998). *DIBELS* is standard-

ized in its administration and can be used to monitor progress of students in the critical areas of reading fluency including phonics, phonemic awareness, and oral reading. Scores are compared to benchmarks; student scores are placed into one of three categories—at risk, some risk, low risk or deficit, emerging, established (see Table 2). *DIBELS* standard protocol is to administer specified fluency probes up to three times per year (e.g., fall, winter, spring).

Table 2
DIBELS Risk Status Indicators

Grade	Initial Sound Fluency (ISF)	Letter Naming Fluency (LNF)	Phoneme Segmentation Fluency (PSF)	Nonsense Word Fluency (NWF)	Oral Reading Fluency (ORF)
K					
Beginning 1-3 months	ISF < 4 (At risk)	LNF < 2 (At risk)			
	4 ≤ ISF < 8 (Some risk)	2 ≤ LNF < 8 (Some risk)			
	ISF ≥ 8 (Low risk)	LNF ≥ 8 (Low risk)			
Middle 4-6 months	ISF < 10 (Deficit)	LNF < 15 (At risk)	PSF < 7 (At risk)	NWF < 5 (At risk)	
	10 ≤ ISF < 25 (Emerging)	15 ≤ LNF < 27 (Some risk)	7 ≤ PSF < 18 (Some risk)	5 ≤ NWF < 13 (Some risk)	
	ISF ≥ 25 (Established)	LNF ≥ 27 (Low risk)	PSF ≥ 18 (Low risk)	NWF ≥ 13 (Low risk)	
End 7-10 months		LNF < 29 (At risk)	PSF < 10 (Deficit)	NWF < 15 (At risk)	
		29 ≤ LNF < 40 (Some risk)	10 ≤ PSF < 35 (Emerging)	15 ≤ NWF < 25 (Some risk)	
		LNF ≥ 40 (Low risk)	PSF ≥ 35 (Established)	NWF ≥ 25 (Low risk)	

(table continues)

Teachers within the school made decisions on the probes to administer based on their particular needs. For example, the following probes were provided in the spring (parting from the standard protocol): initial sound fluency for kindergarten students, letter naming fluency for first-grade students, and nonsense word fluency for second-grade students. Also, spring-only oral reading probes were not provided to first-grade students given that *Reading Mastery Plus* included frequent oral

reading assessments within the program. Fall and spring administration of the initial sound fluency (i.e., correct onsets per minute) probe was used to assess changes in the phonological awareness skills of kindergarten students. Kindergartners' risk statuses of their phonological awareness and phonics skills were assessed by the fall administration of the phoneme segmentation fluency (i.e., number of correct phonemes per minute) and nonsense word fluency (i.e., number of correct

Table 2, continued
DIBELS Risk Status Indicators

Grade	Initial Sound Fluency (ISF)	Letter Naming Fluency (LNF)	Phoneme Segmentation Fluency (PSF)	Nonsense Word Fluency (NWF)	Oral Reading Fluency (ORF)
1					
Beginning 1-3 months		LNF < 25 (At risk)	PSF < 10 (Deficit)	NWF < 13 (At risk)	n/a
		25 ≤ LNF < 37 (Some risk)	10 ≤ PSF < 35 (Emerging)	13 ≤ NWF < 24 (Some risk)	
		LNF ≥ 37 (Low risk)	PSF ≥ 35 (Established)	NWF ≥ 24 (Low risk)	
Middle 4-6 months			PSF < 10 (Deficit)	NWF < 30 (Deficit)	ORF < 8 (At risk)
			10 ≤ PSF < 35 (Emerging)	30 ≤ NWF < 50 (Emerging)	8 ≤ ORF < 20 (Some risk)
			PSF ≥ 35 (Established)	NWF ≥ 50 (Established)	ORF ≥ 20 (Low risk)
End 7-10 months			PSF < 10 (Deficit)	NWF < 30 (Deficit)	ORF < 20 (At risk)
			10 ≤ PSF < 35 (Emerging)	30 ≤ NWF < 50 (Emerging)	20 ≤ ORF < 40 (Some risk)
			PSF ≥ 35 (Established)	NWF ≥ 50 (Established)	ORF ≥ 40 (Low risk)

(table continues)

letter sounds per min) probes. The fall and spring administration of the phonemic segmentation and nonsense word fluency probes were used to assess changes in the first graders' phonological and phonics skills. Fall and spring administration of letter naming fluency measured skills within the alphabetic principle. Fall and spring administration of the nonsense word and oral reading fluency probes were used to assess changes in the phonics and word reading skills of the second-grade students.

