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What we need to know about linking assessment and phonemic awareness training in the classroom we can learn in kindergarten.

Margaret C. O'Hearn-Curran
University of Massachusetts Amherst

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<https://doi.org/10.7275/a2ze-yg92> https://scholarworks.umass.edu/dissertations_1/1268

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WHAT WE NEED TO KNOW ABOUT LINKING ASSESSMENT AND
PHONEMIC AWARENESS TRAINING IN THE CLASSROOM WE CAN
LEARN IN KINDERGARTEN

A Dissertation Presented

by

MARGARET C. O'HEARN-CURRAN

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

September 1999

Counseling Psychology

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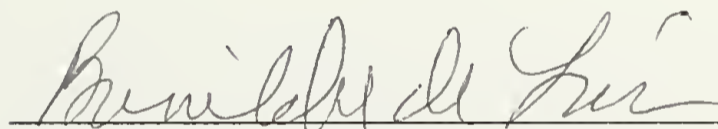
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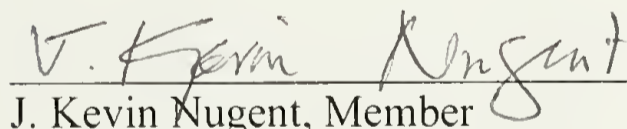
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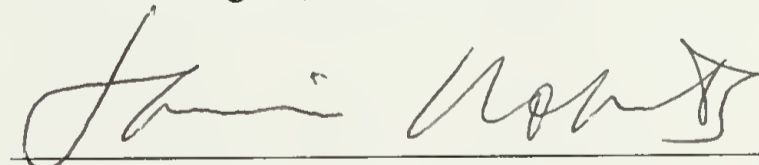
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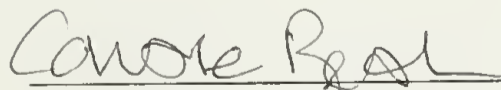
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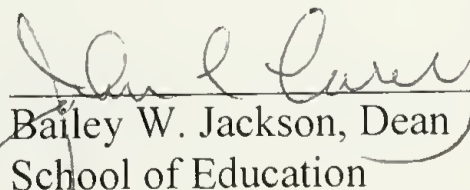
J. Kevin Nugent, Member



Janine Roberts, Member



Carole Beal, Outside Member


Bailey W. Jackson, Dean
School of Education

DEDICATION

This is dedicated to my parents in gratitude for all their love and guidance throughout the years. They have instilled in me a love of learning and an ethic of care that is now shared by my own children. I am forever grateful.

ACKNOWLEDGMENTS

I would like to extend my sincere gratitude and thanks to my committee members for their assistance, guidance, and encouragement throughout this process. Dr. Carole Beal, Dr. Brunilda DeLeon, Dr. Kevin Nugent, and Dr. Janine Roberts are each experts in their field of study, masterful teachers, and important mentors in my educational journey. A very special expression of gratitude is extended to my advisor and committee chair, Dr. DeLeon. She has always been there to guide me and has provided me with a sense of belonging, both as a student and as a professional in the field of psychology.

I would like to take this opportunity to thank my internship supervisors who have provided guidance, support, and insight over the years. Mr. Kenneth O'Connell and Dr. Jay Ryan have taught me about children, politics, and patience. I am grateful for the lessons I have learned from them.

My colleagues who demonstrated their commitment to improving the lives of children by participating in this study are due a very special thanks. Anne, Judy, Katie, and Meghan collected data and followed my lead in a whirlwind of activity. Ms. Cindy Rouse and Ms. Susan Amico are owed a tremendous debt of gratitude. They gave up their lunchtime every week and prepared lessons at home or on the "fly". The teachers who participated in this study, Ms. Jennifer Haggerty and Ms. Noreen Howe, exemplify the characteristics and commitment that define truly gifted teachers. I would also like to thank the administrators in the school system who believed in the project and made it happen.

The children in this study taught all of us about literacy and learning and we are thankful for their persistence and enthusiasm. Those children who struggled to learn are owed a promise to continue to search for strategies that will prevent them from stumbling along their pathway towards literacy.

Ms. Lori Nogueira, the third teacher in this study, served as the editor of this paper, organizer of the data, and assistant investigator of this study. She is a committed teacher, true friend, and Lindsey's hero. She is truly an angel for many of the children she teaches and the many hearts she touches. I am forever grateful to her for all of her help.

I am thankful for all of the encouragement from my many siblings and friends. My parents exemplify what commitment to work and family means and have served as important role models. My sons, Patrick, Thomas, and Daniel have made many sacrifices over the years and have been the source of a tremendous degree of joy as they have grown. I am thankful for their presence in my life and the support they have provided on this project.

Finally, I would like to express my sincere gratitude to my husband, David. His love and guidance over the years have been my mainstay. He has organized my life and taught me many lessons. He is my most trusted friend and confidant. I would not have accomplished this without him by my side.

ABSTRACT

WHAT WE NEED TO KNOW ABOUT LINKING ASSESSMENT AND PHONEMIC AWARENESS TRAINING IN THE CLASSROOM WE CAN LEARN IN KINDERGARTEN

SEPTEMBER 1999

MARGARET C. O'HEARN-CURRAN, B.S. UNIVERSITY OF MASSACHUSETTS

M.S. FITCHBURG STATE COLLEGE

Ph. D., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Dr. Brunilda DeLeon

Although the research evidence in support of providing phonemic awareness training for young children is substantial, its implementation in kindergarten programs has been limited. The need to bridge the gap between research and practice is clear, given the number of children demonstrating difficulties learning to read and the powerful effects specific training programs have had upon reading. This study's aim was to examine the feasibility of a comprehensive early literacy program linking research-based curricula with innovative assessment procedures in a kindergarten setting.

Teachers and support staff from a small urban school system monitored early literacy skills using Dynamic Indicators of Basic Early Literacy Skills (DIBELS). Local normative data was collected to establish standards of performance and to serve as a means of comparing the efficacy of the traditional system of assessment and instruction to the model used by the participating teachers.

Both quantitative and qualitative data were collected to address questions regarding the usefulness of DIBELS and the effectiveness of the model. The

individual and overall outcomes of students receiving phonemic awareness instruction were evaluated by examining a set of descriptive statistics and conducting a repeated-measures analysis of variance (ANOVA) design. Time series analyses were also employed to illustrate the process used in making programmatic decisions. Staff members were interviewed at regular intervals to obtain feedback about the implementation process. Factors relating to the manageability of data collection and analysis, the feasibility of providing activities for a wide range of students, and the integration of this training into existing curriculum were given special attention.

Although restricted by the limitations of design and nature of the data, descriptive and inferential statistics indicate that the formative assessment model was more effective in building phonemic awareness skills than the general curriculum. No significant differences were found in the development of letter naming skills. Participants indicated that DIBELS are effective assessment and teaching tools. They reported that the effectiveness of the training program lay in the high level of student involvement in the lessons. Issues related to time, space, support from personnel, and need for collaboration were raised as important factors in implementation.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS.....	v
ABSTRACT.....	vii
LIST OF TABLES.....	xii
LIST OF FIGURES.....	xiii
CHAPTER	
I. STATEMENT OF THE PROBLEM.....	1
Reading Difficulties: A High Stakes Problem.....	1
The Case for Early Intervention.....	2
The Gap Between Research and Practice.....	5
Bridging Research and Practice: What We Need to Learn in Kindergarten.....	7
Assessment as the Foundation of an Effective Program.....	9
Purpose of the Study.....	11
II. LITERATURE REVIEW.....	15
Language and Literacy: A Strong Connection.....	15
Metalinguistic Awareness.....	24
Individual Predictors of Reading Difficulties.....	26
The Development of Phonemic Awareness.....	33
Intervention Studies.....	38
A Pragmatic and Collaborative Model for the Assessment of Early Literacy Skills.....	42
Guiding Children Down the Pathway to Success.....	49
III. DESIGN OF THE STUDY.....	51
Research Questions.....	51
Participants.....	53
Measures.....	60
Curricula.....	64
Procedures.....	66
Staff Training.....	66
Selection of Participants.....	67
Data Collection.....	68

	Page
Phonemic Awareness Training.....	71
Teacher Feedback.....	74
Data Analysis.....	76
Quantitative Analysis.....	76
Qualitative Analysis.....	79
IV. RESULTS.....	82
Descriptive Statistics for DIBELS Measures.....	82
Effect of Intervention Over Time for DIBELS Measures.....	97
Descriptive Statistics for Traditional Teacher Measures.....	103
Relationship of Measures.....	104
Case Studies.....	106
Qualitative Data.....	121
Time as a Factor in Implementation.....	122
Making DIBELS Part of the Routine.....	125
Evaluating the Curriculum.....	129
The Need for Communication.....	132
Student Responsiveness.....	133
Weighing the Costs and Benefits of Implementation.....	136
V. DISCUSSION.....	138
Is the Model Effective in Developing the Early Literacy Skills of Participants in the Study?.....	138
What Do the Numbers Tell Us?.....	138
What Do the Participants Tell Us?.....	142
Is it Feasible to Administer DIBELS in a Diverse Urban School System?.....	143
Are the Measures from DIBELS Useful in Identifying Students Who Would Benefit from Additional Programming and in Monitoring Their Progress?.....	145
What Do the Numbers Tells Us?.....	146
What Do the Participants Tell Us?.....	150
How Feasible is the Integration of the Phonemic Awareness Training Programs into the Current Early Literacy Curriculum?.....	152
Is the Model Useful in Guiding Teachers as They Make Curriculum Decisions?.....	154

	Page
Limitations of the Study.....	159
Recommendations for Future Studies.....	164
Summary and Conclusion.....	167

APPENDICES

A.	INFORMATIONAL LETTER TO ALL PARENTS.....	174
B.	INFORMATIONAL LETTER TO CLASSROOM PARENTS.....	175
C.	STAFF CONSENT FORM.....	176
D.	DIBELS MEASURES.....	177
E.	TEACHER ASSESSMENT RESPONSE SHEET.....	184
F.	INITIAL INTERVIEW QUESTIONS.....	185
G.	LOG FOR ADMINISTRATION OF DIBELS	187
H.	STUDENT CHART FOR GRAPHING PROGRESS.....	188

REFERENCES.....	189
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LIST OF TABLES

Table		Page
1.	Samples of Phonological Awareness Tasks.....	37
2.	System Wide Enrollment by Selected Populations for 1997-1998.....	54
3.	Kindergarten Enrollment by Selected Populations for 1998-1999.....	55
4.	Local Normative and Intervention Groups by Selected Populations.....	58
5.	Lowest Quartile Groups by Selected Populations.....	59
6.	Schedule Used in Establishing Local Norms.....	69
7.	Descriptive Statistics for Onset Recognition Fluency by Group.....	88
8.	Descriptive Statistics for Letter Naming Fluency by Group.....	92
9.	Descriptive Statistics for Phonemic Segmentation Fluency by Group.....	96
10.	Repeated Measures ANOVA for Onset Recognition Fluency with the Local Normative and Intervention Groups.....	98
11.	Repeated Measures ANOVA for Onset Recognition Fluency with the Lowest Quartile Groups from the Local Normative and Intervention Groups.....	99
12.	Repeated Measures ANOVA for Letter Naming Fluency with the Local Normative and Intervention Groups.....	100
13.	Repeated Measures ANOVA for Letter Naming Fluency with the Lowest Quartile Groups from the Local Normative and Intervention Groups.....	100
14.	Repeated Measures ANOVA for Phonemic Segmentation Fluency with the Local Normative and Intervention Groups.....	101
15.	Repeated Measures ANOVA for Phonemic Segmentation Fluency with the Lowest Quartile Groups from the Local Normative and Intervention Groups.....	102
16.	Correlational Matrix for Readiness Measures.....	105

LIST OF FIGURES

Figure	Page
1. The Distribution of Scores Obtained on Onset Recognition Fluency for the Local Normative Group.....	83
2. The Distribution of Scores Obtained on Onset Recognition Fluency for the Intervention Group.....	85
3. The Distribution of Scores Obtained on Letter Naming Fluency for the Local Normative Group.....	89
4. The Distribution of Scores Obtained on Letter Naming Fluency for the Intervention Group.....	90
5. The Distribution of Scores Obtained on Phonemic Segmentation Fluency for the Local Normative Group.....	93
6. The Distribution of Scores Obtained on Phonemic Segmentation Fluency for the Intervention Group.....	94
7. Juan's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norm.....	108
8. Andrew's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norm.....	112
9. Elizabeth's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norm.....	115
10. Erica's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norm.....	118
11. Bob's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norm.....	120

CHAPTER I

STATEMENT OF THE PROBLEM

Reading Difficulties: A High Stakes Problem

Learning to read is considered the foundation upon which a solid education is built. The shift in the workforce from an industrial-based to an information-based economy has placed new demands on schools to improve the literacy levels of all students (U.S. Department of Labor, 1992). Yet results from reading assessments conducted in 1994 through the National Assessment of Educational Progress indicate that approximately 40% of fourth grade students, 30% of eighth graders, and 25% of twelfth graders tested scored below the Basic level in reading (Campbell, Donahue, Reese, & Phillips, 1996). These students could not demonstrate even partial mastery of the knowledge and reading skills necessary to perform work at their grade level.

The high percentages of children falling below the Basic level on the NAEP suggests that far too many children do not possess even the minimal skills needed to succeed in school. This problem cuts across subgroups of children studied through the NAEP. For example, approximately one third of the fourth grade children reading below the Basic level report their parents have graduated from college. However, it disproportionately affects certain groups of children. For example, 29% of White children in grade four scored below the basic level, compared to 67% of African American children and 64% of Hispanic children.

Future prospects for individuals with low levels of literacy are limited. Statistics reported by the Orton Dyslexia Society (cited in Adams, 1990) indicate that 75% of unemployed adults, one-third of mothers receiving welfare and approximately 60% of

incarcerated individuals are functionally illiterate. In a society where literacy is highly valued the social and personal costs of reading difficulties extends far beyond the classroom. Thus, curriculum changes aimed at elevating the reading levels of all students and intensive programs aimed at raising the reading levels of students with the lowest levels of literacy skills are needed.

If we fail to keep the promise-if we continue to focus on the most fortunate youngsters and leave the rest behind-the costs to our society in human distress, lost productivity, crime, welfare and in the fraying of the nation's democratic ideals will be unbearable. (Carnegie Corporation of New York, 1996, p. 26)

The Case for Early Intervention

Patterns of underachievement have unfairly excluded poor children from particular racial and ethnic groups from opportunities only afforded to children from middle-class backgrounds (Carnegie Corporation of New York, 1996). Alexander, Entwisle and Lloyd, (cited in Carnegie Corporation of New York, 1996) note that achievement trajectories in reading and language skills are often established by the third grade. Juell (1988) conducted a longitudinal study of children from first through fourth grades. She found that children who were poor readers at the end of first grade were highly likely to be poor readers at the end of fourth grade (.88 correlation). There was a .87 probability that children who were average readers at the end of first grade remained good readers through the end of fourth grade. Her study also found that students with lower reading performance

were exposed to far less reading materials than their high performing peers. Good, Simmons, and Smith (1998) found that reading trajectories were stable and distinct by the end of first grade. Furthermore, the discrepancy between the middle (50th percentile) and low performing (10th percentile) students grew larger with time. These studies support Stanovich's (1986) hypothesis that early failure in basic reading skills leads to less exposure to vocabulary, poor reading comprehension and eventually to low overall academic achievement.

As the stakes become higher for children who experience difficulties learning how to read, the importance of getting off to a good start becomes imperative for young children. The National Academy of Sciences has recently published a report (Snow, Burns, & Griffin, 1998) to address the issue of preventing reading difficulties. The authors of the report note that large numbers of children experience great difficulties in learning how to read and that children who are poor, non-White and/or dual language learners are overrepresented in this group. They contend that there is sufficient evidence from research to guide practitioners in the classroom and maintain that, "excellent instruction is the best intervention for children who demonstrate problems learning to read" (p. 3).

A tremendous amount of research involving reading problems has taken place over the past thirty years. These studies have provided important information on how children learn to read, what proficient readers do when they read, what factors predict reading failure and success and what skills are deficient in children and adults who experience difficulty reading. Research has also provided us with information about what activities can foster the development of reading (Grossen, 1997; Lyon, 1997).

Consequently, the field has become more knowledgeable about the individual and environmental factors that need to be considered in developing effective practices within homes, schools, and communities.

Research examining early indicators of reading have identified phonological awareness, letter naming skills, level of vocabulary development, rapid serial naming, expressive and receptive language skills, verbal memory and concepts of print as predictors of reading (Snow, Burns, & Griffin, 1998). Skills related to phonological awareness have emerged from the research as powerful indicators of later reading achievement (Adams, 1990; Blachman, 1997; Torgesen, Wagner, & Rashotte, 1994). Phonological awareness involves the ability to perceive the segments of individual sounds in words. It is a critical skill when learning to read a written language based on an alphabetic code. Although the terms phonological and phonemic awareness are often used interchangeably, phonemic awareness involves sensitivity to sounds at the level of individual phonemes. A phoneme is the smallest unit of sound in a word that makes a difference in meaning. In most cases phonemes correspond to individual letters. For example, the word *bat* contains three phonemes /b/ /a/ /t/. Phonological awareness is a term that includes the awareness of sounds at the phonemic level, as well as a broader sensitivity to sounds at the syllable level.

The performance of kindergarten age children on tasks involving phonological awareness has been reported as highly correlated to success in reading through the secondary grades (Adams, Foorman, Lundberg, & Beeler, 1998). Studies have shown that phonological skills can be taught to young children and that the development of these skills facilitates later reading achievement (Blachman, Ball, Black, & Tangel, 1994;

Foorman, Francis, Beeler, Winkates, & Fletcher, 1997; O'Connor, Jenkins, & Slocum, 1995; Torgeson, Wagner, & Rashotte, 1994). A set of converging evidence points to the reciprocal nature of the relationship between phonemic awareness and early reading (Smith, Simmons, & Kameenui, 1995).

Recent research studies conducted at the various National Institute of Child Health and Human Development (NICHD) research sites have highlighted the importance of early intervention for children with significant weaknesses in phonological processing (Lyon, 1997; Torgesen, Wagner, & Rashotte, 1994). It has been demonstrated that children with weak phonemic awareness in kindergarten can learn to read if provided with explicit training in this area and direct instruction in the alphabetic code (Blachman, 1994). However, in the absence of explicit instruction many of these children may not develop the level of fluency in reading that is necessary for reading comprehension and thus they will perform at levels that are well below expectancy.

The Gap Between Research and Practice

Although the evidence in support of providing phonemic awareness training for young children is substantial (Smith, Simmons, & Kameenui, 1995), its implementation in kindergarten programs has been limited. Blachman (1991) notes, "It sometimes appears that the more we learn from research, the less that research is reflected in actual classroom practice" (p. 29). The need to bridge the gap between research and practice is clear, given the statistics on children who demonstrate difficulties in reading and the powerful effects specific training programs have had upon early reading skills.

A joint position statement issued by the International Reading Association and the National Association for the Education of Young Children (1998) supports the need to provide literacy instruction based on empirical research findings. Authors of the position paper contend the persistence of a maturational view of literacy development has been a contributing factor to the lack of movement towards more research-based models of instruction. This developmental or readiness view of literacy development is based on the belief that children will read when they are physically and neurologically ready. In rejecting the concept of reading readiness, Marie Clay stresses that schools must stop waiting for children to “mature” and begin to ask carefully constructed questions regarding what each child needs to develop literacy skills. Her work in emergent literacy, like research in phonological awareness, emphasizes the need for early intervention in reading. “If we can detect the process of learning to read ‘going wrong’ within a year of school entry then it would seem folly to wait several years before providing children with extra help” (Clay, 1991, p. 13).

Other factors that appear to contribute to the separation of research and practice involve debates about reading pedagogy, a lack of teacher training, insufficient availability of research-based curriculum, and the limited applicability of experimental studies to actual classroom practice. Disputes regarding pedagogy in reading have led to a polarization in the field of reading instruction (Adams, 1990; Foorman, 1995; Stanovich; 1994). As a result, many teacher preparation programs have not exposed teachers to the full spectrum of research currently available and have not adequately prepared teachers to work with children who have difficulty learning how to read. Hence, many teachers are simply unaware of the types of strategies needed to improve the reading performance of

children (Moats, 1997). Yet, these same teachers are experts on developmentally appropriate practices and they possess a high level of working knowledge regarding what is manageable within a classroom setting.

The majority of research in the area of phonemic awareness training has relied on stand-alone training programs conducted by researchers. This type of research has offered the opportunity to present a controlled and sequential curriculum to students. However, because much of the research has been conducted by trained researchers and specialists working outside of the classroom, the efficacy of incorporating these techniques and curriculum into classrooms has not been fully documented. A study conducted by Blachman, Ball, Black and Tangel (1994) extended previous research by conducting the actual training in kindergarten classrooms delivered by regular education kindergarten teachers. However, its usefulness for the practitioner is somewhat limited by the exclusion of lower functioning students from the training and its reliance on assessments to identify students in need that are not readily available to classroom teachers. In addition, the lack of anecdotal feedback from the teachers implementing the program provides little insight into how programs can be successfully executed. Consequently, there is a need to conduct research that will promote the use of strategies and principles proven effective in experimental studies and document the process of implementing effective training programs within the field.

Bridging Research and Practice: What We Need to Learn in Kindergarten

Time within the constraints of a school day is a commodity that has to be allocated wisely. School systems offering half-day kindergarten sessions ask kindergarten

teachers to be responsible for the learning of twice as many students as their first grade colleagues. Many teachers spend only two-and-one-half hours with students and are expected to teach a variety of skills. Kindergarten teachers are expected to include curriculum in their programs that promote social skills, build critical thinking abilities, and develop the foundation for a variety of academic skills and attitudes about learning. Early literacy programs should include phonemic awareness programs; yet, previous research has also demonstrated the effectiveness of whole language techniques and philosophies in early reading instruction (Stahl, McKenna, & Pagnucco, 1994; Stahl & Miller, 1989).

Effective literacy preparation motivates children to become readers, develops background and vocabulary knowledge, promotes print awareness, and teaches specific skills such as letter-sound correspondence. Because phonemic awareness training needs to be incorporated into an existing curriculum, procedures for avoiding duplication and increasing efficiency should be explored to ensure that many other critical areas within the kindergarten curriculum are given the prominence they warrant.

Creating research that is more relevant requires a closer look at design and instrumentation. For example, teachers are being called upon to service students with a wide range of skills and experiences with literacy (Adams, 1990; Carnegie Corporation of New York, 1996; Kameenui, 1993). Therefore, research with increased relevance for the practitioner should document the efficacy of a classroom-based approach to phonemic awareness training with diverse groups of kindergarten students. The luxury of additional staff to implement programs is not a reality in many school systems. Consequently, feasibility studies should involve programs implemented by teachers in their classrooms

using existing support staff. The level of support needed from existing school staff members, such as school psychologists, who offer particular areas of expertise should be explored. In addition, more pragmatic assessment procedures should be included in studies. Traditional measures that are expensive, timely to administer, and require specialized training are not a practical means of identifying students who are at risk for developing reading difficulties.

Assessment as the Foundation of an Effective Program

Clearly, an essential factor effecting the feasibility of implementing a phonemic awareness training program for young children involves the need to decide who could benefit from intervention. Although certain elements of a program should be delivered to the class as a whole, teachers need to decide which students will require more explicit instruction in phonemic awareness. Time consuming evaluation methods are not feasible, yet, decisions should not be based on subjective opinions. Thus, valid and expedient methods of assessing children are needed within the classroom to identify children most in need of intervention. To be effective methods of assessment should be timely to administer, yield relevant instructional information, be inexpensive to obtain and sensitive to change (Kaminski & Good, 1996).

Evaluation should be conducted on a regular basis in order to monitor the progress of children receiving instruction. Kameenui (1993) notes that formative evaluation of instructional approaches is imperative to determine the progress of individual children and the overall effectiveness of programs. This careful monitoring is particularly important for young children who often demonstrate variable rates of growth.

Monitoring children's response to instruction is also a critical component in differentiating between a child with a serious learning problem or disability from one who lacks the experiences that are critical to literacy development (Vellutino, Scanlon, & Sipay, 1997). Yet, progress monitoring cannot be labor intensive if it is going to be effective in most classroom settings.

Good and Kaminski (1996) have developed the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) as a curriculum-based measurement system for important skills related to early literacy development. The use of the measures within this instrument can provide classroom teachers with the data necessary to make decisions about curriculum planning for the class as a whole and for small group or individual interventions. Although several studies have been conducted to validate these measures (Good & Kaminski 1996; Kaminski, 1992), issues regarding the manageability of the data for teachers has not been fully documented. The level of assistance needed by teachers in collecting and analyzing data will depend on individual circumstances. However, research aimed at exploring obstacles to implementation would provide teachers with greater insight into the resources needed to establish effective programs at their outset. There is also a need to further explore the sensitivity of the individual measures included in DIBELS to growth in skills through systematic instruction within the classroom (Kaminski, 1992).

The appropriateness of training materials and the scope and sequence of instruction play critical roles in the successful implementation of programs. Good, Simmons, and Smith (1998) note that several new, research-based curricula have recently become commercially available. They outline specific criteria for selecting such

programs and call for the linking of formative assessment to high quality curricula. The new materials available on the market have been designed to assist teachers in implementing phonemic awareness training. For example, a program developed by Lundberg, Frost, and Petersen (1988) has recently been adapted and piloted for three years in the United States (Adams, Foorman, Lundberg, & Beeler, 1998). This is available for integration in large and small group settings. In addition, more intensive training programs are available for children who may not respond to this approach (Torgesen & Bryant, 1994).

A strong link between assessment and intervention has the potential to provide valuable information for practitioners as they plan for classroom and individual instructional needs. Research-based curricula affords teachers the opportunity to present content and teaching techniques that have been demonstrated to be effective with a variety of populations. Formative evaluation procedures can assist teachers in monitoring growth in skills and in selecting specific instructional strategies and content. For students demonstrating limited growth in a particular skill, more explicit programming may be needed. In contrast, students demonstrating sufficient growth in skills may respond well to a more student directed or embedded approach.

Purpose of the Study

This study's aim is to examine the feasibility of utilizing a comprehensive early literacy program linking research-based curricula with innovative assessment procedures within a small urban school system. The school system in question has established the improvement of reading skills as a major goal throughout the system. This was the

impetus for the adoption of a system-wide reading curriculum several years ago and for the establishment of Reading Recovery programs in the elementary schools. The reading program chosen by the system is *Literature Works* published by Silver Burdett Ginn. It is based on the whole language philosophy of providing a literacy-rich classroom through exposing children to quality literature and a print rich environment. Results from the *Iowa Grade Three Reading Test* administered in the 1997/1998 academic year indicate that 9% of third grade students in the district scored within the prereader stage on reading comprehension. Another 33% scored within a range indicating only basic reading comprehension. Only 10% of the students fell within the advanced level, in comparison to 21% of students from across the state. Although administrators acknowledge the diversity of the student body poses challenges to instruction, they have urged teachers to raise the standards for all students. Thus, they have purchased the curriculum and recommended materials for the two classrooms piloting the phonemic awareness training programs.

The question of feasibility encompasses several aspects of implementation that have been addressed in the present study. These involve issues related to implementing the assessment and curriculum components independently and examining the usefulness of their linkage in identifying students at risk and in helping teachers to make decisions related to instruction. Program effectiveness measured by student progress has also been incorporated into the design of the study. Because the study's aim is to strengthen the link between research and practice, special attention has been given to issues facing teachers and support staff in the implementation of the curricula and the formative assessment system.

The use of DIBELS has been relatively limited in scope, thus, the appropriateness of the developers' recommended schedules for measurement and the sensitivity of DIBELS to growth in skills has been investigated within the local context of the school system. The results of various assessments currently used within the classroom have been compared to results from DIBELS. In addition, the individual and overall outcomes of students receiving phonemic awareness instruction have been evaluated.

The challenges faced by teachers in implementing new programs are numerous and complex. Important factors need to be addressed if meaningful change is to occur. These include the manageability of data collection and analysis for classroom teachers, the feasibility of offering activities for high and low functioning students and the integration of phonemic awareness training into existing curriculum. In addition, the challenges posed in balancing training and assessment procedures with the evaluation and instructional mandates from the school administration should be documented. The nature of qualitative research affords researchers opportunities to make meaning from complex areas of study (Rossman & Rallis, 1997). Thus, systematic feedback from teachers serves as an invaluable source of program evaluation.

Quantitative data analysis is also needed to illustrate the decision making process used in identifying students and in documenting their progress. This is accomplished through the depiction of several within subject case studies using time series analysis to document growth in skills for individual children and to illustrate points of concern in making instructional decisions. The exploration of correlations between informal and formal assessments has the potential to provide teachers with information regarding the efficacy and redundancy of specific measures used in evaluating students. Finally, the

comparison of student performance in classes providing phonemic awareness training to the general population of kindergarten students is included to evaluate overall program effectiveness. The progress of students targeted for more intensive group work within the participating classrooms is examined and compared to the progress made by children from the local norming group who initially demonstrated a similar level of performance.

Some researchers have been criticized for being too behaviorally oriented or reductionistic when studying the subject of early literacy, while others have been denounced for a lack of scientific methodology in their research on this topic (Adams, 1990). The issues to be addressed are complex in nature and require a multifaceted approach to investigation. The challenge facing researchers is to gain an appreciation for the complexity of issues facing teachers as they deal with constraints such as time, limited resources, and ever changing educational mandates. This knowledge can only be gained in the field by applying appropriate techniques from both qualitative and quantitative research.

The following chapter presents a review of the research that has established the importance of specific metalinguistic skills in early reading development. The nature of the link between language and literacy development is explored in the introduction. The developmental course of phonological awareness is presented and several intervention studies are examined to illustrate critical issues related to curriculum development and assessment. The final section of the review introduces a relatively new framework for assessment based on a problem solving model currently utilized in curriculum-based measurement.

CHAPTER II

LITERATURE REVIEW

Language and Literacy: A Strong Connection

Research has demonstrated that the development of oral language and literacy are closely linked in many ways and that there are many similarities between their development. It is widely acknowledged that reading is a language based activity. Reading ability is highly correlated with measures of vocabulary, syntactic knowledge, and metalinguistic awareness (Chaney, 1992; Snow, 1983; Snow, Burns, & Griffin, 1998). Both language and reading involve complex learning processes, are somewhat constrained by maturation, and are significantly impacted through social interaction (Snow, 1983). The manner in which children learn language from adults is deeply embedded in their culture and, in literate societies, it is often intertwined with literacy (Mason & Allen, 1986).

Children's progression in developing linguistic and communicative competency falls along a highly predictable pathway. By the time most children reach kindergarten they have developed extensive vocabularies and can utilize fairly complex sentence structures. They also develop competence in using language for a variety of purposes and can adapt their use of language to a variety of situations (Gleason, 1993). Although different theories of language development emphasize different aspects of development, most present day researchers acknowledge that humans have evolved with a biological endowment for spoken language. However, the question that stands at the core of much of the debate in teaching reading concerns whether or not humans are "hardwired" to use written language as a means of communication.

Lieberman (1997) asserts that research in speech has direct implications for understanding the process of literacy development. He notes that new theories of speech indicate a human specialization for the speech act, but not for the act of reading and writing. Speech is an overlaid function, which means that the mechanisms involved in producing speech have primary functions such as breathing. The process of articulation involves a significant degree of coordination of speech mechanisms that occur at the automatic level (i.e., beneath the level of consciousness). He notes that this is profoundly different for reading and writing. Liberman, Shankweiler and Liberman (1989) contend that it is this unawareness of the segmental nature of speech that enables speakers to communicate fluently with one another. They also note that it is this same unawareness of phonemes that often presents difficulties for children as they begin to learn how print maps to speech. Furthermore, they argue that the process of learning the alphabetic principle involves developing an understanding of the internal structure of words that does not occur naturally in oral communication.

The English language uses an alphabetic writing system, which involves the use of graphic symbols to represent individual phonemes. An advantage of this type of writing system is that a limited number of symbols are needed, as compared to the Chinese writing system that uses approximately 80,000 logograms (Adams, 1990). In addition, rules govern the way that speech maps on to print. However, English uses a system that is known as deep orthography which means that the phonological aspect of a word may be compromised to reflect a word derivative or a historical spelling (Snow, Burns & Griffin, 1998). This results in one symbol mapping onto several different phonemes. Thus, the number of exceptions to rules and the abstract nature of phonemic

units combine to make learning to read the English language a formidable task for many children.

Although the majority of researchers maintain that reading is a language-based activity, the assumption that children can learn to read through exposure, as indeed they learn language, is at the very heart of differences among many researchers. The position held by Liberman, Shankweiler, and Liberman (1989) leads to the notion that the process of learning how to read should involve what is commonly referred to as a “bottom-up” approach. This approach emphasizes the primary role that lower level processes play in the act of reading and stresses the importance of deciphering the code used in written language.

Smith, Goodman, and Meredith (1976) present a top-down view when they stress the role that meaning and context play in the reading process. They contend that readers utilize systems of signals to construct meaning and assert meaning is what needs to be emphasized when learning to read. Because the assumption of this approach is based on the belief that learning to read is a natural process, the emphasis is on exposing children to rich meaningful literature in order to encourage and motivate them to engage in the process of becoming literate. Critics of this theory point to the slow development of literacy in history, the high rates of illiteracy in literate societies, and to societies that have not developed literacy as evidence that literacy development is not a “natural” process (McGuinness, 1997).

Gough and Hillinger (1979) maintain that learning the alphabetic code is a complex process that requires direct instruction and assert that literate adults often underestimate the abstract nature of the phoneme. Although children can tell the

difference between the meanings of two words based on one phonemic unit, (i.e., bat versus bag), they are not aware that the two words are comprised of a series of phonemes. This lack of true phonemic awareness is further substantiated through research that has examined the differences between word discrimination and phonemic awareness. Snow, Burns, and Griffin (1998) note that the children who can detect slight differences between spoken words are often not aware of the nature of those differences.

There is a significant degree of research indicating the difficulty that some children experience in acquiring phonemic awareness (Adams, 1990; Stanovich, 1994; Snow, Burns, & Griffin, 1998). Research has shown that children who experience difficulty developing phonemic awareness also encounter difficulty with word recognition. Word recognition involves associating the printed form of a word with its meaning. The accuracy and speed of word recognition is highly correlated to measures of comprehension (Adams, 1990; Chard, Simmons, & Kameenui, 1995; Snow, Burns, & Griffin, 1998; Stanovich, 1991).

Reading represents a complex process that involves extracting meaning from print. Although the goal of learning to read is not to become fluent at decoding, reading for meaning is significantly impeded when a disproportionate amount of an individual's cognitive resources are allocated for word recognition. Consequently, children who do not develop fluency in word recognition encounter a great deal of difficulty extracting meaning from print (Adams, 1990; Stanovich, 1986, 1994). The critical question that then needs to be asked is not if

learning to read is a natural process, but what experiences best facilitates the skills essential to reading.

In literate societies, the development of language and literacy become intertwined. As children approach the stage where formal instruction in reading begins, their language development will have an important impact on how successful they become at reading. As children learn to read, their vocabulary and language development become dependent on how well and how often they read (Stanovich, 1986). Understanding the process of becoming literate is crucial for the practitioner who is beginning the process of formal instruction with children.

Prior to the research on emergent literacy, stages of reading acquisition conceptualized the beginning point of literacy as concurring with formal instruction (Chall, 1983). However, there is now solid evidence that children's early literacy experiences warrant significant attention (Juel, 1991). These preschool experiences shape a child's knowledge of the functions of print, develop vocabulary skills, foster the development of overall language skills, and prepare children for the decontextualized language used in schools (Gunn, Simmons, & Kammeenui, 1995; Snow, Burns, & Griffin, 1998). Children who are exposed to rich and varied print learn metalinguistic terms (i.e., word, letter, sentence) and children who listen to oral stories are better prepared to handle narrative information (Mason & Allen, 1986). Children who are not exposed to these types of activities benefit from careful monitoring by teachers to insure that the expectations and activities within the classroom match their level of literacy development. These children in particular benefit from opportunities for shared reading, teacher modeling of different structures of language (i.e., informational, interactional, and

entertainment), exposure to the communicative functions of print, and exploration of early writing activities (Gunn, Simmons, & Kameenui, 1995). In addition, these children clearly benefit from training in phonemic awareness (Adams, 1990, 1998; Blachman, Ball, Black, & Tangel, 1994; Foorman, Francis, Beeler, Winkates, & Fletcher, 1997; Gunn, Simmons, & Kameenui, 1995; Juel, 1988, 1991; O'Connor, Jenkins, & Slocum, 1995; Torgesen, Wagner, & Rossette, 1994).

Early stages of reading involve learning the alphabetic principle, which involves understanding an arbitrary set of graphic symbols correspond to parts of spoken words. Juel (1991) notes early literacy activities set the stage for the selective-cue phase of beginning reading. This stage involves using some type of cue to distinguish words from one another. The use of cues varies and may involve environmental features (i.e., golden arches for McDonald's, the color and shape of a stop sign, or the placement and color of an exit sign). It may involve using the /c/ in *cat*, or the /b/ in *ball* to identify words or the use of pictures in story books to guess at words. Although children can identify these words in context, numerous studies have been conducted that indicate children are not able to decode these words through their knowledge of sound-symbol correspondence (Masonheimer; Drum & Ehri; Samuels & Jeffrey; Ehri & Wallace, cited in Juel, 1991).

As children progress in their reading development, they move on towards a stage that involves learning and using sound-symbol correspondence. Those who are successful at this stage gain insight into the alphabetic principle. Children who previously used picture cues to guess words, try to match a string of letters to their corresponding sounds. At this point children appear to be "glued" to the print (Chall, 1983). They may make errors that produce nonsense words rather than those that are more contextual in nature

(Juel, 1991; Mason & Allen, 1986). During this stage in reading, many children benefit from systematic instruction in sound-spelling correspondences and from opportunities to practice the skills that they learn. Although the text they practice with should be meaningful, research has shown that skilled readers do not rely on context for word recognition (Adams, 1990; Chall, 1983; Grossen 1997).

Biemiller (1994) contends that, “what distinguishes able from poor beginning readers is not the ability to use context to identify print words, but rather their facility in recognizing print words without context” (p.205). In citing a study he conducted in 1970, he notes that the majority of children who were the most able readers at the end of first grade remained in an initial contextual miscue phase for up to one month. In contrast, the least able readers remained in this phase for up to four months.

Research has shown children are often taught phonics through independent seatwork that is often not engaging (Adams, 1990). In addition, children often have difficulty learning phonics because they lack phonemic awareness (Snow, Burns, & Griffin, 1998). This too has implications for the practitioner. Direct instruction in the code can be made engaging and should be delivered in developmentally appropriate ways. “Drill and kill” worksheets are not effective ways to teach children how to read. Children should be taught how to blend sounds together and should practice with connected text that presents words with the spelling sound correspondences that they have been taught. A number of sight words should also be taught so that texts can be presented in a meaningful fashion (Grossen, 1997).

Children should be exposed to stories that challenge their oral language skills. However, at this level children are not capable of reading materials that pose a challenge

to their oral language comprehension (Grossen, 1997). Thus, the oral context must play a very significant role in contributing to the development of children's vocabulary knowledge and comprehension strategies (Chall, 1983). This points to the critical role that shared reading experiences play in the classroom.

The process of learning to read is complex and closely linked to the development of language. Research has demonstrated that development of one fosters the development of the other. An important element in getting ready to read is a solid foundation in language and a developing awareness of the structure of language. Exposure to print prepares a child to develop a sense of its communicative function. Lap or shared reading with adults offers opportunities to develop conceptual knowledge and facility with new language structures. As a child progresses through the various stages of reading, they learn and gain proficiency in applying the alphabetic principle. This in turn facilitates the development of metalinguistic skills. Automatic word recognition sets the stage for the transition to more advanced reading comprehension (Chall, 1983).

Skilled readers who demonstrate rapid word recognition free their cognitive resources from focusing on decoding and are able to focus on comprehension (Adams, 1990; Chard, Simmons, & Kameenui; Lyons, 1996; Stanovich, 1991). As they read, they gain access to new knowledge, experiences, and complex language structures. Their listening and reading comprehension become commensurate with one another and they are on the road to academic success. Very skilled readers often demonstrate higher reading comprehension levels than listening comprehension levels (Chall, Jacobs, & Baldwin, 1990). Skilled readers come to enjoy the act of reading and their language

development is facilitated through the increased background and vocabulary knowledge they gain in reading.

On the other hand, children who enter literacy instruction with limited background knowledge, language skills, and exposure to print are at great risk for low academic achievement. If they do not develop metalinguistic awareness, basic reading skills and age appropriate language structures (i.e., grammar, vocabulary, and pragmatics), because of a mismatch between their needs and the instruction they receive, they will experience fewer opportunities to develop language (Stanovich, 1986; Snow, Burns, & Griffin, 1998). Children from homes where the dominant language of the home is not English, and who are expected to learn English as they develop literacy skills, have many obstacles to overcome in early reading. They are at risk for reading difficulties because they have not acquired sufficient language skills in English to develop the metalinguistic skills necessary for literacy. Although some may appear to have communicative proficiency for limited conversations, their vocabularies and background knowledge in English are often limited (Dannenberg, 1983; Duran, 1987). This creates significant educational needs in regards to language and literacy.

Research that has examined the relationship between language and literacy has clear implications for practitioners in early childhood education. The teaching of reading must be balanced. Quality early reading programs need to offer a combination of exposure to rich language experiences and direct instruction in the alphabetic code for those children who need it (Adams, 1990; Foorman, 1995; Grossen, 1997). Instruction must take into account what children bring to the process of reading. It must also offer

opportunities for children to develop competencies in all of the skills essential to success in reading (Carnine, Silbert, & Kameenui, 1997).

Metalinguistic Awareness

The development of metalinguistic skills is a critical issue in the development of literacy and oral language that has been studied extensively in the research (Chaney, 1992; Lundberg, Olofsson, & Wall, 1980; Mason & Allen, 1986; Turnner, Herriman, & Nesdale, 1988). Metalinguistic skills involve the ability to think about language and its structural features. It requires a child to focus on the form of language rather than the content or meaning (Chaney, 1992). For example, to understand that *dog* is a symbol or word that represents the animal but is separate from it, and that the word itself is made up of three separate phonemes, /d/ /o/ /g/. Chaney (1992) notes that the three major domains in metalinguistic awareness are phonological, word, and structural (syntax).

Several different theories regarding the development of metalinguistic abilities have arisen through research (Chaney, 1992; Mason & Allen, 1986; Turnner, Herriman, & Nesdale, 1988). A study conducted with three-year-olds by Chaney (1992) supports the theory that metalinguistic skills develop concomitantly with overall language. Her study presented a variety of metalinguistic tasks to children (i.e., phonological, word and syntactic) that were adjusted for the degree of cognitive control (i.e., memory and problem solving processes). She found that the different types of metalinguistic skills were related to one another and to overall linguistic development.

Other researchers (Lundberg, Olofsson, & Wall, 1980; Turnner, Herriman, & Nesdale, 1988) have proposed a connection between phonological awareness

and decentration, the concept proposed by Piaget, which involves the development of the ability to focus on more than one dimension of an object. This theory of metalinguistic development supports the notion that children develop metalinguistic awareness after they develop basic language skills and when they are capable of shifting focus from one dimension to another. Tunmer, Herriman, and Nesdale (1988) conducted a study with five and six-year-olds that examined the relationship of four different metalinguistic skills (i.e., phonological, word, syntactic, and pragmatic). Growth in phonological awareness was found to be dependent on children's levels of concrete operativity, supporting a cognitive capacity model of metalinguistic development.

In examining models of spoken word recognition, Walley (1993) proposes that early on children's perception of spoken words are holistic in nature. As their vocabularies grow, they gradually develop a greater sense of the segmental nature of words because of "the need to discriminate a growing number of lexical items quickly and accurately" (p. 291). She contends that research on spoken word production points to a developmental explanation of phonemic awareness versus a cognitive capacity approach.

Snow, Burns, and Griffin (1998) suggest that there may be a minimum level of linguistic development needed before children can develop metalinguistic skills. For example, perhaps there is a certain level of vocabulary development that must be reached before children can shift focus from meaning to form. Gleason (1993) notes that during the preschool years children are not often required to shift focus from meaning to the form of language. Although they may

make adjustments in their language that involves changes in form (i.e., changing grammatical structures), they do not appear consciously aware of the changes they have made. However, the task of learning how to read and write places great demands on children's metalinguistic skills and also facilitates its development.

The studies examining metalinguistic skills have differed in the types of tasks they have presented to children. The tasks in Chaney's (1992) study deliberately controlled for the level of cognitive processing within tasks. Most studies found that metalinguistic skills were related to overall language development, to one another and to early literacy skills. The question of when precisely these metalinguistic skills develop within a child may not be as critical for practitioners as those that ask what skills need to be developed, what level of skills need to be reached for success in early reading and what types of activities facilitate the development of these skills. This study has attempted to assist teachers develop a local context for assessing skill level in phonological awareness. It also introduces formal activities to build these skills. Follow-up studies will need to address the issue of impact on reading achievement.

Individual Predictors of Reading Difficulties

Many studies have shown that certain skills, which can be measured in preschool, kindergarten, and first grade children, are highly predictive of later reading achievement (Adams, 1990; Chaney, 1992; Lundberg, Olofsson, & Wall, 1980; Maclean, Bryant, & Bradley, 1987; Stanovich, Cunningham, & Feeman, 1984; Tunmer, Herriman, & Nesdale, 1988; Walsh, Price, & Gillingham, 1988). Correlations between children's reading levels from one grade to another usually fall between the .60 to .80 range. Letter

naming, one of the strongest individual predictors of reading, has been shown to fall as high as .56 in some studies (Snow, Burns, & Griffin, 1998). Various studies have demonstrated moderate to moderately high relationships between early reading and such variables as phonological awareness, short term verbal memory, rapid naming, expressive language, letter naming skills, and print awareness.

When examining studies that have looked at predictors of reading difficulties it is important to understand that correlation does not indicate causation. For example, Share, Jorm, Maclean, and Matthews (1984) note that when looking at cognitive deficits and their relationship to reading problems, several possible alternatives are plausible. The cognitive deficit may be the cause or the result of the reading problem, or both may be related to an underlying factor. Stanovich, (1986) notes that it is very important to examine the directionality of correlations, to take into account the developmental limitations of certain cognitive functions, and to consider the developmental stage of the child when studying reading acquisition or predictors of reading. For example rhyming has been shown to be highly predictive of reading at some stages of development, but has shown little correlation with measures of reading when assessed at later stages of development (Adams, 1990).

Measures of overall intelligence have not been shown to be strong predictors of early reading achievement (Adam, 1990). Stanovich, Cunningham, and Feeman (1984) found that measures of intelligence were not a strong predictor of reading achievement when measured in the first grade. In their two-year long study, Tunner, Herriman, and Nesdale (1988) examined the relationship of reading achievement to measures of verbal intelligence,

metalinguistic skills, print awareness, and measures of operativity. They concluded that metalinguistic and print awareness were the highest predictors of reading achievement when measured between the age of five and six years.

Adams (1990) notes that although measures of intelligence have been shown to be only weakly related to early reading achievement, reading failure seems to have a significantly negative impact on overall cognitive skills.

Researchers have come to realize that the fluency of letter naming skills is a critical factor in predicting later reading achievement (Adams, 1990; Snow, Burns, & Griffin, 1998; Walsh, Price, & Gillingham, 1988). Several theories have been developed for why the relationship between letter naming and early reading is so robust. The first deals with its usefulness as an indicator of exposure to early literacy. Adams (1990) notes that this may be particularly true of preschoolers. Letter naming fluency may serve as a facilitator for early reading because it facilitates the long term storage and retrieval of the symbols and expedites the learning of the phonemic associations with letters and letter patterns. Slow facility in letter naming (below a particular threshold) has been found to be related to difficulties in reading (Walsh, Price, & Gillingham, 1988). It has been suggested that this may reflect an underlying cognitive capacity that is important to reading (Adams, 1990; Walsh, Price, & Gillingham, 1988). Although letter identification serves as a strong predictor of early reading, numerous studies have shown that teaching letter naming has minimal effects on the improvement of early reading (Adams, 1990).

Measures of print awareness have also been shown to be moderately correlated with measures of reading in the early primary grades (Adams, 1990; Tunmer, Herriman, & Nesdale, 1988; Snow, Burns, & Griffin, 1998). These measures capture how print can be used, commonly referred to as the functions of print. When combined with measures of letter naming and sound correspondence they have been found to be highly related to early reading (Stuart, cited in Snow, Burns, & Griffin, 1998). The differences in children's exposure to print in the early years can be quite extreme. Some children are exposed to thousands of hours of literacy experiences prior to kindergarten, while others receive very minimal exposure to print (Adams, 1990). The discrepancies in early literacy experiences among children entering schools underscores the necessity to examine multiple factors (individual and environmental) that may contribute to early reading and to consider response to formal literacy activities. Staff members involved in this study have learned how to use and interpret measures that carefully consider and monitor children's individual skills and evaluate the effectiveness of curriculum.

Measures of overall language skills are predictive of reading, which is not surprising given that reading is a language based activity. Although measures of receptive vocabulary have been found to be moderately correlated with early reading, measures of expressive vocabulary have been found to demonstrate higher correlations. This may be explained by the differences between the two tasks, with object naming calling for the accurate retrieval and production of phonological representations of words. This may more closely reflect the

demands placed upon children as they read (Snow, Burns, & Griffin, 1998). Studies have shown a correlation between the speed of lexical access and reading (Wolf, 1997). Snow, Burns, and Griffin (1998) note that further research is needed to determine the relationship of confrontation and rapid naming to reading.

Measures of verbal short-term memory have been shown to be moderately related to measures of early reading. Sentence recall and recall of short stories appears to be more closely related to reading than digit span or word span tasks (Leather & Henry; 1994; McDougall & Hulme, 1994; Snow, Burns, & Griffin, 1998). Leather and Henry (1994) compared measures of simple memory span, complex memory span, phonological awareness, and early reading. They found that complex memory span tasks were highly related to phonological awareness and both of these were stronger predictors of early reading than simple memory span tasks. The complex memory span task involved memorizing words while also processing them in a sentence.

McDougall, Hulme, Ellis, and Monk, (1994) examined the role of short-term memory and phonological awareness on reading and found that measures of verbal memory, but not visual memory were related to differences in reading ability. However, they found that differences in memory span were primarily associated with measures of speech rate and report that measures of speech rate were better predictors of reading ability than memory span. Phoneme deletion and speech rate explained much of the variance in reading ability. Their participants

ranged from ages seven to nine which may explain why rhyming did not prove to be a powerful predictor of reading in their study.

Torgesen (1996) has proposed that the relationship of phonological awareness and verbal memory to reading can be explained through the model of working memory first developed by Baddeley. This model presents a central executive with two subsystems known as the visuospatial sketchpad (concerned with visual short-term memory) and the phonological loop (concerned with verbal short-term memory). The phonological loop stores verbal information using a code based on the phonological features of material. It is made up of two systems known as the phonological store (holds speech-based information for brief periods) and the articulatory loop (refreshes or establishes memory in the phonological store through activating central speech-motor mechanisms). The articulatory loop can establish representation if material is presented visually or can directly represent auditorally presented information. Decaying memory traces are thought to be refreshed through subvocal rehearsal.

Torgesen, Wagner, and Rashotte (1994) note that it is important to differentiate between phonological awareness and phonological coding. They define awareness as one's sensitivity to the structure of the sounds. Coding is the process of storing and retrieving phonological representations. It involves translating and accessing information through phonologically based representations (speech code). Measures of memory span and rapid naming are thought to assess two different facets of coding. Torgesen (1996) maintains that phonological coding impacts the development of phonological awareness.