Procedures

Teacher and related services personnel training. An educational consultant conducted *Reading Mastery Plus* training. This consultant had a bachelor's and a master's degree in special education. She was a former special education teacher and had worked for 8 years as an educational consultant at the time of the original study. All teachers and related services personnel in the school were provided 2 days of *Reading Mastery Plus* training the year prior to

Table 2, continued
DIBELS Risk Status Indicators

Grade	Initial Sound Fluency (ISF)	Letter Naming Fluency (LNF)	Phoneme Segmentation Fluency (PSF)	Nonsense Word Fluency (NWF)	Oral Reading Fluency (ORF)
2					
Beginning				NWF < 30 (Deficit)	ORF < 26 (At risk)
				30 ≤ NWF < 50 (Emerging)	26 ≤ ORF < 44 (Some risk)
				NWF ≥ 50 (Established)	ORF ≥ 44 (Low risk)
Middle					ORF < 52 (At risk)
					52 ≤ ORF < 68 (Some risk)
					ORF ≥ 68 (Low risk)
End					ORF < 70 (At risk)
					70 ≤ ORF < 90 (Some risk)
					ORF ≥ 90 (low risk)

this study. This training covered the revisions made to the *Reading Mastery Classic* program.

Reading Mastery Plus placement. All students were tested for placement at the beginning of the school year using the placement tests within the programs. Some students were grouped with other students of similar skill levels. Students were moved up or down depending on individual performance as assessed by within-program assessments.

Reading Mastery Plus instruction. Special education instruction lasted 110 min per day; students did not receive instruction with their typically-achieving peers in their classrooms but rather in the resource room. More intensive instruction was involved to meet the individualized needs of the students (e.g., one-on-one, focused work on individual sounds, use of sound amplifier for students who were hard of hearing, use of a laser pointer to help with tracking, individualized motivational systems). Kindergarten reading instruction occurred over 100 instructional days. First- and second-grade reading instruction occurred over 144 and 133 instructional days, respectively.

Lessons were scripted and presented as such. A standard error correction was used when errors occurred, as recommended by the program (e.g., model/test/retest). If students did not meet criterion on a mastery test or a reading checkout, specific directions were followed in the program to ensure that students received instruction on needed skills again until mastery was demonstrated. In addition, students received explicit spelling instruction in *Spelling Mastery Levels A and B* (Dixon & Engelmann, 1999). Students were grouped by skill within their grade levels for this spelling instruction (*Level A* was used in first grade; *Level B* was used in second grade).

Results

As shown in Table 3, fall to spring changes in the scores of the two kindergarten students on the initial sound fluency probe indicate they made significant improvements in their phonological awareness skills. The spring-administered phoneme segmentation fluency probe scores indicate both students had fully established phonological awareness skills. The spring-administered nonsense word fluency probe scores for students 1 and 2 fell within the some- and low-risk categories, respectively.

Table 3
Grade K DIBELS Scores

Student	Initial Sound Fluency			Phoneme Segmentation Fluency		Nonsense Word Fluency	
	Fall	Spring	Change	Fall	Spring	Fall	Spring
Grade K							
Student 1 Risk Status	2.00	26.00	24.00		50.00 Established		24.00 Some risk
Student 2 Risk Status	0.00	18.00	18.00		50.00 Established		27.00 Low risk

Table 4
Grade 1 DIBELS Scores

Student	Letter Naming Fluency			Phoneme Segmentation Fluency		
	Fall	Spring	Change	Fall	Spring	Change
1st Grade						
Student 3 Risk Status	7.00	62.00	55.00	0.00	44.00 Established	44.00
Student 4 Risk Status	15.00	32.00	17.00	43.00	59.00 Established	16.00

Table 4 shows the two first-grade students with IDD made gains in the areas of letter naming fluency, phoneme segmentation fluency, and nonsense word fluency. Both students had fully established phoneme segmentation skills. The spring-administered nonsense word fluency probe scores for students 3 and 4 fell within the established and emerging categories, respectively. Note that there were no spring risk indicators for letter naming fluency.