Torgesen (1996) contends that individuals with reading disabilities have problems with the phonological codes available for processing in the phonological store and use the articulatory loop less efficiently. Furthermore, he contends that phonological coding (measured through verbal short-term memory) influences the development of phonological awareness by effecting the ease with which segments of words can be held and compared in working memory. He notes this would explain their high correlations in preschool and kindergarten. McDougall and Hulme (1994) suggest that this model would explain the relationship of verbal short-term memory, phonological awareness, and speech rate to reading. Torgesen notes that the relationship between phonological awareness and short-term verbal memory becomes more differentiated with development and proposes that differences in verbal memory in preschoolers may account for early differences in phonological awareness development. Further longitudinal research is needed to substantiate this model.

Torgesen (1997) reports the processing abilities that consistently differentiate between dyslexic and non-impaired readers include phonological awareness, rapid naming, verbal short-term memory, and fine speech discriminations. The most reliable predictors of fluent and accurate word recognition skills are phonological awareness and rapid naming skills. Wolf (1997) notes that different groups of disabled readers have emerged through the research. Individuals with phonological awareness difficulties, those with rapid naming difficulties and those who manifest difficulties in both areas. She refers to these individuals as having “double deficits” and notes that these individuals

appear to be the most resistant to remediation. She also cautions that individuals with rapid naming difficulties may go undetected if only measures of phonological awareness are used to detect at risk status.

It should be noted that individuals with hearing impairments, chronic otitis media, early language impairments, and attentional deficits have been shown to be at varying levels of risk for reading difficulties (Snow, Burns, & Griffin, 1998). In addition, children with a familial history of reading difficulties are also at risk and require close monitoring. Research studies (Pennington; Cardon et al., cited in Lyon & Chhabra, 1996) have indicated a strong genetic component in learning disabilities related to phonological deficits. Neural imaging techniques have begun to reveal what underlying neural mechanisms are responsible for specific reading disabilities (Shaywitz et al., 1997). However, these are currently in the exploratory phase and have limited relevance for the early childhood practitioner attempting to discern who may need specific interventions in their classroom.

The Development of Phonemic Awareness

Measures of phonological awareness have consistently proven to be good predictors of early reading achievement (Adams, 1990; Blachman, 1997; Snow, Burns, & Griffin, 1998; Torgesen, 1996). Studies that have assessed phonological skills in kindergarten have usually shown correlations of .4 to .6 with reading at the end of first grade (Torgesen, Wagner, & Rashotte, 1994). Phonological awareness appears to be highly predictive of reading success, but at the outset of

school many children who demonstrate limited phonological awareness, develop it during early reading instruction (Snow, Burns, & Griffin, 1998). Thus, initially they may be difficult to distinguish from children who will continue to demonstrate difficulties in phonemic awareness.

Studies have established that phonemic awareness can be taught to young children and that this has a positive effect on later reading and spelling (Blachman, Ball, Black, & Tangel, 1994; Lundberg, Olofsson, & Wall, 1980; Vellutino & Scanlon, 1987). As mentioned previously, there appears to be a reciprocal relationship between the development of phonemic awareness and reading. As children become exposed to early reading skills, they become more aware of the segmental nature of speech. As they develop phonemic awareness, their early reading skills are enhanced (Smith, Simmons, & Kameenui, 1995; Spector, 1995; Wagner, Torgesen, & Rashotte, 1994). Some children appear to develop this skill with minimal effort, while others experience a significant degree of difficulty understanding the segmental nature of speech (Adams, 1990). Because there is now overwhelming evidence that phonological awareness has an important relationship with early reading skills, the need to monitor response to training is crucial in identifying children with serious learning difficulties (Adams, 1990; Blachman, 1997; Stanovich, 1994; Torgesen, 1996). The model of assessment used in this study provides teachers and specialists with the tools to provide the type of monitoring and intervention crucial to detecting learning difficulties early on in the learning process.

As research has grown in this area, questions regarding whether phonological awareness is a unitary construct or a multidimensional one have arisen (Smith, Simmons & Kameenui, 1995; Stanovich, Cunningham, & Cramer, 1984; Torgesen, Wagner, & Rashotte, 1994). Although a consensus has not been reached, it appears that there is some evidence to suggest it is a “general ability that has multiple dimensions of varying complexity” (Smith, Simmons, & Kameenui, 1995, p. 8). In her study of various phonemic tasks, Yopp (1988) factored various tasks according to their complexity. She found that some tasks, such as phoneme deletion, required greater cognitive processes to perform them successfully. For example, to perform a task involving phoneme deletion a child must isolate a particular sound, hold the resulting sound in memory and then blend it to produce a response. Other tasks, such as blending or segmenting were found to be somewhat less complex in nature (Yopp, 1988). Adams (1990) notes that phonemic awareness tasks differ in the phonemic sophistication they assess and in the memory demands they place on individuals.

Stanovich (1986) and Adams (1990) contend that the relationship among phonological skills and the relationship that each of the skills has to reading acquisition can only be understood by considering the developmental emergence of these skills. For example, rhyming is a skill that emerges prior to phonemic segmenting and blending. It is a powerful predictor of later reading skills when measured at a young age, but not when measured in children older than five years of age.

Tasks involving rhyme, alliteration and syllable awareness do not assess phonemic awareness (Torgesen, 1997). Phonemic segmentation and manipulation tasks do measure phonemic awareness and have been shown to be stronger predictors of early

reading (Stanovich, Cunningham, & Cramer, 1984). However, they are prone to floor effects at kindergarten entry (Kaminski & Good, 1996). Phoneme manipulation tasks, in particular, appear to be beyond children before early first grade. This may be due to the cognitive demands of the task and to the level of phonemic sophistication. The level of phoneme awareness required by these types of tasks is related to instruction in reading (Adams, 1990; Torgesen, 1997).

Smith, Simmons, and Kameenui (1995) note that the difficulty of a task depends on memory requirements and the characteristic of the phonological unit. The characteristics they consider include position in word, degree of abstraction, size, and phonological properties. They note that, in general, initial and final sounds are easier to segment than phonemes in medial positions. Words and syllables are less abstract than phonemes and some phonemes are easier to isolate than others. Torgesen (1997) notes that some phonemes are more distorted when said in isolation, thus they are more difficult to work with. For example, it is easier to produce an /f/ in isolation than a /d/ because the /d/ often becomes distorted with a vowel sound being placed after it. Good, Simmons, and Smith (1998) maintain research has demonstrated length of words, number of consonant clusters, and the articulatory features of phonemes within words must be considered when designing instruction. Further research is needed in this area to develop a more accurate assessment of how factors combine to effect difficulty level and to develop consistency among measures. Table 1 provides examples of phonological awareness tasks in order of least to most difficult.

Table 1

Samples of Phonological Awareness Tasks

Task	Sample Question	Expected Response
Rhyming	<i>Which ones sound the same?</i>	call- <u>bat</u> -mat
Oddity tasks	<i>Which one does not belong?</i>	<u>hill</u> -ball- bag
Syllable splitting	<i>Say the first sound in bear.</i>	/b/
Phoneme blending	<i>Put these sounds together.</i>	/h/ /a/ /t/ hat
Phoneme Segmentation	<i>Take this word apart.</i>	hat /h/ /a/ /t/
Phoneme Deletion	<i>Take the b from ball.</i>	all
Phoneme Substitution	<i>Take the /b/ from ball and add /t/</i>	tall

Counting the number of phonemes in a word is a procedure sometimes used by researchers. Usually a child is asked to count phonemes as they are orally recited by moving chips from one place to another. This is a procedure usually used by Blachman (1997) in her studies. It involves training to teach the actual procedure and success depends on an understanding of one-to-one correspondence. The use of concrete materials can reduce the cognitive capacity requirements of tasks for young children and facilitates demonstration during instruction. Another method that has been used to assess phonemic awareness is the scoring of invented spellings for phonological accuracy. Mann, Tobin, and Wilson (1987) have used this method and found that it correlates to speech-processing skill and predicts first grade reading ability. Both of these types of tasks appear beyond the child who has not had any type of reading instruction (Adams, 1990).

Intervention Studies

There have been numerous intervention studies conducted that have examined the effectiveness of phonemic awareness training on later reading (Smith, Simmons, & Kameenui, 1995; Spector, 1995). Many of these studies have included training in sound-symbol correspondence, as well as phonemic awareness (Blachman, 1997). Studies conducted over the last several decades have included a variety of tasks with varying results. However, it is difficult to compare the findings among the studies because of variations in the age of participants and nature of the tasks performed (Smith, Simmons, & Kameenui, 1995; Spector, 1995). Research studies have used various types of training programs for different lengths of time. Nicholson (1997) reports that training sessions used have varied in frequency from a low of 12 to a high of 160 sessions. Some of the investigations have involved entire classes, while others have used individual or small group pullout sessions. Yet, most studies have demonstrated significant gains in phonemic awareness skills, reading achievement and/or spelling skills (Blachman, 1997; Torgesen, Wagner, & Rashotte, 1994; Smith, Simmons, & Kameenui, 1995).

Lundberg, Olofsson, and Wall (1988) demonstrated that training in phonological awareness can have an important impact on developing phonemic awareness, reading and spelling skills. They contend that explicit instruction in phonological awareness is the crucial factor in developing phonemic awareness, rather than direct instruction in letter identification. This has been challenged by many and seems to contradict the evidence from other studies, which demonstrate a significant effect for both letter-sound correspondence and phonemic awareness training when compared to either in isolation (Blachman, 1997). It is widely held that direct instruction in phonemic awareness and

letter knowledge is critical when introducing the alphabetic principle to young children (Adams, 1990; Blachman, 1997; Good, Simmons, & Smith, 1998; Snow, Burns, & Griffin, 1998).

Significant training effects have been found for children in general and those who have been determined to be at risk for reading difficulties. Yet, studies have also shown that some children experience a significant degree of difficulty developing phonemic awareness and early reading skills (Blachman, 1997). Smith, Simmons, and Kameenui (1995) note that path analyses have shown several dimensions of phonological awareness are differentially related to reading. For instance, tasks involving segmenting syllables are less related to reading than those involving segmenting phonemes.

Smith, Simmons, and Kameenui (1995) report, in their analysis of the research on phonological awareness, that segmentation appears to be the most frequently used task to measure phonemic awareness. Yopp, (1988) contends that several measures of phonemic awareness should be administered when screening for phonemic difficulties to increase the reliability of the procedure.

O'Connor, Jenkins, and Slocum (1995) conducted a study to examine the relationship of several different phonological skills. They propose that a closer examination of the relationship of specific phonological skills such as rhyming, blending, and segmenting to one another and to the process of early reading acquisition can lead to a better understanding of which tasks should be incorporated into training programs. They note that efficiency is a critical component in developing appropriate training programs, particularly for children with limited skills in these areas because "they have more to learn in less time than their peers" (p. 214).

Their study included students who had originally entered kindergarten with very low levels of phonological skills. The children who received training on phonological tasks and limited letter-sound correspondence, were able to learn the skills presented and generalize them to both novel phonological awareness and beginning reading tasks. These students were able to achieve a level of mastery that was equal to students who had entered kindergarten with a high level of phonological skills. O'Connor, Jenkins, and Slocum (1995) found that blending and segmenting skills make a significant contribution to the development of phonological awareness, and that this then readily transfers to other phonological related tasks. They suggest teaching skills of blending and segmenting in combination around a common core of words may be more effective than other programs used in previous research programs. Their study addresses important pragmatic issues related to the instruction of children who are at risk for reading failure. Teachers often struggle to service a wide range of students under significant time constraints. Program designs that build in efficiency without sacrificing effectiveness will prove valuable to practitioners in the field. An adaptation of their training program has recently become commercially available and is incorporated into this study.

Many studies evaluating phonemic awareness training have included controls for exposure to activities within the general education curriculum. Certainly for stand-alone programs conducted by outside researchers, classroom activities can serve as confounding variables. For example, in the study by O'Connor, Jenkins, and Slocum (1995) an important question raised by the researchers involved whether or not phonemic blending and segmenting activities are capable of producing similar effects as training programs that include a variety of phonological awareness tasks. If phonological

awareness activities such as rhyming were incorporated into the daily curriculum of the kindergarten classroom, it raises questions regarding the internal validity of the study and the results of their study cannot be definitive until carefully constructed clinical trials are run. However, a more important issue that should be raised involves the practicality of stand-alone training programs conducted by researchers. Although these stand-alone programs offer the opportunity to design controls into the study, they are not readily transferable to the classroom. This may contribute to the limited adoption of training programs in classrooms. Thus, a major question posed by the current study relates to issues effecting the manageability of offering various levels of training activities by teaching and support staff. In designing their study on phonemic awareness Blachman, Ball, Black, and Tangel (1994) set out to evaluate the effectiveness of a phonemic awareness training program implemented with teachers and paraprofessionals in their own kindergarten classrooms. They recognize that researchers must begin to examine the efficacy of a classroom based approach. The aim of their study was to evaluate the effectiveness of providing phonemic awareness activities to kindergarten children in their own classes by their own teachers and paraprofessionals.

Their study took place in low-income, inner-city schools in upstate New York. However, children excluded from the study often present the greatest challenge for teachers. These included children with language scores more than 1.5 standard deviations below the mean, those who were not able to demonstrate one-to-one correspondence, and those who demonstrated severe articulation problems. Children who were identified as readers by their teachers or by their score on a word identification test were also not considered for participation. The exclusion of both high and low functioning children is

not unusual in this area of research. Yet, this is another factor that limits the relevance of research for classroom teachers. Intervention studies must begin to make a concerted effort to include children representing a wide variety of skill levels if it is going to yield meaningful information for practitioners. This study has included children who currently are receiving special education services because of significant cognitive weaknesses and speech and language delays.

Assessments used in many of the intervention studies are not practical for classroom teachers to administer. They often require specialized training, are expensive, timely to administer, and are summative in nature. Scores produced from these assessments often have limited instructional value. These static assessments also have limited utility in differentiating children with serious learning problems from those with limited literacy experiences because they do not allow a practitioner to monitor growth over time or to observe response to specific interventions. Teachers need a more pragmatic means of evaluating students in order to design effective instruction in preliteracy skills.

A Pragmatic and Collaborative Model for the Assessment of Early Literacy Skills

Shinn and Hubbard (1992) contend that if assessment is going to be useful for planning interventions, it should “provide information about what skills, task preskills, or problem-solving algorithms a student does and does not demonstrate that are essential for success in the curriculum the student is expected to learn” (p. 1). Likewise, if assessment is to be used for evaluating the effectiveness of interventions, it should be able to be administered on a frequent basis, be sensitive to change, and include methods of response

that lend themselves to error analysis. They note curriculum-based measurement serves as a viable alternative to the use of traditional norm-referenced tests because it allows teachers and specialists to conduct formative evaluations that can meaningfully inform practice. Curriculum-based measurement utilizes short-duration fluency measures of basic skills administered in standardized formats. These measures have been shown to be sensitive to change over time and to differences among individuals. They are designed to be indicators of important skills and have established technical adequacy. Research studies conducted on the use of these measures have shown dramatic reductions in the number of referrals to special education and demonstrated significant achievement gains in students (Shinn & Hubbard, 1992).

The application of a problem solving model within reading preparations programs offers the opportunity to evaluate the effectiveness of curriculum in meeting children's needs and to assess an individual child's response to intervention. Kaminski and Good (1998) contend that research in early reading and advances in assessment based upon the problem solving model have set the stage for a move towards the prevention of reading difficulties. They have begun to conduct research using DIBELS to monitor individual children's response to specific interventions aimed at developing early reading skills.

The problem solving model presented in their research involves progression through a series of phases aimed at examining the performance of the group as a whole and individuals within the group. Assessment information is collected in order to establish local normative data, to make well informed educational decisions, and to monitor progress. The phases begins with problem identification and validation and then moves on to phases involving exploring and evaluating solutions.

Although this model is usually applied to identifying students with existing academic difficulties, Good and Kaminski (1996) note that it is easily applied to a prevention model. They have developed DIBELS to identify students who may not have the prerequisite skills for reading as they enter reading preparation and early reading programs. The identification of children who do not demonstrate important phonological and letter naming skills provides classroom teachers with the data necessary to make decisions about curriculum planning for the class as a whole and small group or individual interventions.

Given the evidence from the research which shows phonological skills are necessary for reading and that these skills can be taught, the use of an assessment to evaluate children's skills in this area is an appropriate first step in the prevention process. The monitoring of response to intervention can be used to evaluate the effectiveness of the interventions and, if necessary, new interventions that are more intensive can be implemented. Bearing in mind the call made by Vellutino, Scanlon, and Sipay (1997) for looking at response to intervention as a criteria for identifying learning disabilities, the use of DIBELS as a means of carefully monitoring children's progress makes sense. It can provide valuable information for the specialist who is asked to assess young children in order to make important educational decisions about placement or the need for services. However, it should not be used as the sole criterion for making these decisions.

In the first phase of this model, the questions asked by teachers involve whether or not a child is potentially at risk for reading difficulties. This step involves assessing all of the children in the classroom on measures that are related to important early literacy skills. This screening also serves as a means to establish local normative data for the

classroom and can serve as a means to guide curriculum. When teachers have this data, they are able to determine who may be performing at very low levels in comparison to their classmates or peers within a school district. District-wide local norms are highly recommended.

Kaminski and Good (1998) have reviewed their assessments for level of difficulty. This is important because if they are too difficult or too easy, they will not demonstrate sufficient variability among the children. For example, using rhyming tasks with kindergarten children may be too easy and all of the children may score high, resulting in ceiling effects. A phoneme deletion task would be beyond the reach of too many kindergarten children and result in floor effects. They indicate that Onset Recognition Fluency is adequate for use in late preschool through mid-kindergarten. Phoneme Segmentation Fluency is adequate for mid-kindergarten through the middle of first grade. These are estimates and need to be established through the collection of local normative data. It is important to note that these timeframes are used for data collection for the group as a whole. The determination of when to use a specific assessment for progress monitoring would be determined by the individual skills of that child. For example, it may be appropriate to use Onset Recognition Fluency for a child in late first grade if that child has very low phonological skills.

Once data for the group is collected, it can be reviewed to determine who should be assessed at another point in time. This is the validation phase, which is particularly important for young children, whose performance is often more variable than older children or adults. DIBELS offers many alternative forms, which can be used over the course of the year. Children who score below the 25th percentile might be designated to

go through the validation phase. Although the measures within DIBELS are quick to administer (one minute), they can reveal a range of skills because a fluency rate is calculated. Francis, Shaywitz, Stuebing, Shaywitz, and Fletcher (1994) note that speeded response measures administered over a period of time offer a great deal of potential in quantitatively measuring change. Kaminski and Good (1998) recommend a one-to-two-week waiting period between administrations for children who are targeted for monitoring. Teachers can then easily plot slopes of progress for children who have several points of data. Repeated administrations increase the reliability of these measures as an estimate of performance.

The authors recommend that local normative data be collected three times during the school year. This provides information regarding how the group as a whole is progressing and allows teachers to identify children who may have entered with an acceptable level of skills, but are not keeping up with their classmates.

Children who show improvement and reach a level of performance above the designated cut-off point, are no longer monitored. Those children who continue to show difficulties after several administrations could be targeted for small group work interventions. This marks the exploring solutions phase. In the studies conducted by Kaminski and Good (1996), children whose scores were above a specific cut-off point were determined not to need intervention. Children who performed below a certain cut-off point during the monitoring phase were selected to receive instruction within the class using a program aimed at building phonemic awareness. However, teachers could make the decision at this point to increase an activity for all children in the class. A higher level of intensity might involve more teacher directed activities or small group work. This

would depend upon the resources available to the individual teachers and the flexibility within a given curriculum. The authors present a model that ranges from making environmental modifications within the classroom setting to intensive one-on-one instruction.

An advantage of this model involves frequent assessment to evaluate the effectiveness of a program. During this, the evaluating solutions phase, decisions can be made to change the intensity of programming depending on how much progress a student is making. If a particular program is not resulting in a change in performance, a different more intensive program could be implemented. Kaminski and Good (1998) recommend that a set of decision rules be established for determining when and how interventions should be modified. Goals can be set for students in relation to how the class as a whole is performing in a given area. During the problem solutions phase, a problem is determined to be solved when a particular child's performance is within a determined expectancy level. This would be determined by the teacher in comparing an individual child's performance to the class as a whole or to an established performance standard. A performance standard can be established when a certain level of performance has been determined to correlate with success. For example, if it was established that a certain performance level on Phonemic Segmentation Fluency was correlated with success in reading, that could serve as a specific goal for intervention. Good (1998) has recently reported tentative performance standards for Phonemic Segmentation based upon his research.

The problem solving model using DIBELS provides teachers and specialists with a framework for identification and monitoring of specific skills highly related to early

literacy development. The measures are reported to be easy and quick to administer. Data analysis can be handled through computer software or by hand plotting individual student's progress. However, teachers may need help carrying out this aspect of the program and in making decisions about program modification.

One advantage of adopting this type of model involves the establishment of local norms as a reference point. Good and Kaminski (1996) make note of this point, which is critical when examining the demographics of the children with whom they have piloted DIBELS. They worked with a group of first grade and kindergarten children from a rural community in the Pacific Northwest to pilot DIBELS. Thus, admittedly, the timeframes they established for administration of the phonemic awareness tasks may need to be adjusted for children from other communities, such as an urban population in the Northeast. This is not meant to say high standards should not be set for a particular group of students, but it provides teachers with the means to set realistic goals initially and to assess children's needs within a more appropriate context.

Use of this model provides teachers with information to evaluate the needs of students in a formative, rather than summative manner. Measuring performance within a traditional static format can lead to misdiagnosis and inappropriate interventions. Waiting until the end of a year is too late to determine that a specific curriculum is not working with a given child or a group of children. Adoption of an early intervention/prevention model provides teachers with opportunities to formulate solutions in a timely manner.

Guiding Children Down the Pathway to Success

Learning to read is a complex process that depends on many factors, which become intertwined with one another as a child grows. There are many bends in the road and many uneven spots to watch for as children find their way along this pathway. Phonemic awareness is a small step on the road to literacy, but it is a crucial one. The linking of a formative assessment model with research-based curriculum aimed at developing phonemic awareness may provide the kind of support that children need to begin their long journey along this pathway. Early prevention models are a means to make sure children do not stumble, allowing observant teachers to catch them before they fall.

The model offered by Kaminski and Good (1998) may provide teachers with the means to assess important skills needed for reading and to evaluate the effectiveness of their early literacy curriculum. It provides school psychologists with an opportunity to serve in a facilitative role with teachers. Working within a collaborative research model, teachers and specialists can explore various approaches to instruction and options for classroom modifications. The data generated from the formative assessment model can help practitioners make objective and informed decisions as to when children may need more intensive assistance to develop specific skills related to reading.

The selection of a more pragmatic approach to assessment may serve as the means to extend current research into the classroom. However, critical questions must be addressed before the wide scale adoption of any model. The current study explores the feasibility of the use of this model within a local context. Chapter three provides information regarding the specific questions posed and the procedures used in this study

to examine critical issues faced by practitioners as they implement this model and to evaluate the significance of student outcomes.

CHAPTER III

DESIGN OF STUDY

Research Questions

Although initial research on DIBELS supports its usefulness as an assessment tool, this study has attempted to address specific questions regarding the efficacy of its use within a diverse urban school system. Manageability issues regarding the use of DIBELS as a means to monitor the development of early literacy skills on a system-wide and classroom basis have been examined through a variety of methods. This study has also investigated the effects of linking DIBELS with systematic phonemic awareness training delivered in both the classroom and within a small group setting. However, because the effectiveness of phonemic awareness training programs has been clearly demonstrated in the literature, this study has focused on implementation issues involved in the linkage of formative assessment with early literacy training.

The following questions provide a framework for the study. They have been developed to examine the feasibility of applying Good and Kaminski's (1996) model within the context of the local school system in the study.

1. Is the model effective in developing the early literacy skills of participants in the study?
2. Is it feasible to administer DIBELS in a diverse urban school system?
 - a) Is the data collection manageable?
 - b) What level of support is needed for implementation?

3. Are measures from DIBELS useful in identifying students who would benefit from additional programming and in monitoring their progress?
 - a) How appropriate is the schedule recommended by the developers?
 - b) What is the relationship between performance on DIBELS and other measures used within the system (i.e., untimed letter and color identification)?
4. How feasible is the integration of the phonemic awareness training programs into the current early literacy curriculum?
 - a) Are the lessons manageable?
 - b) How can the activities be integrated within the current curriculum and the general education setting?
 - c) What is the level of support needed for implementation?
 - d) Can the curriculum be delivered in the regular education setting to address a wide range of skill levels?
5. Is the model useful in guiding teachers as they make curriculum decisions?

These questions have been addressed through a multifaceted approach using both qualitative and quantitative methodologies. The examination of data obtained through the combination of these methodologies can provide greater insight than each of them would have been able to contribute in isolation. Because research findings are often written with little regard for the practitioner in the field, they often offer limited practical suggestions. A concerted effort has been made to document the obstacles faced and strategies used in implementing both the use of DIBELS and the phonemic awareness training programs. This has been accomplished through obtaining systematic feedback from the practitioners involved in the study. The following is a detailed description of specific methods used in

the study. This includes a description of the participants, the measures administered, the curricula used, and the procedures for data collection and analysis.

Participants

Children who participated in the study were enrolled in kindergarten classes within a small urban school system for the 1998/1999 academic year. Demographic information provided by the school system indicates that approximately five hundred children were enrolled in kindergarten during the previous school year (1997/1998). Specific enrollment data within the entire school system for that same year is broken down in Table 2. State figures released from the Massachusetts Department of Education have also been included as a means of comparison. These statistics reveal the diversity of the overall student population.

Preliminary data from this year's kindergarten enrollment is included in Table 3. The enrollment data is taken from the two early childhood centers in the system. There are also three other kindergarten classrooms disbursed throughout several schools within the city. Enrollment data from those classrooms are not included in Table 3. A review of enrollment data for the 1998/1999 kindergarten classes indicates that the district's demographic data in Table 2 is reflective of the breakdown of students enrolled in kindergarten. The data indicates a lower percentage of special education students and a higher percentage of children with limited English proficiency than is reported for the system. The lower percentage of special needs children in kindergarten may reflect the fact that many learning disabled children are identified after kindergarten. The higher number of students with limited English proficiency may be because many young

children enter school from homes that do not speak English. As they develop proficiency in English, they would no longer be included in these numbers. It may also reflect a change in demographics of the student population.

Table 2

System Wide Enrollment by Selected Populations for 1997-1998

<u>Ethnicity</u>	<u>District</u>	<u>State</u>
African American	6.6	8.5
Asian	9.6	4.1
Hispanic	24.9	9.7
Native American	0.1	.2
Caucasian	58.8	77.5
<u>Selected Populations</u>	<u>District</u>	<u>State</u>
Special Education	15.7	16.6
Limited English Proficient	9.5	4.8
Eligible for Free/Reduced Lunch	50.1	25.9

Note. The values represent percent of student population

There are two early childhood centers in the school system with a total of eleven kindergarten classes between the two centers. There is one Spanish bilingual class and two multilingual classes that incorporate English-as-Second-Language methodologies into their curriculum. Only one of the kindergarten classrooms offers a full day program and students are chosen for participation on a lottery basis. All of the other classrooms offer half-day sessions. Children with disabilities are evenly distributed throughout the

classrooms and serviced by an inclusion specialist. Children from both centers participated in the establishment of local norms.

Table 3

Kindergarten Enrollment by Selected Populations for 1998-1999

<u>Ethnicity</u>	<u>Actual Value</u>	<u>Percentage</u>
African American	31	7.2%
Asian	45	10.6%
Hispanic	124	29.1%
Native American	1	.002%
Caucasian	226	53.1%
<u>Selected Populations</u>		
Special Education	45	10.5%
Limited English Proficient	70	16.4%
Total Number of Students	427	

The local normative group consists of 25% of the kindergarten population enrolled at the two early childhood centers. Children were randomly chosen from each classroom to participate in the local norming procedures for the year. Data from this group's performance was used to establish local norms. The process of collecting local norms is crucial in determining expected performance levels based on a local context. This allows the comparison of an individual student's performance to local group norms. Data from local norms can also facilitate the evaluation of curriculum by monitoring the growth of students in general. The growth of the local normative group on measures over

the year served as the comparison group for the performance of students in the classrooms using phonemic awareness training.

Appendix A contains the letter sent home to their parents informing them of the procedure. During this project the students chosen for participation in the local norms for the fall also made up the groups for the winter and spring norms. This was done to examine growth in skills over the course of the study. These students were administered various measures from DIBELS according to the schedule outlined in the section on measures. One hundred and four students were assessed over a two-day period in the fall. That number was reduced to 84 by the final collection date due to children moving out of the system during the year and extended absences around the norming dates. In addition, the decision to remove students in the intervention classrooms from the local normative group was made during the study to improve the integrity of the formal group comparisons.

The intervention group consists of students from the two participating classrooms at one of the early childhood centers. Three teachers volunteered to participate in the study. Two of the teachers work within one classroom that integrates kindergarten and preschool children with emotional and social difficulties into a traditional kindergarten classroom. They co-teach and have a higher number of children within their classroom than is found in the other kindergartens. All of the kindergarten children from the two participating classrooms involved in the study were administered measures from DIBELS on the same schedule followed for the local normative group. A letter sent home to the parents of these students is contained in Appendix B.

Data from the students in the classrooms was not included in the local norms in order to establish the independence of the samples used in the formal comparison. Thirteen children from the classrooms moved away during the course of the project and nine more moved into the classrooms at various points throughout the year. Only those 62 students who were present for all three of the data collections have been included in the group. Table 4 depicts the breakdown of children in the local normative group and intervention classrooms by gender, ethnicity, and dual language and special education status. Information regarding free or reduced lunch eligibility is not systematically obtained at the kindergarten level because the majority of children attend half-day sessions and do not receive lunch. The data reveals the diversity of both groups and the high number of dual language learners and children receiving special education support in the participating classrooms.

The lowest quartile local normative group is made up of students from the local normative group who initially scored below the 25th percentile on Onset Recognition Fluency. These students served as the comparison group for the students scoring below the 25th percentile from the intervention classes. Specific demographic data was collected to determine the breakdown of these children. This information is contained in Table 5.

The lowest quartile intervention group is made up students from the intervention classes whose scores remained below the 25th percentile during baseline procedures. Students who initially scored below the 25th percentile based on the local norms were determined to be at risk. They were administered alternative forms for an additional three-week period to determine if their initial performance on the two measures was consistent. Those students whose scores remained below the 25th percentile on Onset

Recognition Fluency were selected to participate in small group activities aimed at building phonemic awareness skills. The breakdown of students scoring below the 25th percentile on Onset Recognition Fluency is also presented in Table 5.

Table 4

Local Normative and Intervention Groups by Selected Populations

<u>Ethnicity</u>	<u>Local Normative</u>	<u>Intervention Classes</u>
African American	7 (8.3%)	6 (9.6%)
Asian	9 (10.7%)	4 (6.5%)
Hispanic	16 (19%)	23 (37.1%)
Native American	0	0
Caucasian	52 (62%)	29 (46.8%)
<u>Selected Populations</u>	<u>Local Normative</u>	<u>Intervention Classes</u>
Special Education	11 (13.1%)	14 (22.6%)
Dual Language	25 (29.7%)	20 (32.3%)
Total Number of Students	84	62

Note. The values outside of the parenthesis represent actual numbers of students

A final group examined in the study is the total number of children who received small group training in phonemic awareness. These students were initially identified as being at risk because of their performance on Letter Naming Fluency and/or Onset Recognition Fluency. All of the lowest quartile intervention students are included in this group. Other students who fell somewhat above the 25th percentile on Onset Recognition Fluency were chosen to participate in the training. This was because of either limited letter naming skills or performance on Onset Recognition Fluency that was above the 25th

percentile, but within a range indicating a random response set. These students were followed as a group, but were not included in any formal group comparisons.

Table 5

Lowest Quartile Groups by Selected Populations

<u>Ethnicity</u>	<u>Local Normative</u>	<u>Intervention</u>
African American	1 (4.5%)	1 (7.1%)
Asian	6 (27.3%)	0
Hispanic	4 (18.2%)	6 (42.9%)
Native American	0	0
Caucasian	11 (50%)	7 (50%)
<u>Selected Populations</u>	<u>Local Normative</u>	<u>Intervention</u>
Special Education	4 (18.2%)	4 (28.6%)
Dual Language	11 (50%)	6 (42.9%)
Total Number of Students	22	14

Note. The values outside of the parenthesis represent actual numbers of students

All of the staff members volunteered to participate in the study because of their interest in formative assessment measures. The three teachers in the study have been teaching within the system for more than eight years. All three of the teachers hold bachelor's degrees in early childhood education and were trained in whole language techniques for teaching literacy. All of the teachers received instruction in administering DIBELS and two of them attended a two-day training program conducted by one of the developers of DIBELS. The paraprofessionals who provided the small group training programs both hold teaching certificates. One of the paraprofessionals has a certification

in art and the other has an elementary education certificate. Both of them hold bachelor's degrees. One of them runs the computer classroom and the other is the classroom assistant in one of the intervention classrooms. All of these staff members were asked to participate in the interviews to obtain systematic feedback regarding their experiences with the project. A consent form for their participation is included in Appendix C.

Measures

Measures used to assess the readiness skills of students within the study include three measures from the Dynamic Indicators of Basic Early Literacy Skills, an untimed letter naming task, and a color identification task. Measures used to obtain student and teacher feedback include a series of formal interviews, informal and formal classroom observations, and observations made during assessment procedures. In addition, a series of case studies were prepared to illustrate pertinent issues that arose in the study. This section details each of the measures employed in the study.

1. The Dynamic Indicators of Basic Early Literacy Skills (DIBELS) provide several measures of phonemic awareness and a letter naming task to assess the fluency of letter identification skills. Each of these measures has a series of alternate forms for collecting repeated measures. Three measures from DIBELS were administered to all students. The following is a description of each of the measures from DIBELS used in the study.

- a) Onset Recognition Fluency is the easier of the two phonemic measures for children to perform. A child is presented with a series of four pictures placed in random order on a page. The examiner names each of the pictures for the child to avoid any confusion. The child is then asked to identify the picture

that begins with a particular sound, and is instructed to respond by pointing for three of the four items. On the fourth item, the child is shown the correct picture and asked to verbally produce the initial phoneme of the word. A child's response time is monitored and there is a limit of five seconds per item. A fluency rate is calculated using the number of correct responses over the total response time. Kaminski and Good (1998) indicate reliability of one probe as .65 and five probes as .90. Concurrent validity with Phonemic Segmentation Fluency has been determined to fall within the range of .44-.60.

b) Phonemic Segmentation Fluency involves segmenting a series of words that are provided to a child by an examiner. The examiner states the word at a normal rate of speed and the child is asked to repeat the word in phonemic segments. Partial credit is given for responses and the number of correct segments per minute is recorded. This is an important feature that makes it less susceptible to floor effects than other segmentation tasks scored on a pass/fail basis. Reliability of one probe is reported as .88 and three probes as .96 (Kaminski & Good, 1998). The developers note their studies examining predictive validity with reading performance one year later reveal a predictive validity of .73-.91.

c) Letter Naming Fluency, the third DIBELS measure, is a sheet of paper with a random order of upper and lower case letters presented in rows. The child is presented with the sheet and instructed to name each of the letters moving from left to right and top to bottom. The letter is named by the examiner if the child does not provide the name within a three-second period. The total

correct letters per minute is the final score for the task. Reliability of one probe is reported as .93. The reliability of three probes is reported as .98. Predictive validity with reading performance one year later is reported as .72-.98 (Kaminski & Good, 1998). Although Phonemic Segmentation Fluency has a higher reliability than Onset Recognition Fluency and has been shown to be more predictive of reading performance, it is prone to floor effects in early kindergarten children. Thus, Onset Recognition Fluency is a more effective means of measuring early phonemic awareness skills (Kaminski & Good, 1998). Examples of each of the measures are contained in Appendix D.

2. The letter identification task currently used throughout the system consists of two sheets of letters in a random order. One of the sheets contains upper case letters and the other sheet contains lower case letters. The students are presented with the sheets separately and asked to identify each of the letters as they appear on the sheet. Teachers will point to the letters if a child does not independently move in a left to right sweep. Students are given as much time as they need to complete the task. All kindergarten teachers within the system administer this evaluation at three intervals during the year. Data from the first two administrations was collected and analyzed for all groups of children. An example of the score sheet is found in Appendix E.
3. The color identification task involves looking at a series of colored circles depicted on a sheet in random order. The child is asked to name each color and is given an unlimited amount of time to respond. A total number of correct responses is then recorded. The response sheet for this task is included on the score sheet for the letter identification task in Appendix E.

4. A series of three interviews were conducted at regular intervals with each teacher to evaluate the effectiveness of the program. Both of the paraprofessionals in the project were interviewed twice. A series of semi-structured interview questions were formulated and can be found in Appendix F. Each of the interviews were tape recorded and later transcribed. Interviews took place in a small office in the school building. The duration of the interviews ranged between 30 to 60 minutes.
5. An administration log was developed to keep track of the length of time needed to administer DIBELS to the intervention students. Teachers were asked to record starting and completion time, as well as the number of interruptions by children and staff during the procedure. Number of adults in the room and activities of children are also recorded. A sample copy of a log is included in Appendix G.
6. A series of observations conducted by the researcher took place during the administration of assessments, during the phonemic awareness training, and while students were transitioning between various activities. The observations ranged in length from 15 to 45 minutes and were conducted in different areas of the school building. Areas included the classrooms, the computer room, and hallways during transitions. Behaviors of those being observed were recorded on the left hand column of a divided paper. Observer comments were recorded on the right side in an attempt to objectify behaviors and differentiate them from observer's impressions.
7. A series of case studies are presented to illustrate pertinent issues raised in the identification and monitoring of children in the study. Case studies were selected from participants in the intervention group. They were discussed with staff and chosen based upon the specific issues that their cases illustrate. Identifying data has

been changed to ensure that no child can be recognized from these discussions. Each of the case studies displays a graph depicting the child's progress on the three DIBELS measures used in the study with correct units per minute plotted on the vertical axis and time on the horizontal axis. The medians that have been used as a point of reference in the discussions are based on the local norms. The median has been used because it is the least effected by extreme scores. Similar hand plotted graphs were used in the study. A copy of one is included in Appendix II.

Curricula

This section describes the three separate curricula involved in the study. These include the general curriculum adopted by the system for all elementary grades, the phonemic awareness program adopted for use in the two participating classrooms, and the curriculum presented to students in the small group settings.

1. The kindergarten version of *Literature Works*, a commercially produced reading series published by Silver Burdett Ginn, is entitled *Kindergarten Works*. It is a literature-based series presented in a format intended to integrate reading and language arts with other subjects such as science, mathematics, and social studies. The curriculum offers a series of big books for shared reading activities and readables (short stories with predictable language) for students to practice independent reading skills. Activities are aimed at building background knowledge, improving comprehension, developing print awareness and teaching specific skills such as phonemic awareness. The phonemic awareness strand consists of a limited number of activities embedded into shared readings and presented in worksheets. The activities

begin with rhyming and word play in the first two of five themes presented throughout the year. They progress to beginning sounds and provide some activities in learning how to blend sounds together to make words. All of the children in the study were exposed to this curriculum, which has been mandated for use in all classrooms. However, the extent to which the specific activities are integrated into the classroom has been left to the discretion of the individual teacher.

2. *Ladders to Literacy* (O'Connor, Notari-Syverson, & Vadasy, 1998) is a curriculum emphasizing the cognitive processes related to reading acquisition. They include the development of metalinguistic and phonological awareness, print awareness, and oral language development. The program is designed as a series of scaffolded activities that focus on one of the three main areas (i. e. print awareness, phonological awareness and oral language). The curriculum is based on the author's research, which demonstrated significant gains in the development of early literacy skills for at risk children. Each of the activities presents a statement of purpose, list of behavioral objectives, guidelines for activities, modifications based on skill level of students, and ideas for home-based activities. The phonological awareness activities begin with basic listening activities that provide the foundation for later word play, rhyming, initial sound identification, and phonemic segmentation and blending games. The phonological awareness strand and portions of the print awareness strand from this curriculum were integrated into the general curriculum of the two classrooms participating in the intervention. Thus, all of the intervention students were exposed to portions of this curriculum.

3. Phonemic Awareness in Young Children (Adams, Foorman, Lundberg, & Beeler, 1998) is a compilation of short activities delivered in a sequential format designed to build on previously learned skills. These activities are aimed at developing a gradual sense of the structure of language and how it can be broken down at different levels (i.e., word, syllable, and phoneme). Lessons begin with basic listening skills related to inanimate sounds. This progresses to the sequencing of sounds and moves onto a series of rhyming lessons. The concepts of words and sentences are introduced as children are then taught how words can be broken down further into syllables. Activities that focus on the initial and final sounds in words are introduced. The next sets of lessons focus on phonemic segmentation and blending. The final lessons link the sounds to their printed symbol in a series of sound and letter games. The design of the curriculum involves the repetition of previous lessons to reinforce skills. This curriculum was delivered in small groups (three to five children) by one of the two paraprofessionals.

Procedures

Staff Training

Staff members collecting local norms participated in four hours of training conducted by a consultant for the system in the winter of 1998. The trainings addressed both administration and scoring procedures. Staff members include several teachers, two communication assistants, a speech pathologist, a school psychologist, and an inclusion specialist. A paraprofessional, who is also a certified teacher, was trained by the school psychologist in administering Letter Naming Fluency. These staff members also

conducted the collection of local norms during the 1997/1998 school year. Procedural questions that arose during that time were reviewed during several one-hour practice sessions. New procedures for the administration of Phonemic Segmentation Fluency were also reviewed at a two-hour staff meeting held before the collection of local norms. Staff members worked in teams to administer the tasks and reviewed procedural questions with the school psychologist. All of the score sheets were reviewed for accuracy by the school psychologist and two of the teachers. Several sessions that involved examiners scoring children simultaneously also occurred to resolve specific questions that arose in scoring.

Selection of Participants

Students chosen to be included in the local norming were selected in a random manner from the class lists. This was accomplished by randomly drawing one quarter of the names of students from each class list. This insured an equal representation of classrooms within the sample. Students enrolled in the two training classrooms were assigned to their respective classrooms by the secretary and guidance counselor. Efforts were made to evenly distribute children with specific learning needs to all of the classrooms. Children chosen for participation in the small group training programs scored below the designated cut-off score of below the 25th percentile on Onset Recognition Fluency. This is a point recommended by the developers. Students whose scores remained below that cut-off score during the validation phase of the study participated in the small group work with one of the two paraprofessionals providing the training.

Onset Recognition Fluency was chosen as the measure to determine inclusion in the official intervention group because of the focus on phonemic awareness in the

training program. A group of children scored somewhat above the 25th percentile on this measure, but presented with very low performance on Letter Naming Fluency. The cut-off score that fell at the 25th percentile (4 onsets per minute) is within a range that children can receive if answering in a random fashion. In fact, a review of the initial data indicates that the scores of children performing at or below the 40th percentile were within a range indicating random responses. The teachers voiced concern about the at risk status of these students. Thus, 38 of the 62 children were followed during baseline period. Only two children significantly improved in their performance during the baseline period and they were not recommended for small group work. Thus, 36 children from the intervention classrooms were chosen for participation in small group work. Only the 14 students who had initially scored below the 25th on Onset Recognition Fluency were included in the lowest quartile intervention group used for statistical comparison. This was done to facilitate formal analysis. The performance of all 36 children receiving small group instruction is presented in the data analysis section. The lowest quartile local normative group is made up of all the students in the local normative group who initially scored below the 25th percentile on Onset Recognition Fluency.

Data Collection

Students were administered measures from DIBELS according to the schedule recommended by the developers, with the addition of Onset Recognition Fluency in the spring. This information is presented in Table 6. Developers of DIBELS indicate that a student should reach 20 to 25 correct onsets per minute before transitioning to Phonemic Segmentation Fluency (Good, 1998). Results of the local norms taken in the winter and

spring of last year were reviewed to determine the need to modify their administration schedule. Fall norms were not collected last year, as the decision to pilot DIBELS was made too late to collect those norms. Again, it should be noted that different students were assessed during last year's winter and spring administrations.

Table 6

Schedule Used in Establishing Local Norms

Time of Year	Measures to be Administered
Fall	Onset Recognition Fluency
	Letter Naming Fluency
Winter	Onset Recognition Fluency
	Letter Naming Fluency
	Phonemic Segmentation
Spring	Onset Recognition Fluency
	Letter Naming Fluency
	Phonemic Segmentation

The median score for Onset Recognition Fluency in the winter was 13 correct onsets per minute. The median score in the spring was 20 correct onsets per minute. A review of that data reveals approximately half of the students who were assessed in the spring did not reach the criterion for transitioning to Phonemic Segmentation Fluency. Therefore, it was decided that Onset Recognition Fluency would be administered in the spring.

The developers have established a goal of 35 to 45 correct phonemes per minute on Phonemic Segmentation Fluency for children leaving kindergarten or entering first grade. This figure has been derived from data examining the level of performance in phonemic segmentation that is necessary for reading instruction to be effective in first grade (Good, 1998). A review of the data taken from the local norming for the 1997/1998 academic year indicates the majority of students in the school system did not reach this criterion. The median score for the winter norms was four phonemes per minute. The median score for the spring norms was 14 phonemes per minute. Thirty-four of the 97 students assessed in the spring received a score of zero segments. Only twenty of the students within that group reached the benchmark established by the developers.

During the present study, students from the local normative group and the intervention classes were assessed within a two-day period for each of the three sets of norms. Upon completion of the first set of norms, students from the intervention classrooms in need of further monitoring were identified and administered alternate forms of Onset Recognition Fluency and Letter Naming Fluency once a week for three weeks. This process served to validate the skill level of the students and provided baseline data regarding the level of growth before treatment and the degree of variability of performance (Kaminski & Good, 1998). Two students were dropped from the intervention group because of their improved performance during baseline.

Although 14 students were included in the official intervention group used in analysis, 36 students were monitored on a weekly basis during the 20 weeks of data collection. These students were monitored using alternate forms of measures from DIBELS. Initially the students' phonemic awareness skills were assessed using Onset

Recognition Fluency. After the winter collection date, these students were also monitored using Phonemic Segmentation Fluency. The developers recommend a transition from Onset Recognition Fluency to Phonemic Segmentation Fluency when a child reaches between 20 to 25 onsets per minute on Onset Recognition Fluency. All of the students in the intervention group were monitored using both of these measures after the winter collection date regardless of their performance on Onset Recognition Fluency. This was done so that growth on Onset Recognition Fluency could be tracked throughout the research period. This continued monitoring provided the teachers and researcher with the opportunity to track response to intervention for the full period of the study. All of the weekly assessments were conducted by the school psychologist and the three teachers. Students were assessed in their classroom during computer lab time.

Traditional measures used in the classroom were administered in the customary format, which involves sitting individually with their teacher in their classroom. Letter and color identification tasks are usually conducted in September and January. The results of these assessments were analyzed and compared to the results from DIBELS.

Phonemic Awareness Training

The teachers in the training classrooms were provided with the research-based phonemic awareness training programs developed by O'Connor, Notari-Syverson, and Vadasy (1998), Adams, Foorman, Lundberg, and Beeler (1998), and Torgesen and Bryant (1994). All students in the classroom were exposed to the curriculum developed by O'Connor, Notari-Syverson, and Vadasy (1998). Activities from this curriculum were

incorporated into the current reading curriculum. This curriculum was presented in a large group format to all of the children in the classroom.

The small group activities were taken from the curriculum developed by Adams, Foorman, Lundberg, and Beeler (1998). Children who were targeted for small group work received 15 minutes of training four days per week. The sequence of activities presented in this curriculum was followed, with modifications made based upon the children's mastery of specific tasks. Activities from the chapters dealing with the identification of initial and final phonemes and segmentation and blending of phonemes needed to be repeated and extended over several weeks. This was due to the students' initial low level of mastery on these tasks.

Initially, these groups were to take place in the classroom, but it became apparent that the listening activities presented in the curriculum necessitated a quiet area. Choice time, which is an ideal time to pull the children into small group sessions, is often a busy time in a kindergarten classroom. Thus, the teachers and paraprofessionals made the decision to have the paraprofessionals conduct the small group training sessions in the computer room when it was not in use. These training sessions were initially scheduled to take place at the same time every day. However, scheduling constraints resulted in students being taken at different, but consistent times depending on the day of the week.

The teachers reduced their time in the computer lab to make room in their schedule and in the schedules of the paraprofessionals. Children usually spend two hours per week in the lab working with the Write to Read program developed by IBM. This is an older version of the program than is currently offered by the company. Students in the intervention classrooms received 45 minutes per week of lab time. All other children in

the local normative group received two hours of the Write to Read program in the computer lab.

Weekly planning meetings took place with the paraprofessionals to discuss technical issues related to instruction and curriculum. Special attention was paid to curriculum management issues and student responsiveness to training. Strategies employed by the teachers and paraprofessionals to overcome obstacles to implementation were documented for the purpose of informing other educators. Planning the weekly lessons involved discussions about mastery of the previous weeks' lessons. Mastery was determined at the end of each session for each child by the paraprofessionals who placed a check in one of three columns next to each child's name. This was based on the child's responses during the session. Checks indicated either mastery (majority of responses correct), emerging skills (approximately one third to one half of their responses were correct) or needs assistance (did not respond accurately without assistance). This facilitated the weekly discussions about curriculum and communication between the paraprofessionals and teachers about the progress of individual children.

Initially the training programs were to be broken down into two eight-week training periods. At the eighth week students who were not responding to the initial curriculum developed by Adams, Foorman, Lundberg, and Beeler (1998) were going to be presented a different curriculum developed by Torgesen and Bryant (1994). However, this point fell at a crucial time in the presentation of the curriculum. The lessons that had been presented up to that point had evolved from basic listening activities to breaking down words at the syllable level. The children's mastery of particular lessons was discussed to determine which activities should be repeated and when specific activities

should be introduced. The decision to stay with the curriculum was made because the lessons had only recently begun to focus on sounds at the level of the phoneme. Staff felt strongly that introducing a new curriculum at that point in time was premature. Thus, the decision was made to stay with the initial curriculum for the remainder of the training sessions.

Teacher Feedback

The question regarding the utility of this process could only be partially addressed through review of the quantitative data. Systematic feedback from the teachers and staff working on the project also served as a valuable means of evaluation. Although any decision to implement new programs should be based on the attainment of achievement outcomes, the question of whether formative assessment and phonemic awareness training is feasible and beneficial is a complex issue that requires more than quantitative analysis. Informed decisions must also be balanced by acknowledging any obstacles to implementation and effective programming must eventually address these obstacles.

The qualitative researcher, then is in the business of generating knowledge that can serve the society studied, whether through immediate impact on a decision, through shaping people's understandings of a complex topic, through interpreting and reinterpreting the meaning of events, or through actions that empower participants. (Rossman & Rallis, 1997, p. 30).

Several of the questions included in the interviews were raised during a pilot study conducted with two of the same teachers who volunteered to participate in this study. That study involved a series of interviews about teacher's ideas on a wide range of issues related to early literacy. Limitations posed by time constraints emerged as an

important theme within that study. The limited time that the teachers have with the children in their classrooms has forced them to prioritize their curriculum and often confines what skills can be addressed within the school day. During the pilot study one of the teachers noted, “time is always a factor, especially in a half-day kindergarten session.” She went on to say that, “there are things I’d like to assess, or assessments I would like to do that I often can’t.” She indicated that in evaluating the benefits of assessments she considers the time it takes away from teaching.

Both teachers indicated that a good assessment tool should measure important reading skills and be “quick, efficient and helpful”. They also clearly stated that assessments should guide instruction. If they did not, then they were not worth the time they would take away from teaching time. They both felt that teaching time was too valuable to spend on something that would not benefit the children. During the observations conducted during the pilot study, it was clear that the teachers plan their activities with efficiency in mind. They use tasks that need to be completed on a daily basis, such as the milk count, to teach counting and oral language skills. During several observations I heard the teachers comment on the lack of time to complete an activity. Time is thus a major factor that the teachers and paraprofessionals were asked to consider in evaluating the appropriateness of curriculum materials or assessment tools.