Second-grade students with IDD made gains in the areas of nonsense word fluency and oral reading fluency (see Table 5). The spring-administered oral reading fluency probe scores for students 5 and 6 fell within the at-risk and some-risk categories, respectively. Note that there were no spring risk indicators for nonsense word fluency.

Discussion

The purpose of this paper was to examine the effects of *Reading Mastery Plus* on students with IDD. Results showed kindergarten, first-, and second-grade students with IDD made gains across all fluency measures for which there was a fall and spring assessment. Students also improved or remained constant in several risk status categories. What is noteworthy is several of the students were considered

emerging or established across multiple areas. This finding would not be expected for students labeled IDD.

As stated previously, two primary approaches are used to teach reading to students with IDD—sight words and decoding. Reviews of the literature have shown teaching decoding skills to students with IDD has promise (Kinder et al., 2005; Schieffer et al., 2002). Several investigations have shown important gains in decoding skills for students with IDD (e.g., Booth et al., 1979; Bracey et al., 1975; Gersten et al., 1984; Gersten & Maggs, 1982; Gregory & Warburton, 1983; Polloway et al., 1986). Unfortunately, there is a paucity of research demonstrating the efficacy to teaching decoding skills to students with IDD. The current investigation shows the use of a systematic decoding program (i.e., *Reading Mastery Plus*) may have positive effects on the reading performance of students with IDD.

An important question is when phonics-based reading instruction should be provided to students with IDD. Many investigations addressing the effectiveness of Direct Instruction programs included students who were between the ages of 6 to 16 (see reviews by Kinder et al., 2005 and Schieffer et al., 2002). It stands that if effective phonics-based reading instruction is provided to students early in their

Nonsense Word Fluency		
Fall	Spring	Change
0.00	60.00 Established	60.00
19.00	34.00 Emerging	15.00

school careers, important gains can be made. Students in this investigation were younger than those involved in many other investigations and made progress on the measures. It is also possible that the effects of a phonics-based program like *Reading Mastery Plus* are cumulative. In other words, as students are continually exposed to *Reading Mastery Plus*, their performance will begin to approach that of typical students as they progress through school.

Although there were positive gains made by several of the students with IDD, there were limitations present. First, an experimental design was not used in the investigation;

therefore, it is not possible to make cause-and-effect conclusions. In other words, it is not possible to state definitively the *Reading Mastery Plus* program caused the improvements in reading performance. Future studies should examine the effectiveness of explicit programs such as *Reading Mastery Plus* while using an experimental design that also includes a control group. Perhaps more importantly, future investigations should compare the *Reading Mastery Plus* program to a more traditional sight word program. Given that such a comparison was not made, it is not possible to state the *Reading Mastery Plus* program should be preferred over a sight-word program.

Second, there were a limited number of students with IDD involved in the study. Therefore, it is not possible to determine the extent to which the results of the investigation will generalize to other students with IDD. Similarly, it is not possible to assess the likely effects of the *Reading Mastery Plus* program on students with more severe IDD. Making generalized claims more problematic is the lack of information contained on the 6 students involved in the investigation. Clearly, future investigations should increase the number of students with IDD and include specific information on each participant.

Table 5
Grade 2 DIBELS Scores

Student	Nonsense Word Fluency			Oral Reading Fluency		
	Fall	Spring	Change	Fall	Spring	Change
2nd Grade						
Student 5 Risk Status	45.00	52.00	7.00	24.00	53.00 At risk	29.00
Student 6 Risk Status	92.00	105.00	13.00	50.00	87.00 Some risk	37.00

Third, the use of *DIBELS* is problematic given that the assessment was designed for progress monitoring, not to determine changes before and after a program. Future research may consider using measures that are sensitive to changes in reading performance but are designed to measure changes from before to after the implementation of a program.

Finally, given that all lessons were not completed in the *Reading Mastery Plus* program, it is difficult to determine the full extent to which the program may lead to changes in reading performance. Future investigations should include completion of the entire program.

Although there were several weaknesses in the present investigation, the results should be placed in the wider context of reading instruction for students with IDD. Given that there is an increased emphasis in including all students in the general education environment, more research is needed to determine the extent to which students with IDD can access programs such as *Reading Mastery Plus*. Therefore, the current study should be viewed as an initial attempt to address this important area of interest.

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