Another theme that emerged from the pilot study involved the challenges of instructing classes of children with a broad range of skills and exposure to literacy. Some children enter kindergarten already reading and have had thousands of hours of exposure to literacy-based activities. Yet, other children enter school without knowing the very basics of literacy skills, such as how to handle a book (Adams, 1990). One of the teachers

noted, “we have some children who might be at the prereading stage and some children who I’ve had reading chapter books”. The other teacher echoed this statement when she said,

What I find is a lot of children come in... and I don’t think they’ve been exposed to print or to literature, or if they have, they haven’t been exposed to it very much. They come in and they’re not familiar with even how to open a book or where to begin to read. I also usually have maybe one or two in each class that even know how to read.

This presents challenges for both instruction and assessment. Both must be developmentally appropriate for a broad range of learners. Consequently, the utility of the program has been evaluated in light of its applicability to a wide range of skill levels. Thus, several questions aimed at examining this issue were included in the interview questions.

The teachers were asked to complete a set of logs at different points within the study in order to keep track of the length of time needed for administration of DIBELS. The developers of DIBELS report that an entire class can be screened by one individual in one and a half hours (Kaminski & Good, 1998). This may be true if no interruptions occur during this process. The question of how this could be accomplished in a busy classroom environment was examined through discussions with the teachers and observations of the process.

Data Analysis

Quantitative Analysis

A series of descriptive statistics were run on the data in order to review the distribution of scores on each of the DIBELS measures collected for the three local norming periods. This has been broken down by the local normative group and for the

group of students in the intervention classrooms. The two classrooms have been combined to form the one comparison group. Summary statistics have been calculated. Measures of central tendency, distribution and range of scores have been examined. Summary statistics for the traditional assessments used by teachers have also been included in the results section. Summary statistics for the lowest performing children from the local normative group and the intervention classrooms are presented as well.

The growth of the children in the training programs who demonstrated the lowest level of readiness skills (scoring below the 25th percentile on Onset Recognition Fluency) at the outset of the project was compared to the children in the local normative group scoring below 25th percentile. The growth in performance of the 84 children making up the local normative group was compared to the 62 children enrolled in the participating classrooms. Children in both of the local normative groups were exposed to two hours per week of the Writing to Read Curriculum in the computer lab in addition to the reading curriculum adopted by the system. Children in the intervention classrooms were exposed to phonemic awareness training and to forty-five minutes per week of the computerized curriculum. Both groups of children were exposed to activities taken from the system's general reading curriculum. The dependent variable is the intervention, while the dependent variables are performance on DIBELS measures.

Performance of the groups was examined by reviewing both descriptive and inferential statistics. Distributions of scores and measures of central tendency are reviewed. The growth of the groups over time has been compared using a repeated-measures analysis of variance (ANOVA) design. Repeated measures ANOVA is used when all participants have repeatedly been administered the same measures under

different conditions, which can be different points in time. Comparisons were run for the three sets of measures for Onset Recognition and Letter Naming Fluency. Scores on Phonemic Segmentation Fluency from the winter and spring norms were compared in a similar manner. This was done to examine the differences in performance over time between the groups in order to evaluate the effectiveness of the interventions.

The repeated-measures design requires that the correlations among the repeated-measures are constant. Mauchly's Test of Sphericity was used to check for the covariance among the measures to determine if they were equal and if they were uncorrelated with each other. These are assumptions required to run comparisons in a repeated measures design. The results of the test for sphericity indicated that these two assumptions could not be assumed, resulting in the potential for an overestimation of the significance of comparisons being made. The Greenhouse-Geisser is a measure used to adjust the degrees of freedom and run the repeated measures when sphericity cannot be assumed. Use of this procedure results in a conservative test, no matter how serious the violation (Howell, 1995). However, use of the Greenhouse-Geisser procedure is often not recommended because it is so conservative that it can fail to detect a true difference between groups. The Huynh-Feldt procedure is less conservative and is also commonly used when sphericity cannot be assumed. Both procedures were employed in this study.

Correlations among the DIBELS measures and the traditionally used readiness measures were computed using Pearson correlations. A correlational matrix was developed using performance on these measures. Teachers currently do not have any formalized data regarding the relationship of measures to one another or the overall growth of skills during the year. This may assist them as they examine the utility of

assessments used in measuring preliteracy skills and as they make judgements about the significance of an individual student's performance. Age of student was also considered in the matrix. This factor was included to address concerns raised by teachers regarding the impact that a child's age may have upon their performance on these tasks.

Several time series analyses are presented to illustrate the problem solving process as it is applied to the use of DIBELS and the phonemic awareness training. Cases were selected from the group of children who participated in the training program on the basis of varying responses to treatment and because of specific issues that each case illustrates. The performance of these children on each of the DIBELS measures has been graphed with correct units per minute plotted on the vertical axis and time on the horizontal axis. This allows for visual analysis of progress. The median score for the local normative group has been plotted on the individual graphs to facilitate comparison within a local context. This figure has been used because is not effected by extreme scores. Benchmarks recommended by the developers for the phonemic awareness tasks were also considered in evaluating progress. Estimates of slope were computed and included in the presentation.

Qualitative Analysis

Analysis for the qualitative portion of this study addressed themes that emerged through the coding of data obtained in field notes and interview transcripts. Contact summary sheets were developed outlining salient points from each observation and interview. The frequency of phrases, words, and concepts contained in the data was examined. Recurrent ideas or concepts formed the basis for the development of

categories used to code the data. The categories were examined to determine if they represented underlying themes. Because the study was intended to address feasibility issues from a practitioner's perspective, particular attention was paid to time management in the classroom, level of assistance needed for implementation, and teacher evaluation of program effectiveness. Because as Peshkin (1988) asserts "subjectivity is inevitable" (p. 19), efforts were made to monitor how my subjectivity was influencing the outcomes of the study. This was accomplished by attending to my own reaction to statements, actions, activities, and data. These reactions were recorded on a set of index cards and periodically reviewed.

Research should empower those individuals or groups involved in a study. It should also recognize the aptness of the individuals and groups being studied. The feminist perspective of research prioritizes open communication and the sharing of power as essential ingredients in conducting research studies. The quality of the relationship between the researcher and her participants in a study is considered a critical component in developing methodology. The building of trust is a necessary step in assuring the validity and integrity of a study. Punej (1994) contends that, "the women's movement has brought forth a scholarship that emphasizes identification, trust, empathy, and non-exploitive relationships" (p. 89).

My decision to work with teachers and other staff members to document their reaction to DIBELS and its link to instruction is an attempt to learn about the usefulness of this tool in a collaborative way. Thus, their feedback throughout the process was a critical component of the study. Decisions made during the course of the study were done so collaboratively. Interview and observational notes were shared with the respective

staff members. Contact summary sheets were reviewed and analyzed with their input. As information was organized and critical themes emerged from the data, they were consulted as to the relevance of these issues. This process provided them with an opportunity to comment upon my interpretation of their statements or actions. The aspect of reciprocity built into this study was intended to enhance the genuineness of the information obtained. It is a process that acknowledges the fact that the most valuable sources of direction and validation in qualitative research can be found in the individuals who researchers are trying to understand.

CHAPTER IV

RESULTS

This chapter presents descriptive statistics for various measures included in the study. Correlations among the measures administered to all of the students have been examined. Age is also considered in the matrix. The performance of children participating in the intervention classrooms has been compared to the children from the local normative group. In addition, children representing the lowest quartile from each of those groups have been examined to determine if the program was effective for children presenting with the lowest level of skills at the outset of the program. A series of case studies are presented to illustrate the decision making process and pertinent issues that arose during this project. Finally, the qualitative data collected during interviews and observations is presented.

Descriptive Statistics for DIBELS Measures

Descriptive statistics provide important information about the distribution of scores and measures of central tendency. This needs to be considered when examining each of the DIBELS measures for floor and ceiling effects. Figure 1 reveals the distribution of scores for the local normative group on Onset Recognition Fluency administered during the three data collection periods. The chart at the top of the figure reveals the skewed nature of the data for the first administration. The majority of children demonstrated a low level of performance on Onset Recognition Fluency at the outset of the project. At least 30 out of the 84 children in the group performed at the level

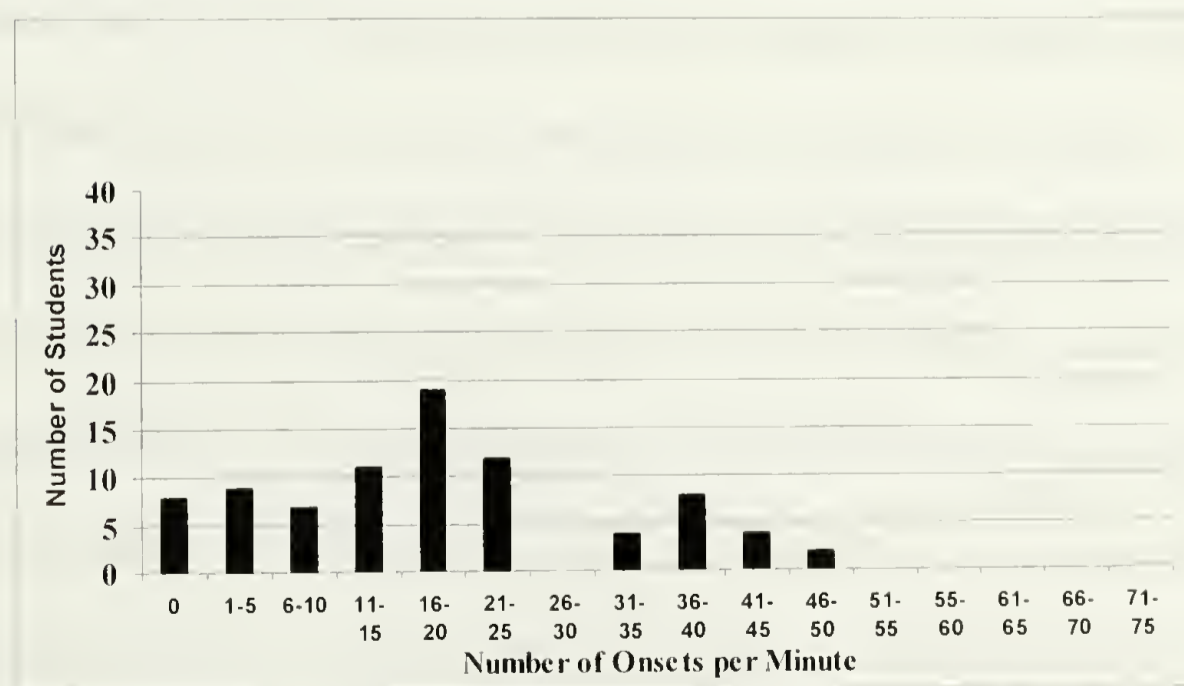
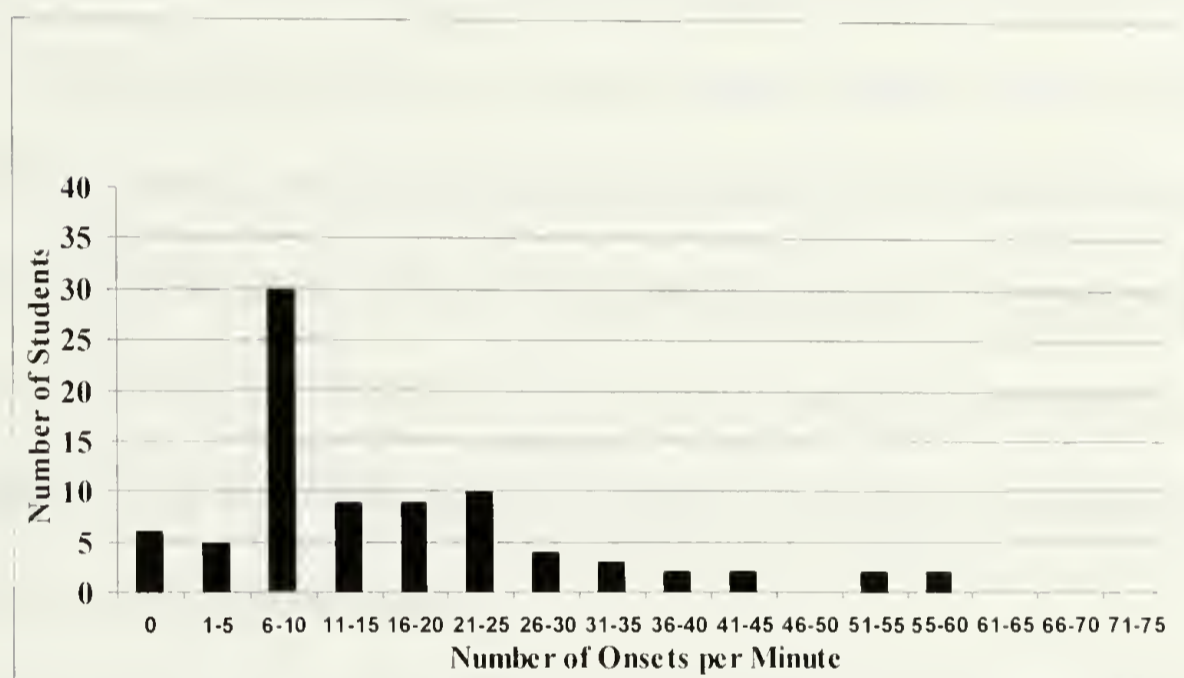
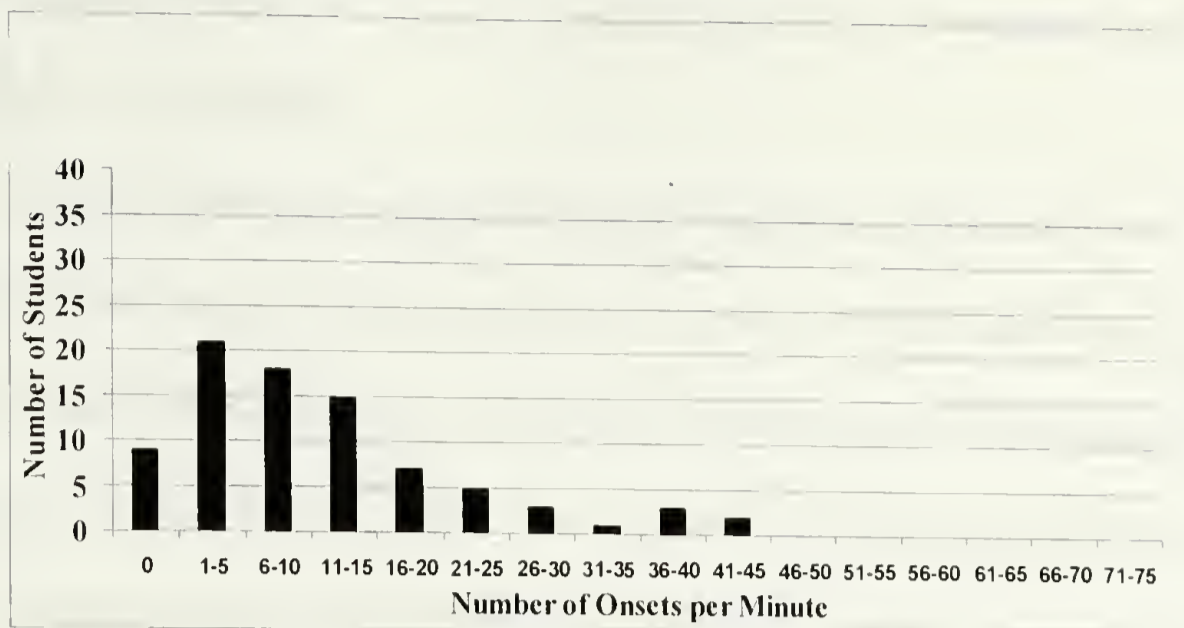


Figure 1. The Distribution of Scores Obtained on Onset Recognition Fluency for the Local Normative Group

indicating random responses. This task was difficult for most students, which indicates floor effects for this measure.

A review of the data in Figure 1 also indicates that a small number of children were already performing this task at a level well above the benchmark for transition to Phonemic Segmentation Fluency. This substantiates teachers' concerns regarding the wide range of skills students present when entering their kindergarten classes.

The chart depicting performance taken at the midpoint of the project indicates the majority of children in the group had not yet met the benchmark of 20 to 25 onsets per minute. In fact, a review of the bottom chart in Figure 1 indicates that more than half of the students assessed in the spring (roughly 65%) had still not reached 20 onsets per minute. Good (1998) contends that students should reach 20 to 25 onsets per minute by the winter of kindergarten. If the data used in establishing this benchmark is valid, the school system needs to examine its current reading curriculum as it relates to the development of this important skill.

Figure 2 displays the distribution of scores on Onset Recognition Fluency for the 62 children involved in the intervention classrooms. Again, the majority of children in this group demonstrated a low level of performance on this task on the first administration. The broader and more even distribution of scores at the midpoint suggests that more children were making gains in this area than the children who were from the local normative group. The chart depicting the spring administration of Onset Recognition Fluency indicates that some students were still not making progress with the level of interventions they received. Forty-four percent of that group had not met the benchmark by the final administration. Although a greater percentage of students from

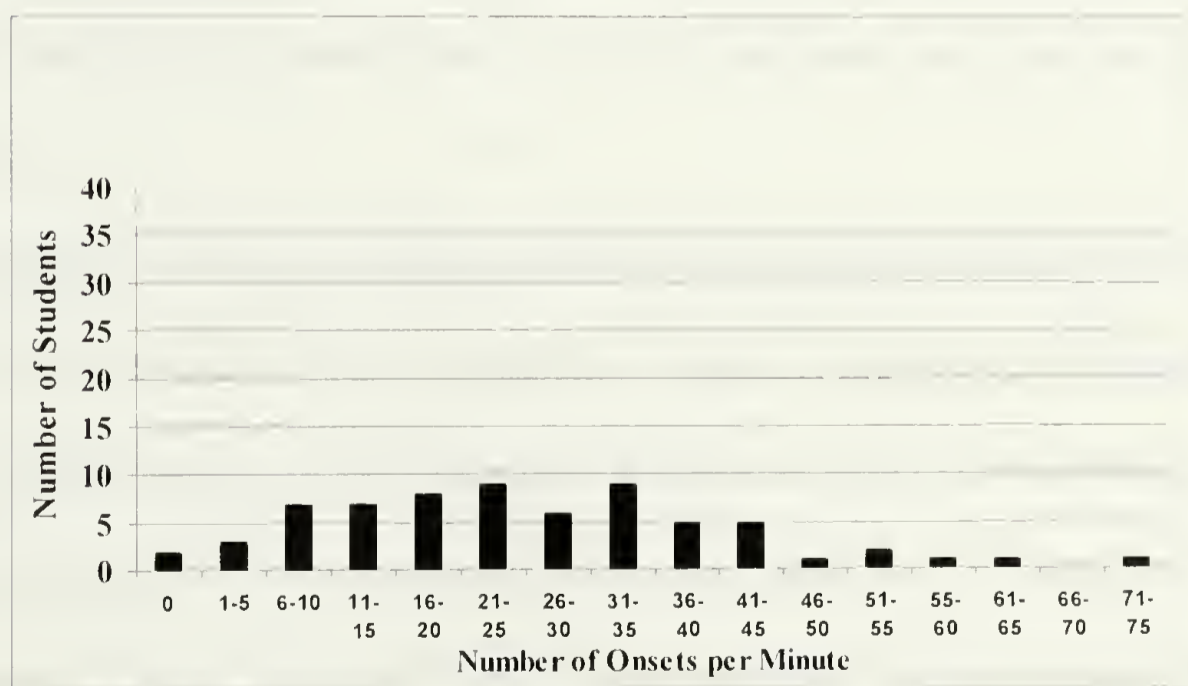
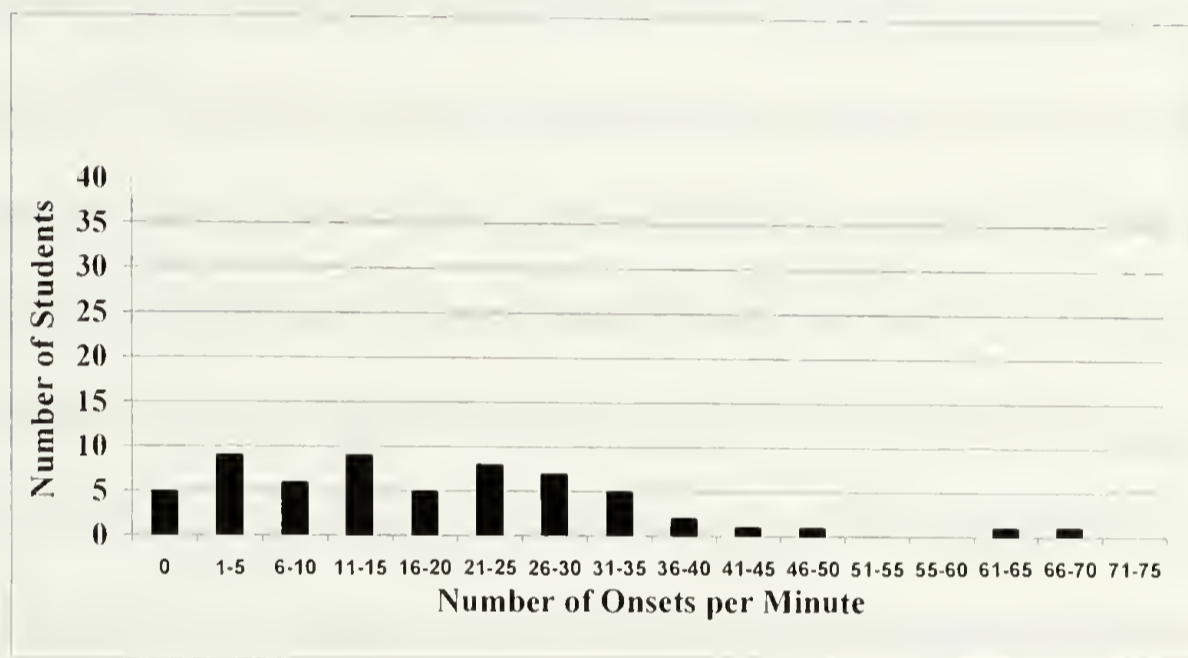
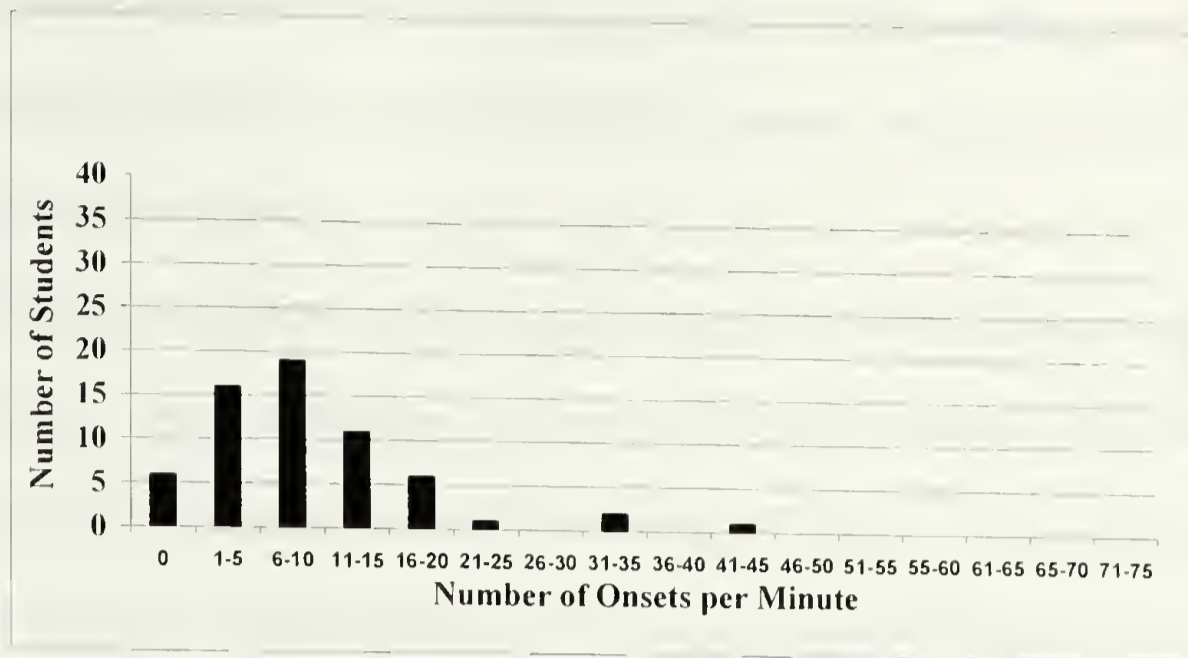


Figure 2. The Distribution of Scores Obtained on Onset Recognition Fluency for the Intervention Group

the intervention classes were demonstrating growth on a task measuring phonemic awareness, there were still a substantial number of students who did not meet the goal of 20 to 25 onsets per minute.

Children representing the lowest quartile of the two larger groups were chosen because of their low scores on Onset Recognition Fluency in the fall. All of the students in the two groups were either initially discontinued with a score of zero or performed at a level that indicated a random response set. The lowest quartile of the local normative group contains 22 children. The lowest quartile of the intervention classrooms is made up of 14 children. These groups are small, limiting the generalizations that can be made when comparing them. However, the differences in their rates of growth warrant attention. The group data taken midway through the project on Onset Recognition Fluency reveals that none of the students from the lowest quartile of the local normative group had arrived at the benchmark by that time. At the time the final data point was collected, only 4 of the 22 students from the local normative group had reached the benchmark, scoring between 20 and 42 onsets per minute. At that time, 9 of the 22 students scored below five onsets per minute. This indicates a very low level of performance.

In contrast, 6 of the 14 children in the lowest quartile intervention group had arrived at the benchmark midway through the project, scoring between 20 and 30 correct onsets per minute. Eleven of the 14 students scored at or above the benchmark by the end of the project (between 20 and 57 onsets per minute). However, 2 of the 14 students' scores remained below five correct onsets per minute. This suggests that the lowest

quartile of the intervention group showed a higher level of growth than the lowest quartile of the local normative group.

Table 7 contains the range of scores, mean, median, and standard deviations for the three separate administrations of Onset Recognition Fluency. It is broken down by the four groups just discussed. Information is also included for the 36 members of the intervention classes who participated in the small group trainings. This group included the lowest quartile of the intervention classes and other students who scored above that level initially. The additional students were chosen to participate in the small group sessions because of their low performance on Letter Naming Fluency and/or because of other risk factors. Nineteen of the 36 students in this group scored below five onsets per minute at the initial administration. At the midpoint, 16 of the 36 had reached the designated benchmark, but 8 of the students remained below five onsets per minute. By the end of the project, 24 of the 36 students had arrived at the benchmark. Only 3 of the 36 students remained below five onsets per minute. This indicates that many of the students responded to the activities aimed at building phonemic awareness.

Figure 3 displays the distribution of scores on Letter Naming Fluency for the local normative group. Again, the charts indicate that many children performed at a low level of fluency at the beginning of the year. The change in the distribution of scores over the three administrations indicates that many of the children grew in the fluency of letter naming skills. Figure 4 indicates a similar distribution of scores on this measure for the group of students in the intervention classrooms. The groups do not appear to be significantly different in their rate of growth over the three administrations; however, the local normative group appears to be moving somewhat further and faster in their

Table 7

Descriptive Statistics for Onset Recognition Fluency by Group

Group	Administration	Minimum	Maximum	Median	Mean	Standard Deviation
Local Norm n = 84	First	0	41.74	9.13	11.55	10.52
	Second	0	60	10.79	15.62	12.89
	Third	0	48	17.89	18.80	13.06
Intervention Classrooms n = 62	First	0	43.64	7.66	9.57	8.43
	Second	0	68.57	16.57	19.59	15.66
	Third	0	73.85	23.98	25.77	15.99
Lowest Quartile Local Norm n = 22	First	0	3.87	1.41	1.43	1.47
	Second	0	19.53	7.35	7.57	4.59
	Third	0	41.74	7.89	10.68	10.15
Lowest Quartile Classrooms n = 14	First	0	4.14	1.53	1.74	1.62
	Second	0	30.00	18.21	16.28	11.99
	Third	0	56.47	28.64	28.63	16.25
Small Group Training n = 36	First	0	16.66	5.22	5.84	4.39
	Second	0	68.57	16.53	18.72	14.79
	Third	0	64	25.19	26.76	15.79

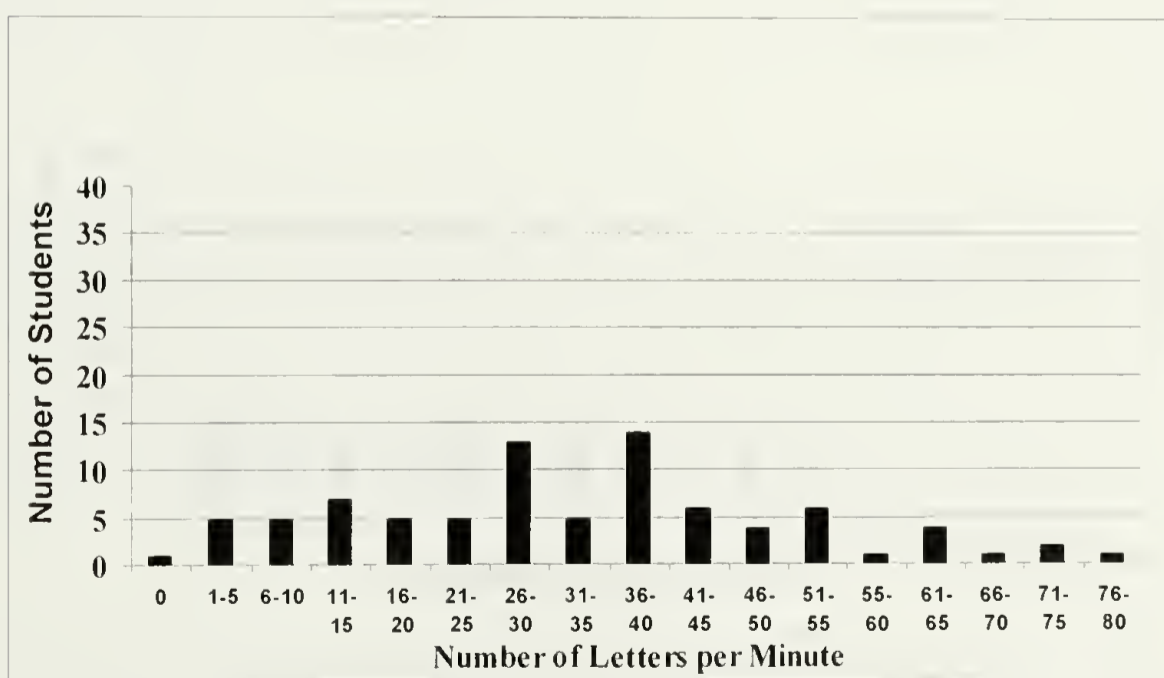
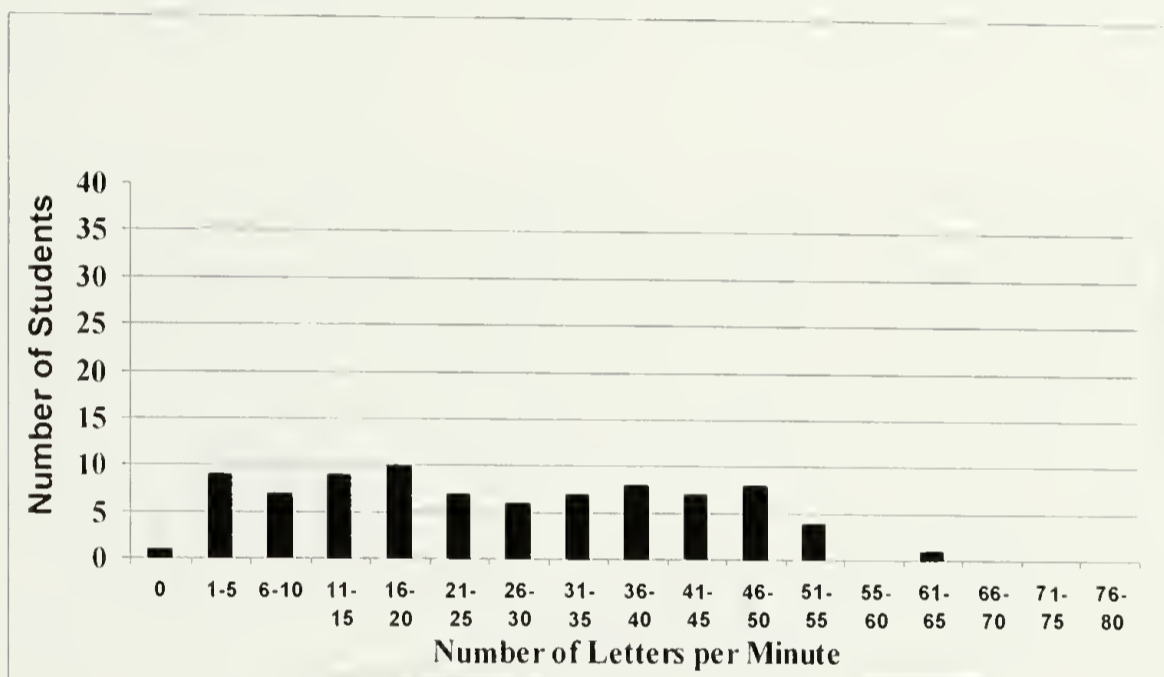
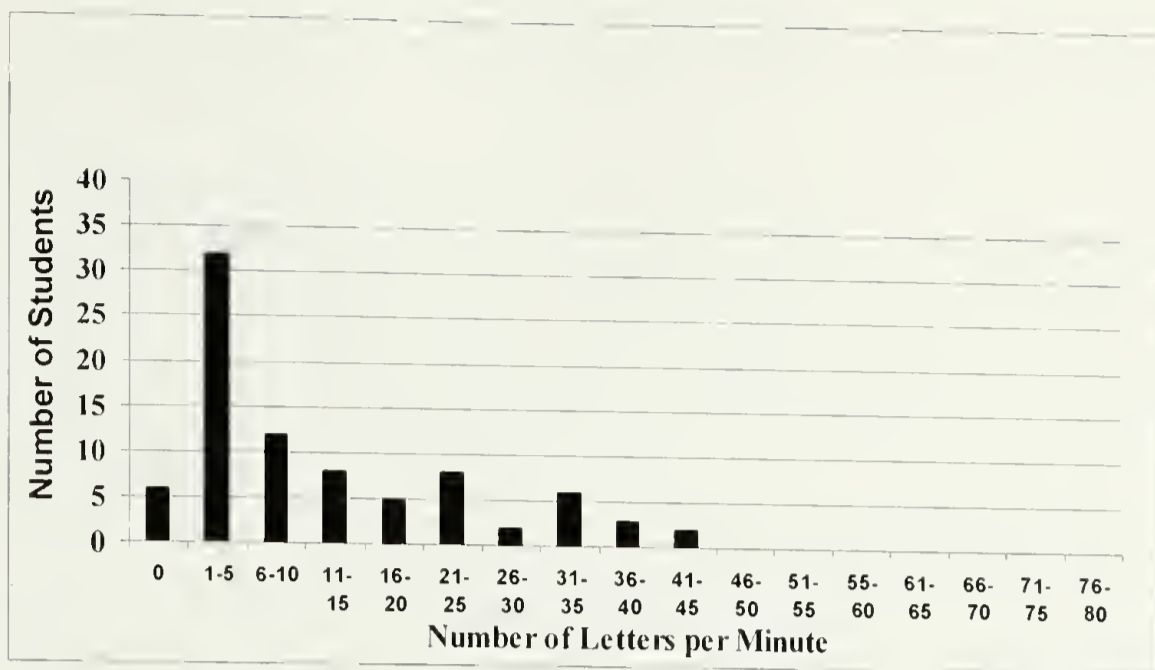


Figure 3. The Distribution of Scores Obtained on Letter Naming Fluency for the Local Normative Group

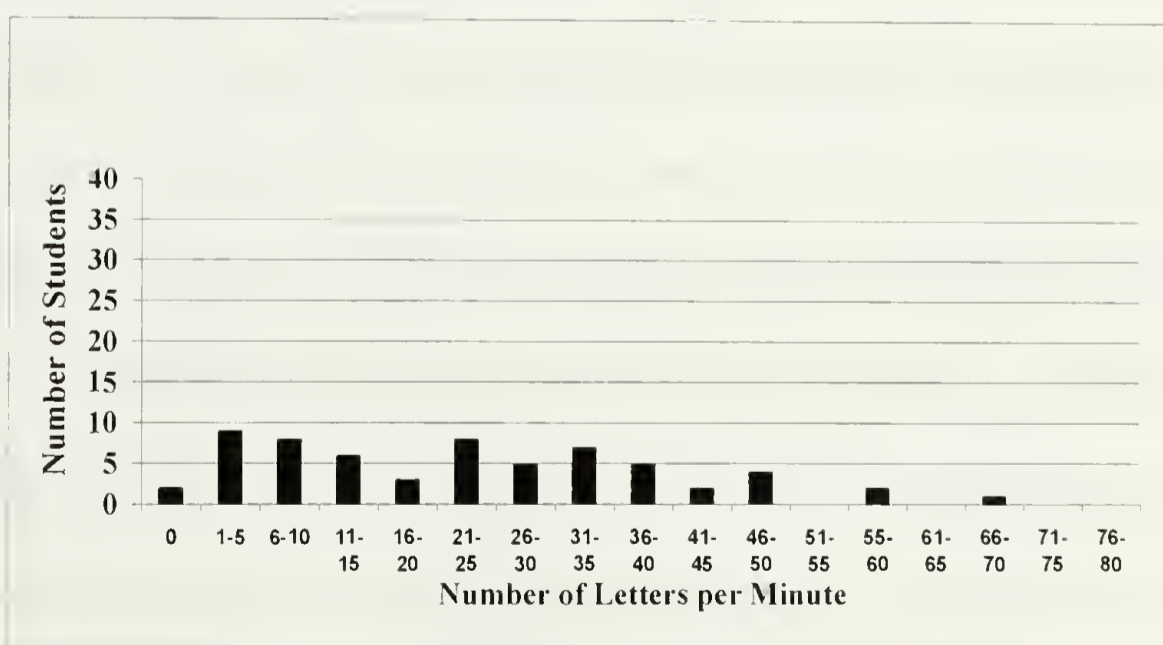
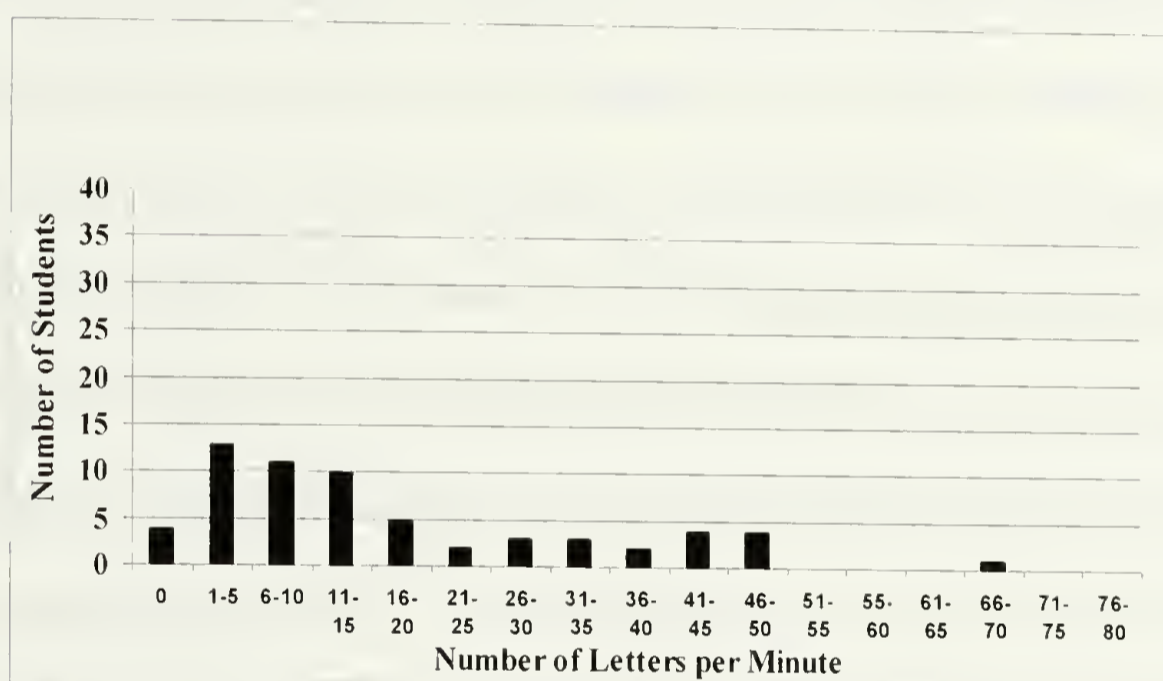
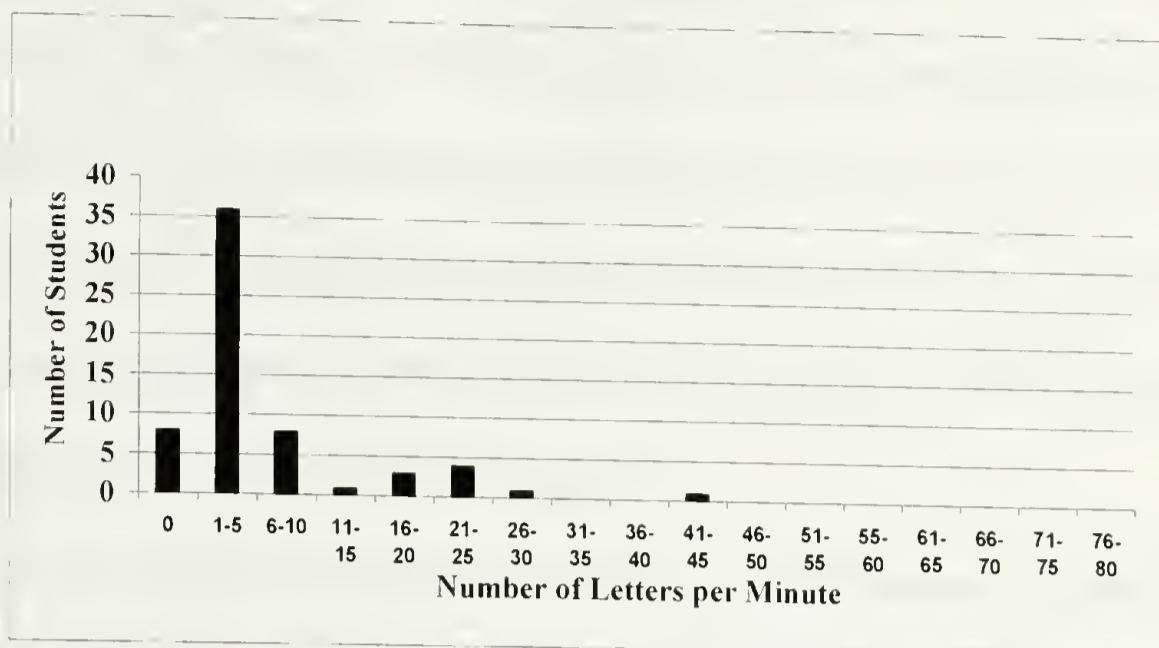


Figure 4. The Distribution of Scores Obtained on Letter Naming Fluency for the Intervention Group

overall rate of growth. Table 8 contains the range of scores, mean, median and standard deviations for the three separate administrations of Letter Naming Fluency by group. A review of these figures indicates that all of the groups made growth over the 20 weeks. The local normative group's mean for each of the administrations is higher than the other four groups. The range of scores indicates that the children assessed represent a very broad range of fluency in letter naming skill.

Figure 5 displays the distribution of scores for Phonemic Segmentation Fluency for the local normative group. A majority of the children initially demonstrated a low level of performance on this task. Forty-three of the 84 children produced five or less segments per minute. This was more than half of the students in the group, which indicates floor effects for this measure. Results from the second administration indicate that roughly the same number of students demonstrated a low level of performance. The small change in the distribution of scores suggests limited growth on this task for the local normative group. Only 3 of the 84 children in the group had arrived at the benchmark of 35 to 45 segments per minute. This indicates that only a small number of these children will leave kindergarten with adequate phonemic segmentation skills.

Figure 6 shows the performance of the intervention group on Phonemic Segmentation Fluency. This group also demonstrated a limited level of skills on this task initially. Forty of the 62 children scored less than five segments per minute. However, by the spring only 14 of the students performed at that level. Changes in the distribution of scores indicate that many of the children improved their performance on this task. Eighteen of the 62 students had reached or surpassed the benchmark set by the developer.

Table 8

Descriptive Statistics for Letter Naming Fluency by Group

Group	Administration	Minimum	Maximum	Median	Mean	Standard Deviation
Local Norm n = 84	First	0	43	7	12.15	12.12
	Second	0	65	25	26.42	16.16
	Third	1	78	32.5	32.40	17.98
Intervention Classrooms n = 62	First	0	44	4	6.37	8.50
	Second	0	67	11.5	17.02	16.06
	Third	0	69	23.5	23.15	16.73
Lowest Quartile Local Norm n = 22	First	0	15	4.5	5.82	4.47
	Second	1	50	22.5	21.68	12.37
	Third	5	64	29	29.37	13.80
Lowest Quartile Classrooms n = 14	First	0	29	3.5	5.00	7.37
	Second	0	46	13	15.79	14.03
	Third	1	47	27	24.64	14.42
Small Group Training n = 36	First	0	29	2	3.22	5.04
	Second	0	46	10	11.53	11.99
	Third	0	47	17.5	18.50	13.76

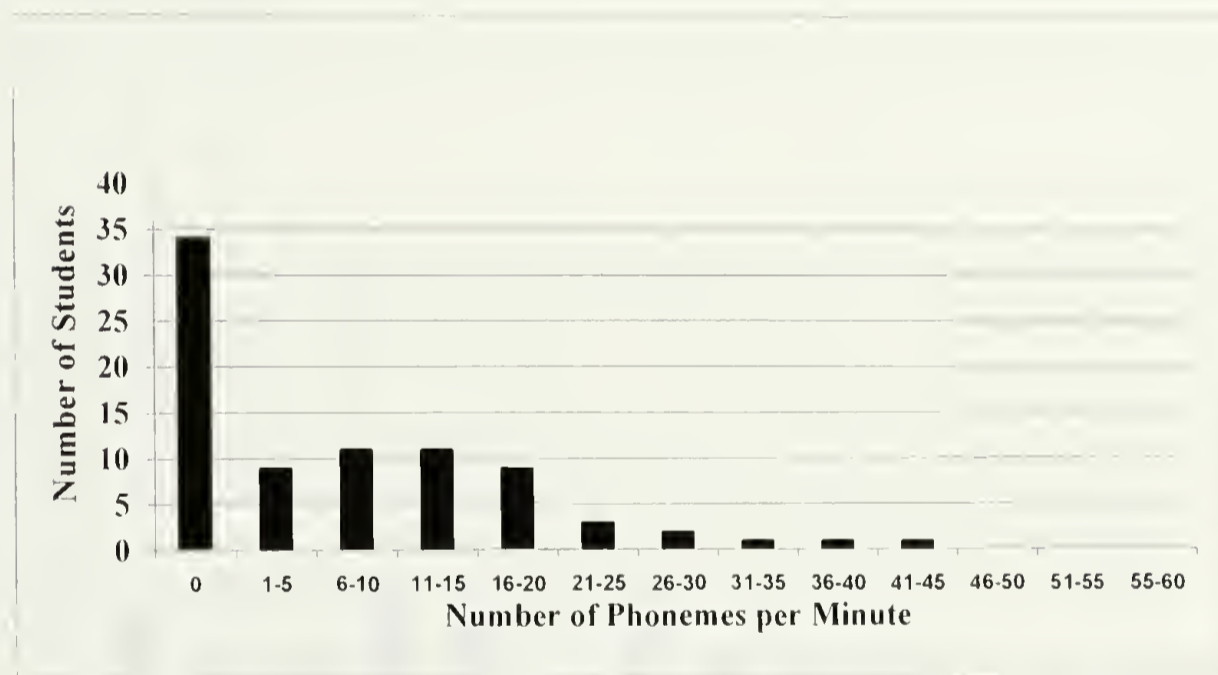
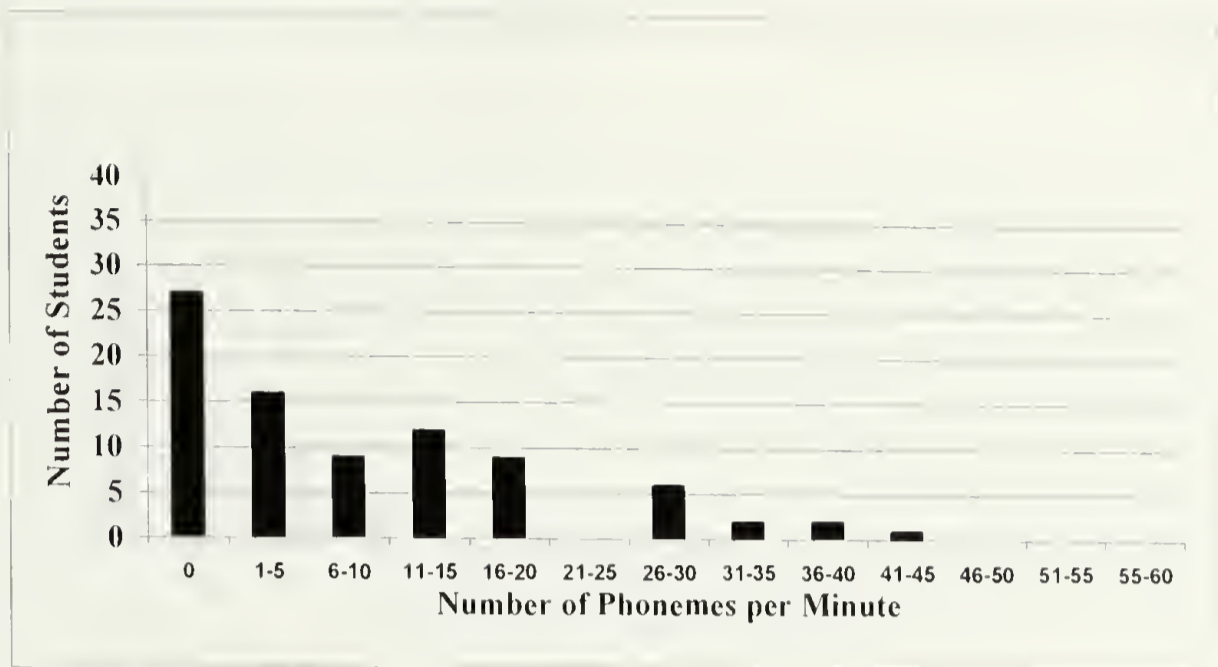


Figure 5. The Distribution of Scores Obtained on Phonemic Segmentation Fluency for the Local Normative Group

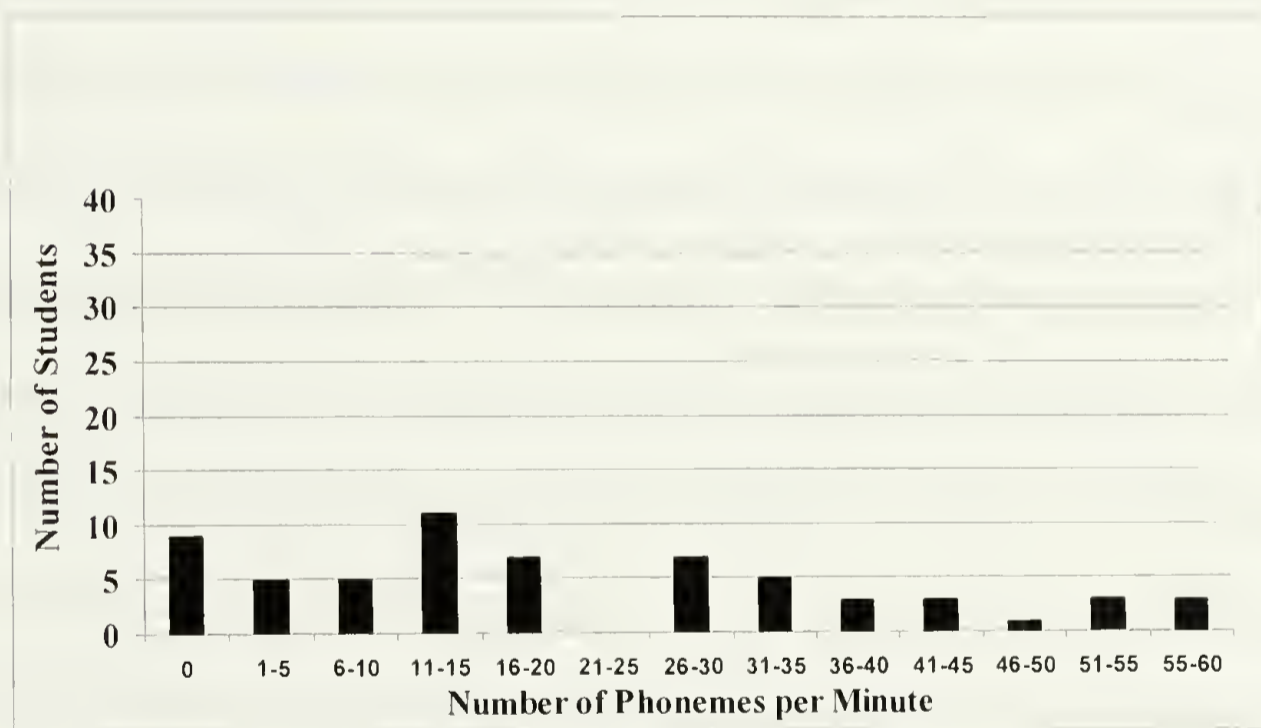
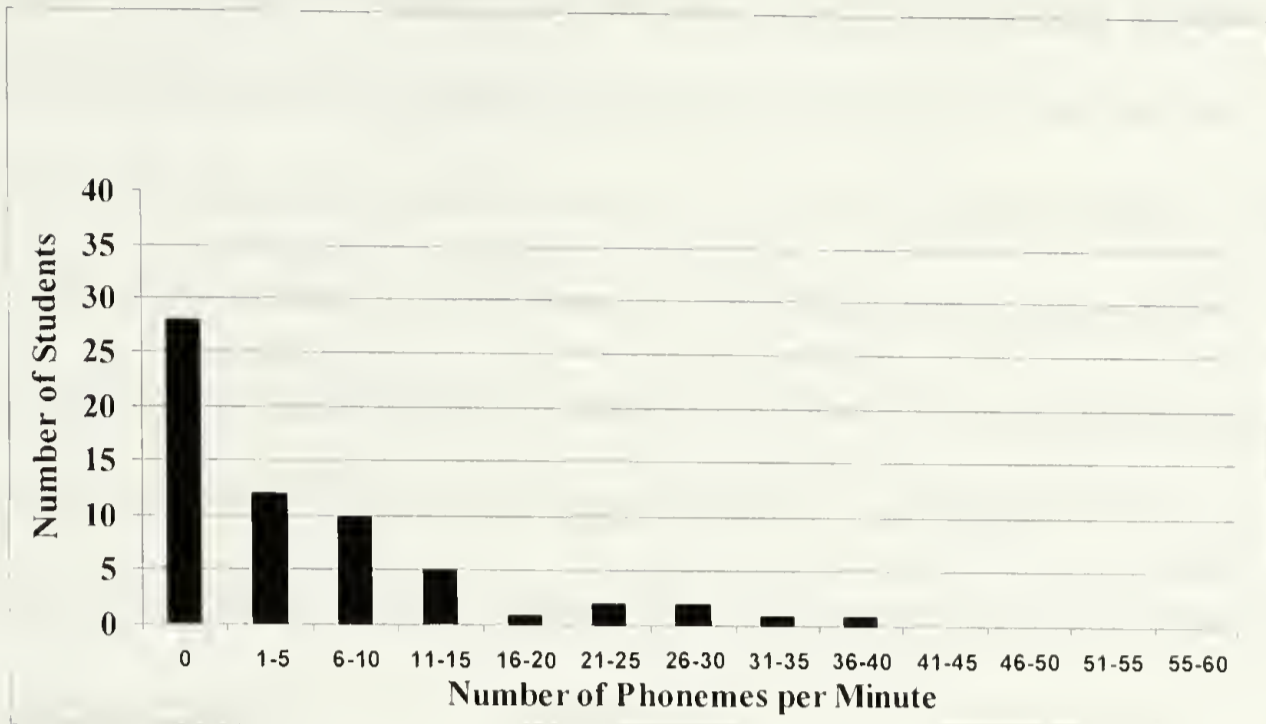


Figure 6. The Distribution of Scores Obtained on Phonemic Segmentation Fluency for the Intervention Group

Table 9 contains the range of scores, mean, median and standard deviations for the two separate administrations of Phonemic Segmentation Fluency by group. A review of the two sets of data points suggests that the intervention groups demonstrated a greater level of growth than the local normative group. The mean of the general local normative group changed from the initial performance of 7.85 segments per minute to 9.21 segments on the second administration. The group from the intervention classrooms moved from a mean of 6.05 on the first administration to a mean of 21.29 on the second data point. This appears to represent substantial differences in pre and posttest measures between the two groups.

The performance of the students representing the lowest quartile of their respective groups also reveals a notable difference in segmenting skills. The lowest quartile of the local normative group initially earned a mean score of 2.82 segments per minute. Their final mean score was 4.91 segments per minute. None of the students in this group reached the benchmark. The lowest quartile from the intervention classrooms initially earned a mean of 4.42 segments per minute. At the end of the project, the mean for the group was 32.29 segments per minute. By that point, 8 of the 14 students had arrived at or surpassed the benchmark. Only 1 student scored under five segments per minute. Again, this is a small number of students, but the difference in performance is noticeable through reviewing the descriptive measures. The wide range of variation in all of the groups is also apparent in Table 9.

Table 9

Descriptive Statistics for Phonemic Segmentation Fluency by Group

Group	Administration	Minimum	Maximum	Median	Mean	Standard Deviation
Local Norm n = 84	First	0	43	4	7.85	9.68
	Second	0	44	5	9.21	10.76
Intervention Classrooms n = 62	First	0	37	1	6.05	9.13
	Second	0	57	16.5	21.29	17.23
Lowest Quartile Local Norm n = 22	First	0	13	0	2.82	4.34
	Second	0	27	0	4.91	8.38
Lowest Quartile Classrooms n = 14	First	0	30	0	4.42	8.20
	Second	0	57	30.5	32.29	17.60
Small Group Training n = 36	First	0	30	0	3.53	6.35
	Second	0	57	27.5	25.97	17.97

Effect of Intervention Over Time for DIBELS Measures

A repeated-measures analysis of variance (ANOVA) design was conducted to formally compare differences in performance on Onset Fluency Recognition over time between the local normative and intervention groups. Performance on the assessment is the dependent variable. Phonemic awareness training is the independent variable. The question at hand involves whether the phonemic awareness activities were effective in improving performance on Onset Recognition Fluency. The local normative group did not receive the phonemic awareness training. Instead, they worked in the computer lab for the full two hours a week. The intervention classrooms worked in the computer classrooms for only 45 minutes per week. Both groups of children were exposed to the published reading curriculum recently adopted by the school system.

The variable time was used to represent the sets of data points collected on each of the measures. The interaction between time of measurement and treatment is the focus of this analysis (Gall, Borg, & Gall, 1996). Table 10 contains the results of this analysis using both the Greenhouse-Geisser and Huynh-Feldt procedures. The effect of interest in Table 10 is time by group. Results from even the more conservative Greenhouse-Geisser procedure indicates that the difference between the pretest and posttest measures is significant by group $F(1.89, 272.408) = 8.21, p < .000$.

A review of the data in Table 7 presented earlier indicates that the intervention group started the project with a lower mean score (9.57) than the local normative group (11.55). Their mean score at the end of the project (25.77) was considerably higher than the mean score for the local normative group (18.80). This suggests powerful effects for the intervention when measured through Onset Recognition Fluency. However,

limitations posed by the integrity of the study’s design signal caution in interpreting this effect.

Table 10

Repeated Measures ANOVA for Onset Recognition Fluency with the Local Normative and Intervention Groups

Source		<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Tests of Within-Subjects Effects					
Time	Greenhouse-Geisser	1.892	9948.107	5258.753	55.230*
	Huynh-Feldt	1.929	9948.107	5155.914	55.230*
Time x Group	Greenhouse-Geisser	1.892	1478.567	781.598	8.209*
	Huynh-Feldt	1.929	1478.567	766.313	8.209*
Error (Time)	Greenhouse-Geisser	272.408	25937.605	95.216	
	Huynh-Feldt	277.842	25937.605	93.354	

Note. * $p < .000$

The performance on Onset Recognition Fluency of the groups representing the lowest quartiles was also compared with a repeated measures ANOVA. Results of this analysis using both procedures reveal that the change over time is significant by group. Results of the more conservative Greenhouse-Geisser procedure indicate a high level of significance $F(1.57, 53.49) = 10.46, p < .000$. Table 11 contains the results of this analysis using both the Greenhouse-Geisser and Huynh-Feldt procedures. Again, the focus of a repeated measures design is the interaction of time over measurement. Thus, the effects that are meaningful in this analysis are the interaction of time and group. Additional limitations posed by the small size and unequal numbers in the groups signal greater caution in interpreting these effects.

Table 11

Repeated Measures ANOVA for Onset Recognition Fluency with the Lowest Quartile Groups from the Local Normative and Intervention Groups

Source		<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Tests of Within-Subjects Effects					
Time	Greenhouse-Geisser	1.573	5627.316	3576.733	44.140*
	Huynh-Feldt	1.685	5627.316	3339.638	44.140*
Time x Group	Greenhouse-Geisser	1.573	1333.290	847.442	10.458*
	Huynh-Feldt	1.685	1333.290	791.266	10.458*
Error (Time)	Greenhouse-Geisser	53.493	4334.625	81.032	
	Huynh-Feldt	57.290	4334.625	75.661	

Note. * $p < .000$.

The next analysis addresses whether the interventions were effective in improving performance on Letter Naming Fluency. A similar analysis was conducted between the local normative and intervention groups for performance on Letter Naming Fluency. Table 12 contains the results of this analysis. No significance is revealed in how the groups varied over time. This is consistent with a review of the distribution of scores depicted in Figures 3 and 4. This pattern also held true when the means of the lowest performing quartiles were compared over time. The mean scores of the pre and posttest measures of Letter Naming Fluency did not vary significantly by group. Table 13 contains the results of this analysis. In reviewing these tables it is again important to consider that the question of significance relates to the interaction of time and group. This effect is not significant. This indicates that the type of instruction received by students did not differentially effect their growth in rate of letter naming skills.

Table 12

Repeated Measures ANOVA for Letter Naming Fluency with the Local Normative and Intervention Groups

Source		<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Tests of Within-Subjects Effects					
Time	Greenhouse-Geisser	1.895	25421.433	13415.298	176.876*
	Huynh-Feldt	1.933	25421.433	13152.487	176.876*
Time x Group	Greenhouse-Geisser	1.895	299.423	158.011	2.083
	Huynh-Feldt	1.933	299.423	154.915	2.083
Error (Time)	Greenhouse-Geisser	272.874	20696.325	75.846	
	Huynh-Feldt	278.327	20696.325	74.360	

Note. * $p < .000$.

Table 13

Repeated Measures ANOVA for Letter Naming Fluency with the Lowest Quartile Groups from the Local Normative and Intervention Groups

Source		<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Tests of Within-Subjects Effects					
Time	Greenhouse-Geisser	1.911	8124.799	4251.263	50.147*
	Huynh-Feldt	2.000	8124.799	4062.399	50.147*
Time x Group	Greenhouse-Geisser	1.911	120.910	63.265	.746
	Huynh-Feldt	2.000	120.910	60.455	.746
Error (Time)	Greenhouse-Geisser	64.979	5508.701	84.777	
	Huynh-Feldt	68.000	5508.701	81.010	

Note. * $p < .000$.

The next step in the analysis involves examination of the effect of intervention on growth in performance of Phonemic Segmentation Fluency for the local normative and

intervention groups. Results of this analysis using the more conservative Greenhouse-Geisser procedure reveals that the differences in change between the pre and posttest administrations of Phonemic Segmentation Fluency varied significantly by group $F(1.00, 144) = 39.83, p < .000$. The full results of this and the less conservative analysis are contained in Table 14. A review of Table 9 reveals that the group mean for the local normative group was 7.85 and the mean for the intervention group was 6.05 initially. At the final collection point, the group mean for the local normative group was 9.21, but the mean of the intervention classrooms had increased to 21.29. Although this suggests a powerful effect, limitations discussed later pose restrictions on the interpretations that can be made.

Table 14

Repeated Measures ANOVA for Phonemic Segmentation Fluency with the Local Normative and Intervention Groups

	Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Tests of Within-Subjects Effects					
Time	Greenhouse-Geisser	1.000	4921.288	4921.288	57.107*
	Huynh-Feldt	1.000	4921.288	4921.288	57.107*
Time x Group	Greenhouse-Geisser	1.000	3432.590	3432.590	39.832*
	Huynh-Feldt	1.000	3432.590	3432.590	39.832*
Error (Time)	Greenhouse-Geisser	144.000	12409.465	86.177	
	Huynh-Feldt	144.000	12409.465	86.177	

Note. * $p < .000$

The performance on the two administrations of Phonemic Segmentation Fluency by the groups representing the lowest quartiles was analyzed. Results of this analysis reveal that the difference in mean scores between the pre and posttest administrations of

Phonemic Segmentation Fluency was significant by group. The results of this analysis are shown in Table 15. The more conservative Greenhouse-Geisser procedure reveals a high level of significance $F(1.00, 34) = 50.59, p < .000$. Table 9 reveals the initial mean of the lowest quartile intervention group was 4.42. The mean for the lowest quartile local normative group taken at that same time was 2.82. The final mean for the lowest quartile intervention group increased to 32.29. During that same period, the lowest quartile local normative group had increased to only a mean of 4.91. Again, this analysis should be interpreted at an even higher level of caution than that of the larger groups because of the restrictions posed by design and the small and unequal number of students within the groups.

Table 15

Repeated Measures ANOVA for Phonemic Segmentation Fluency with the Lowest Quartile Groups from the Local Normative and Intervention Groups

	Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Tests of Within-Subjects Effects					
Time	Greenhouse-Geisser	1.000	3836.678	3836.678	68.341
	Huynh-Feldt	1.000	3836.678	3836.678	68.341
Time x Group	Greenhouse-Geisser	1.000	2840.012	2840.012	50.588
	Huynh-Feldt	1.000	2840.012	2840.012	50.588
Error (Time)	Greenhouse-Geisser	34.000	1908.766	56.140	
	Huynh-Feldt	34.000	1908.766	56.140	

Note. * $p < .000$

Descriptive Statistics for Traditional Teacher Measures

A review of the data obtained by the teachers during the untimed letter naming indicates that children enter kindergarten with a broad range of skills. Teachers measure upper and lower case letters at three points throughout the year. The first two sets of data were collected for the study. The information from all of the 146 students in the study was used to obtain the following figures. Students entering in the fall were able to identify an average of 11.57 uppercase letters. The mean number of lowercase letters was 8.38. Only four students from the group assessed at that time were able to identify all 26 upper and lowercase letters. Twenty-four students identified one or less uppercase letter in September. Thirty-five students identified one or less lowercase letter at that same time. Thus, almost 25% of the students studied demonstrated a lack of familiarity with lowercase letters upon their entrance to kindergarten. The teachers pointed this out when they first saw the probes for Letter Naming Fluency. They commented that the mix of upper and lowercase letters might confuse the children. It may have contributed to the initial low scores on Letter Naming Fluency.

The average number of uppercase letters identified for the second data point was 18.53. The average for lowercase letters was 15.36 letters. This is consistent with results on Letter Naming Fluency that indicated an overall growth in letter identification skills. Much of the preliteracy activities in the classrooms focus on letter identification skills. Thus, growth in these skills is expected. However, the range in skills was readily apparent in January. Although 25 children could identify both upper and lower case letters with 100% accuracy, 15 children still knew five or less upper and lowercase letters.

Another set of data collected in the study includes color identification skills. The teachers measure children's knowledge of colors at three points in the school year. Data from the September and January checkpoints are included in the study. The data collected from the teachers on the children within the study indicates that the majority of the 146 children were able to identify all of the eight colors as they entered kindergarten. Ceiling effects occur when a measure is too easy, resulting in the majority of individuals earning a high score. Of the 146 children included in the study, 117 identified all eight of the colors presented. Of the 29 children who misidentified colors, 12 misidentified only one of the colors. In January, only 11 of the 146 children did not identify all of the colors. Four of those children were able to identify at least seven of the eight colors. Eight of the 11 children were from homes where English is not spoken. The mean score for the fall was 7.42 colors. The mean number of colors identified at midyear was 7.82.

Relationship of Measures

The relationships among the measures discussed in the study were computed using Pearson correlations. These are displayed in the correlational matrix contained in Table 16. Age in months is also included in the matrix to examine if performance on any of the measures is related to age. Coefficients above .5 are generally considered significant in the field of education (Brase & Brase, 1983).

A review of the data in Table 16 suggests a strong relationship between the timed and untimed letter identification measures. This is understandable in that these measures are aimed at assessing knowledge of the same symbols, albeit under different conditions. The first administrations of Letter Naming Fluency and Onset Recognition Fluency

Table 16

Correlational Matrix for Readiness Measures

	Age	Color 1	Color 2	Upper 1	Lower 1	Upper 2	Lower 2	LNF 1	LNF 2	LNF 3	ONF 1	ONF 2	ONF 3	PSF 1	PSF 2
Age	1.000														
Color 1	0.156	1.000													
Color 2	0.119	0.636	1.000												
Upper 1	0.163	0.359	0.248	1.000											
Lower 1	0.144	0.324	0.221	0.931	1.000										
Upper 2	0.158	0.387	0.330	0.779	0.679	1.000									
Lower 2	0.147	0.352	0.263	0.770	0.751	0.900	1.000								
LNF 1	0.175	0.260	0.159	0.838	0.845	0.627	0.628	1.000							
LNF 2	0.159	0.342	0.254	0.807	0.760	0.789	0.754	0.754	1.000						
LNF 3	0.083	0.322	0.222	0.687	0.648	0.692	0.658	0.672	0.782	1.000					
ONF 1	0.213	0.171	0.123	0.431	0.477	0.292	0.307	0.580	0.366	0.355	1.000				
ONF 2	0.126	0.265	0.203	0.273	0.286	0.187	0.181	0.310	0.301	0.202	0.548	1.000			
ONF 3	-0.006	0.296	0.165	0.340	0.378	0.243	0.216	0.370	0.254	0.265	0.339	0.506	1.000		
PSF 1	0.075	0.186	0.068	0.429	0.479	0.287	0.292	0.457	0.341	0.218	0.418	0.338	0.342	1.000	
PSF 2	0.082	0.218	0.033	0.135	0.174	0.076	0.078	0.131	0.035	0.022	0.059	0.301	0.581	0.344	1.000

demonstrate a correlation above .5. This may be due to the skewed nature of that data, as they do not show a relationship in further administrations. Measures of letter identification skills do not correlate highly with results from the color identification or phonemic awareness measures. The color identification measures correlate highly with one another, but not with other measures. The phonemic awareness measures (Onset Recognition Fluency and Phonemic Segmentation Fluency) show a significant correlation only for the final administration of each. None of the measures in the matrix are related to age of child.

Case Studies

The following case studies are presented to illustrate issues involved in the identification and monitoring process of individual children within the project. The teachers relied on visual analysis to determine rate of growth during the project. An estimate of slope has been also calculated for this discussion using the least squares method. This serves as a measure of student's progress over time. The strength and direction of a slope can be used to determine the need for change in intervention (Shinn, Good, & Stein, 1989).

A mean slope has been obtained for the group of students who were monitored weekly. Out of the 36 students who were monitored in this manner, 25 sets of data could be used to obtain mean scores for Onset Recognition Fluency and Letter Naming Fluency. A number of students had to be excluded from this analysis because of missing data points due to absences. The mean score for Phonemic Segmentation Fluency is

based on 34 students because of fewer absences in the spring. Data points for this measure were not collected until mid-year.

The mean slope for Onset Recognition Fluency was 1.09. This indicates that the children receiving intervention in small groups demonstrated an average gain of 1.09 onsets per week for the 20 weeks. The mean slope for Letter Naming Fluency was 1.02. This indicates that that these students were able to name on average one additional letter per minute each week for the twenty weeks they were measured. The mean slope for Phonemic Segmentation Fluency was 1.92. This indicates that the students in this group were able to produce almost two additional segments per week for the 11 weeks that they were monitored. It should also be noted that these means represent rate of progress for children who were initially determined to be at risk for difficulties developing early literacy skills. Slopes could not be included for all students because of the lack of sufficient data points. It should be noted that the mean slopes reflect a high degree of variability within individual performances over time and among the group as a whole.

The first case presented is a young boy who has been exposed to two languages in his household. He is referred to as Juan in this discussion. He prefers to use English at home and at school, but Spanish is the primary language of the home. He presents as a child with basic communication proficiency in English, but needs to have linguistic concepts reinforced in order to perform oral language activities at a level consistent with his typical monolingual peers. His rate of growth on all three measures is presented in Figure 7. His initial performance on Letter Naming Fluency was above the median of the local norming group. It has remained above this point throughout the project and is not an area for concern. His slope of improvement on this task was .35, which is not as strong an

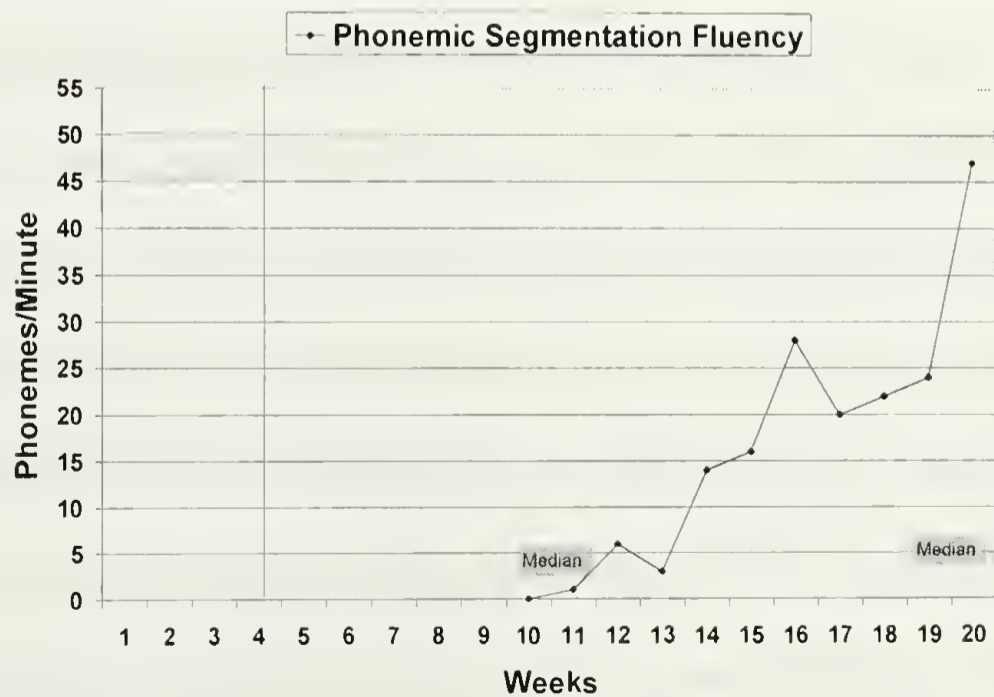
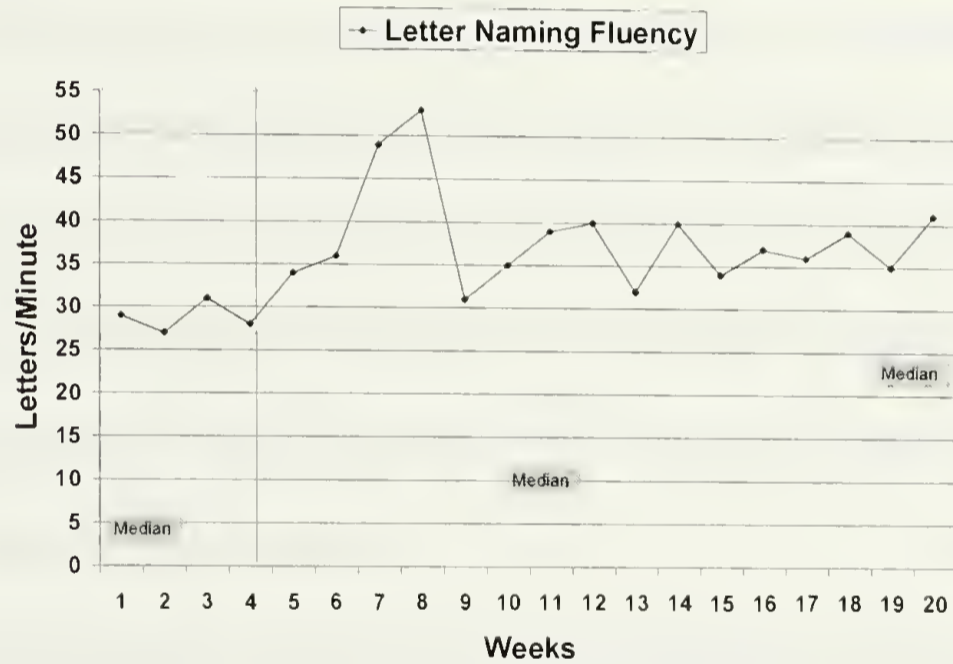
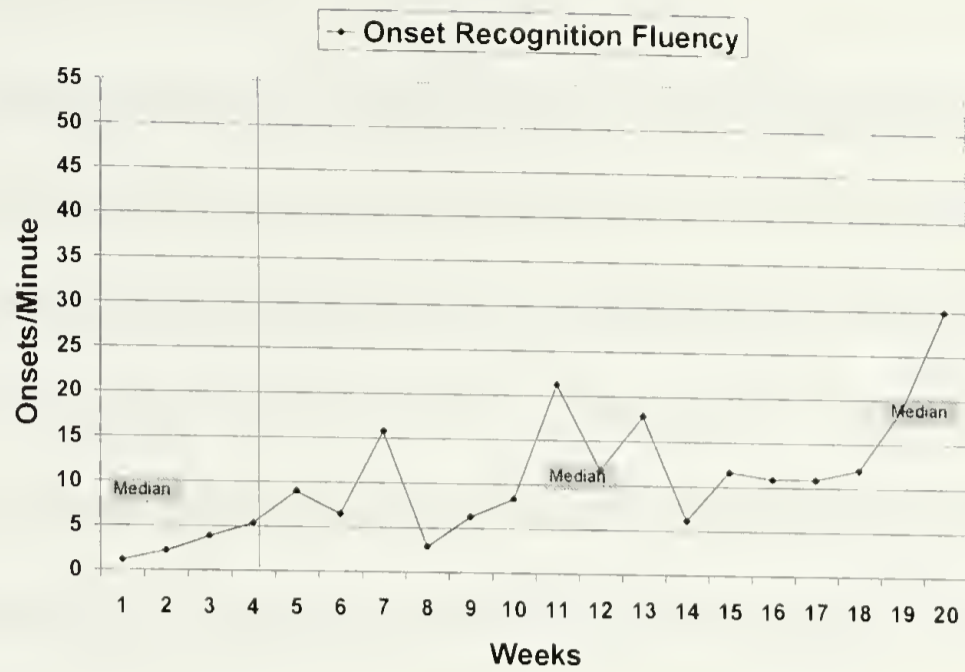


Figure 7. Juan's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norms

improvement as his classmates. However, he entered kindergarten with a relatively higher level of fluency on this task.

Juan's initial performance on Onset Fluency fell below the 25th percentile and remained below that point during baseline. As a result, he was recommended as a participant in the small group training program. His performance on Onset Fluency has been variable. His initial responses were made in a random fashion and he often took the maximum amount of time allotted for a response, which is five seconds for each item. His response rate was slower than many of his classmates on this task. This reduced rate may be related to the learning of two languages simultaneously. His performance on Onset Recognition Fluency at the midpoint fell at approximately the 30th percentile when compared to the local norms. At that point, he had made gains and was functioning within the median, but was not performing consistently at the developer's benchmark of 20 to 25 onsets per minute. Thus, he would not have been seen as ready to be monitored using Phonemic Segmentation Fluency.

Juan's rate of progress on Onset Recognition Fluency, as measured by slope, was .85. This is somewhat below the mean slope of improvement for the group, which was 1.09. Juan did not exceed the benchmark for Onset Fluency Recognition until the final weeks of the program when he accurately identified eleven and then twelve of the sixteen pictures on the task. He also correctly produced three out of the four onsets he was asked to identify. Up until that time, he had pointed to items, but had not correctly produced the sounds. Production of the sound is considered a higher level task than identifying sounds through pointing (Good, 1998). His improved performance indicates that his skills were emerging, but his rate of response and errors indicated that they were not fully mastered.

His performance on Onset Recognition Fluency would need to be monitored for several weeks to determine if it remained consistently above the 20 to 25 onsets per minute level.

A slower response rate was also observed in other dual language students and may be related to the cognitive demands of the task. Juan, like many of the dual language students, seemed to take a few seconds longer to scan the pictures before he responded. He may have been unfamiliar with some of the vocabulary items or may have had to deal with interference from the labels used for the items in his other language. Some of the labels (i.e., postal carrier, couch, dice, etc.) may not have been familiar words to Juan, which may have caused his hesitation and resulted in errors. If his progress had been measured only by Onset Recognition Fluency, staff members would have concluded that his response to intervention was not as positive as his performance on Phonemic Segmentation Fluency suggests.

All of the children in the intervention groups were monitored on a weekly basis with Phonemic Segmentation Fluency beginning with the first set of local norms taken on that measure. Juan's progress on this measure is clearly depicted in Figure 7. His initial score of zero on the measure was similar to many of his classmates. However, his progress on this measure indicates that he responded to the training that began to focus on phonemic segmentation skills at the thirteenth week. His slope is 3.85 and compared to the mean of 1.92, indicates a rapid rate of development. His relatively rapid rate of growth on this measure is surprising, given the variable and slower rate of growth on Onset Recognition Fluency. By the final week of the program, Juan was performing at a level that is significantly above the median of the local norm group. His final score of 47 segments per minute falls at the benchmark of the developer for students leaving

kindergarten and entering first grade. Because that score is significantly above his score from the previous week, he would need to be monitored to determine if this were his true performance level.

Andrew is another dual language student who had difficulties with the phonemic awareness tasks. His case was chosen because it illustrates the value of the home-school connection in building early literacy skills, the need for specific interventions aimed at improving letter identification skills, and the need for careful selection of children at risk. Figure 8 depicts his progress on all three of the measures from DIBELS. As shown on the graph depicting Andrew's performance on Onset Recognition Fluency, his scores on three of the four probes collected during baseline fell below the 25th percentile. His fourth score fell somewhat above the cut-off, yet his three correct responses out of sixteen items on that task were still at the random level. This points to the need to consider the actual score, as well as the child's performance in comparison to the local normative data.

The process of identifying students is more involved than simply choosing a cut-off score and working with students below that point. Andrew, like many other students, was able to earn a score above the cut-off point by responding correctly, and most likely randomly, to only a few items. This is due to the skewed nature of the distribution for the first administration of Onset Recognition Fluency, in that the majority of students performed at a low level of mastery on this task. Staff members involved in the identification process must consider this as they select students needing intervention, or they risk a high rate of false negatives when identifying students in need of programming.

Andrew's progress during the first phase of the training program was minimal in all areas. His letter identification skills were very limited at the second norming period

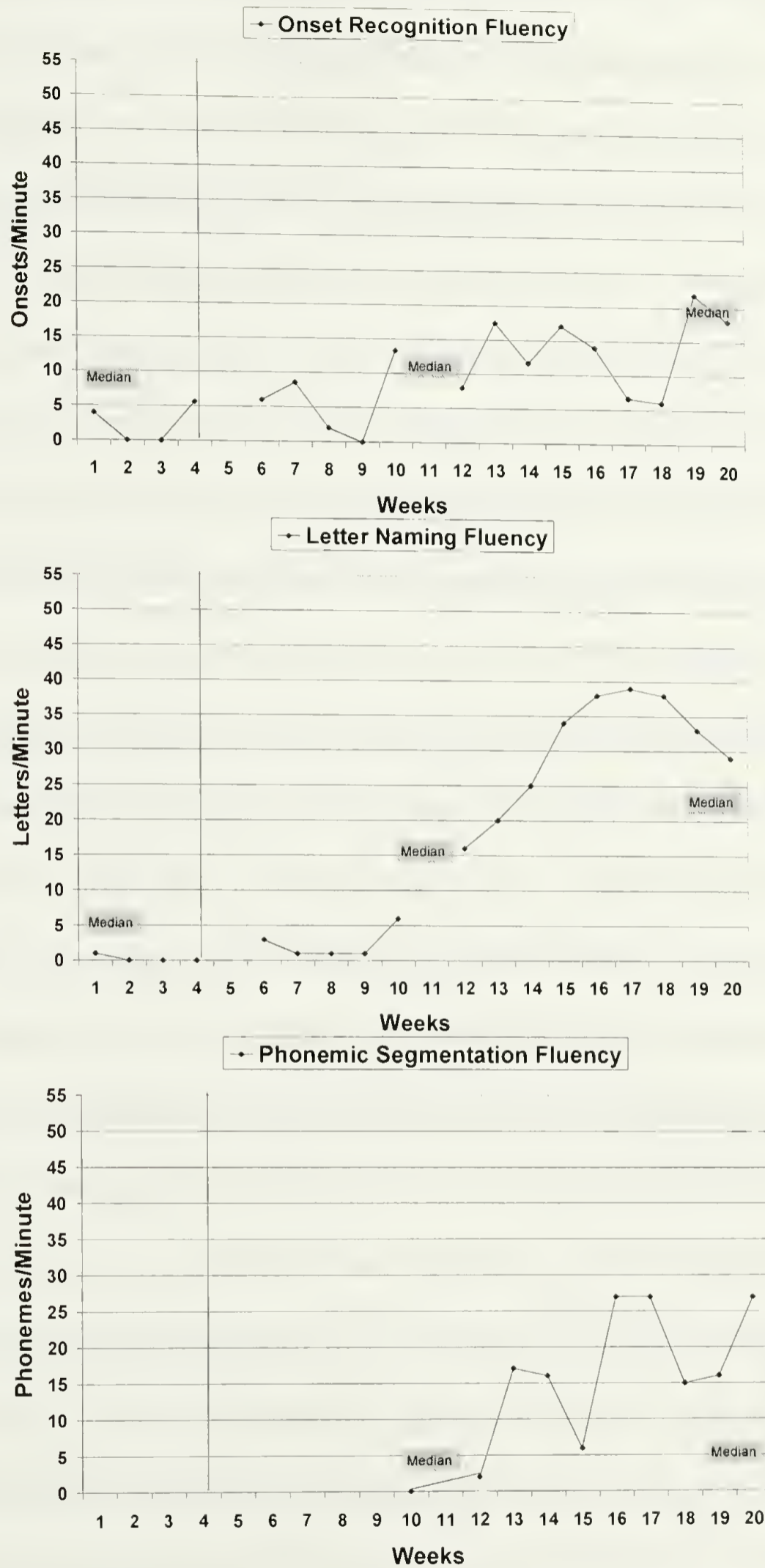


Figure 8. Andrew's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norms

and his parents were brought in to discuss his lack of progress. His parents were asked to focus on letter identification skills and were given some ideas for activities to do at home with Andrew. Figure 8 reveals that his rate of growth in this skill significantly improved after that meeting. His slope on this task over the 20 weeks was 2.71. A review of his graph indicates that much of this growth took place after his parents were informed of his difficulties. His father reported that he worked on letters with Andrew every night after his meeting with the teacher. The value of involving his parents in his learning points to the need for a strong home/school connection. It was also very rewarding for his parents to review the graph depicting his progress after they began to focus on this skill at home.

Like Juan, Andrew demonstrated better growth on Phonemic Segmentation Fluency than Onset Recognition Fluency. His slope on Phonemic Segmentation Fluency was 2.33 compared to the group mean of 1.92. However, his performance was more variable than Juan's, suggesting he will need more explicit programming to develop greater consistency. Andrew's slope for Onset Recognition Fluency was .91, which is only slightly below the mean for the group. He had difficulty initially understanding what he was supposed to produce on the final items that called for a verbal response. For example, when asked to produce an initial sound in a word, he would often provide the noise that the item made versus the sound that began the word. For example, when asked what sounds the word clock began with, he would answer "tick tock" instead of saying the appropriate phonemes /cl/. Although most children did this for the first few sets of probes, Andrew persisted in this behavior until almost midway through the program.

Although his performance on Phonemic Segmentation Fluency was higher than the median at the end of the program, he had not arrived at the benchmark set by the

developers of DIBELS. Andrew will need to be monitored as he enters first grade to make sure that he receives the appropriate reading instruction.

It should be noted that Andrew's English does not appear as proficient as Juan's and his level of vocabulary development may be affecting his progress in the development of phonemic awareness. Andrew would benefit from programming aimed at improving vocabulary, syntax, and oral language comprehension in English. Building these basic linguistic skills would provide him with the foundation needed to support the metalinguistic skills necessary for literacy development (i.e., phonemic awareness). Andrew has been recommended for participation in a summer school program offered through the school system that will provide activities aimed at facilitating his development of academic readiness skills and language comprehension. In addition, a packet of activities will be sent home with his parents to help them develop phonemic awareness skills.

Elizabeth is a young girl who was chosen to participate in the training program, despite her one score during baseline that fell above the cut-off point on Onset Recognition Fluency. Her rates of growth on each of the measures are illustrated in Figure 9. She demonstrated rapid and consistent growth on Onset Recognition Fluency as soon as she began to receive direct instruction in phonological awareness. Her slope on this task was 2.99, which is considerably higher than the group mean of 1.09. Midway through the program, Elizabeth was performing this task at a level that was well above the median of the local norming group. She had also arrived at the benchmark established by the developers for transfer over to Phonemic Segmentation Fluency as a means of monitoring. Her scores on this measure were very high and she would often respond

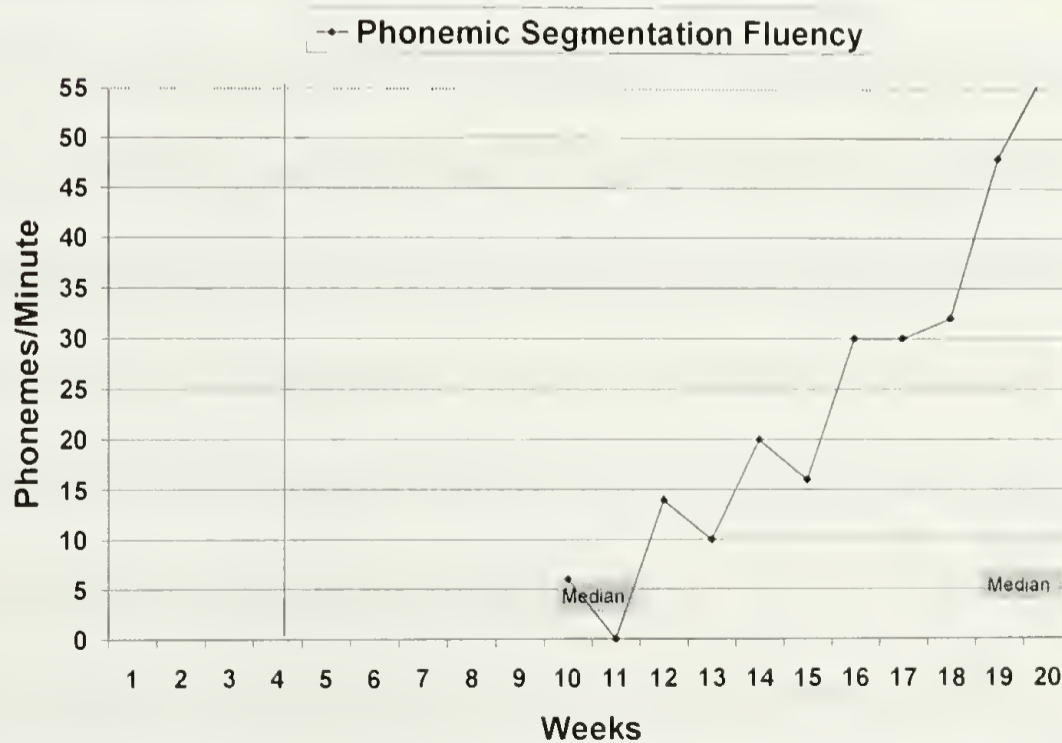
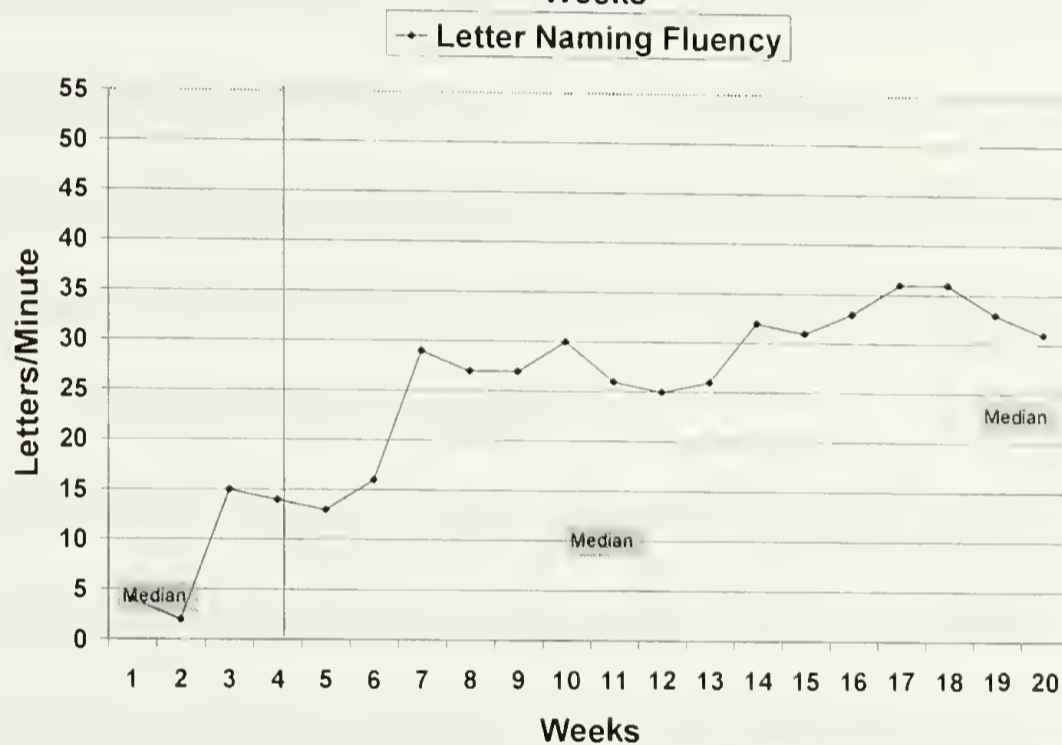
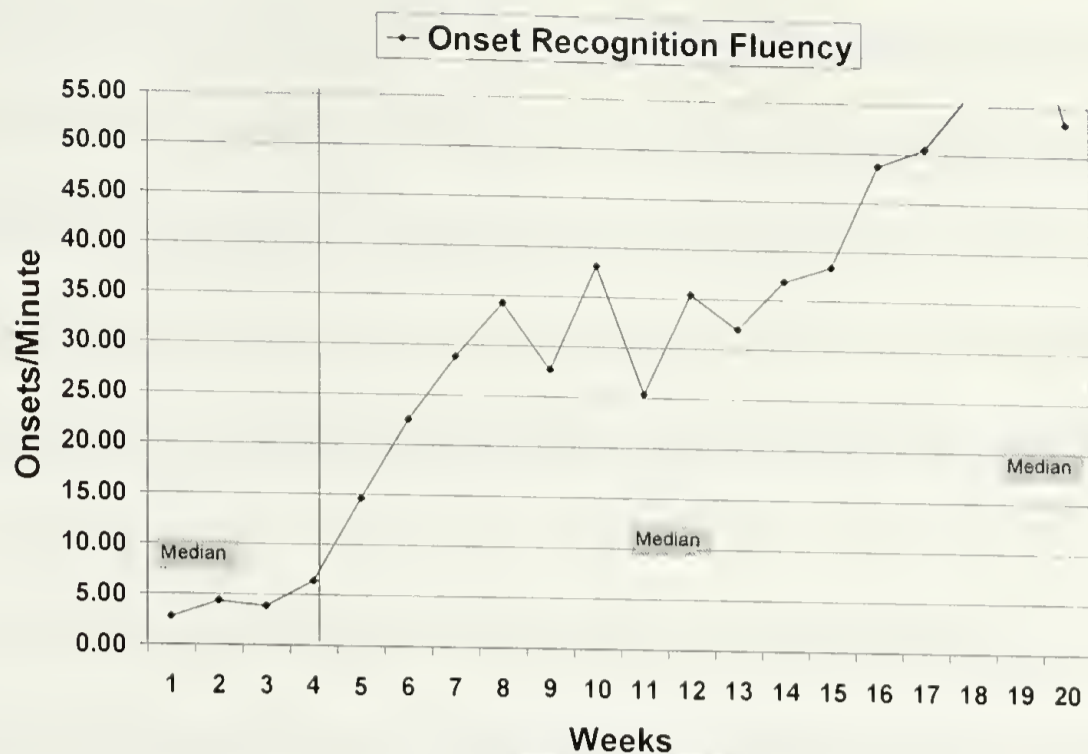


Figure 9. Elizabeth's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norms

before a second had elapsed on the timer. Her score that falls outside of the chart on Figure 9 reflects a rate of 14 correct onsets in 11 seconds. Elizabeth's performance indicates that she could have been successfully discontinued from small group instruction at that time. She remained in the program because staff members were concerned that the training program had not yet sufficiently presented the skills related to segmentation and blending.

Elizabeth's initial performance on Phonemic Segmentation Fluency was typical of her peers; however, her progress on this measure was rapid and relatively consistent. Her slope of 5.00 was well above the mean slope of 1.92. Her performance level at the end of the program indicates she has developed important basic skills related to early literacy. She should only need to be monitored on an intermittent basis in first grade to make sure that she continues to progress in early reading skills.

Elizabeth's participation in small group instruction may not have been necessary for her to make adequate progress in these skills. She may have made steady progress by being introduced to large group activities delivered in the classroom. Her baseline data on Letter Naming Fluency showed that she was making progress through exposure to literacy activities in the classroom. Her baseline data on Onset Recognition Fluency revealed a positive trend, but did not provide teachers with enough information to determine if she was in need of specialized instruction. Perhaps, several more weeks of monitoring before instruction began would have provided teachers with sufficient data to more accurately determine the need for programming.

Erika is a young child who received small group instruction in addition to speech therapy services offered in the school. The chart presented in Figure 10 reveals the

limited progress she made throughout the instructional period. Erica began to demonstrate some progress on Onset Recognition Fluency during baseline. She correctly identified eight onsets in fifty-one seconds on the fourth probe taken during baseline. This lead staff to believe that she may not need small group instruction to develop this skill. She was chosen for participation in the program after consultation with her speech and language pathologist. Erica had been receiving services because of difficulties with phonological processing related to speech production. Her specialist reported a history of reading difficulties in the family and her teacher was concerned about her limited letter identification skills.

A review of Erica's progress on Onset Recognition Fluency reveals that she did not make significant progress during the instructional program. Her slope of .32 is well below the mean of 1.09. A review of her errors indicates she was easily confused when asked to make distinctions between voiced and unvoiced phonemes such as /p/ and /b/. When confused, Erica tended to make additional errors on phonemes she had identified accurately in the past. She did not accurately produce the initial sound of words on this task and her pointing still appeared somewhat random. Her scores on Onset Recognition Fluency were approaching the median of the local normative group midway through the program, but remained below the median at the end of the instructional period.

Erica made almost no progress on Phonemic Segmentation Fluency during the instructional program. Her performance was below the median at the beginning and end of the program. Her slope of .31 shows limited growth when compared to the average slope of the group (1.92). It should also be noted that the median is well below the benchmark set by the developer for leaving kindergarten and entering first grade. Her

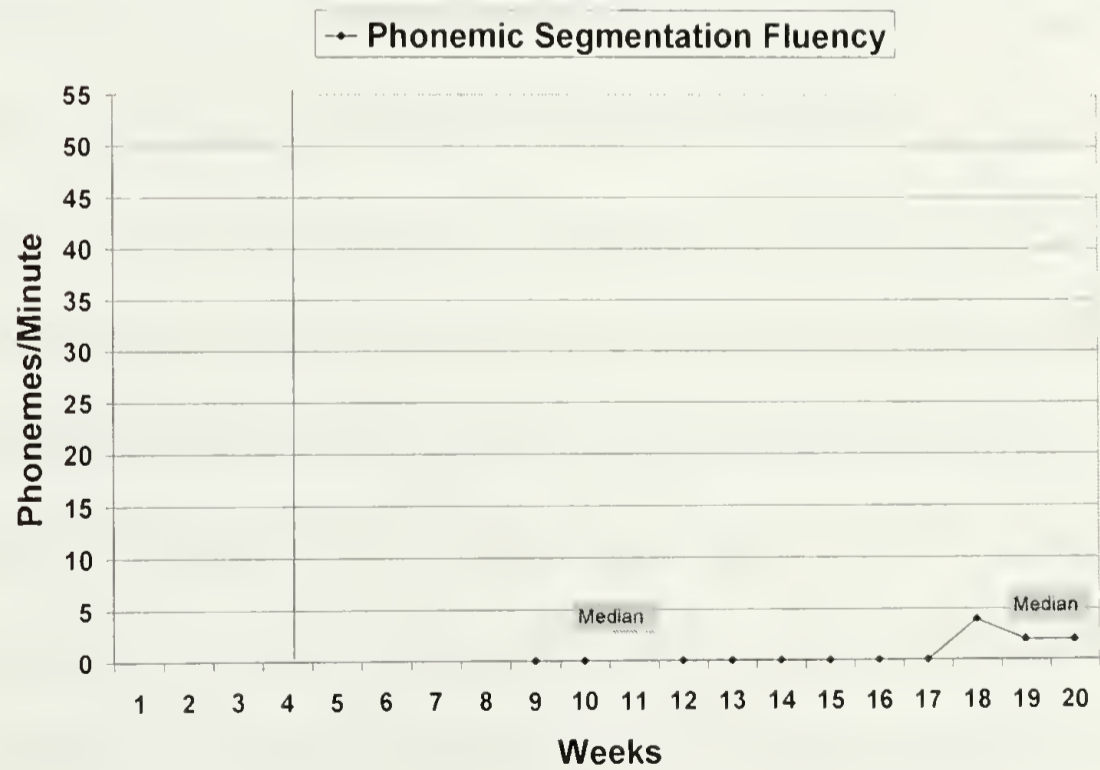
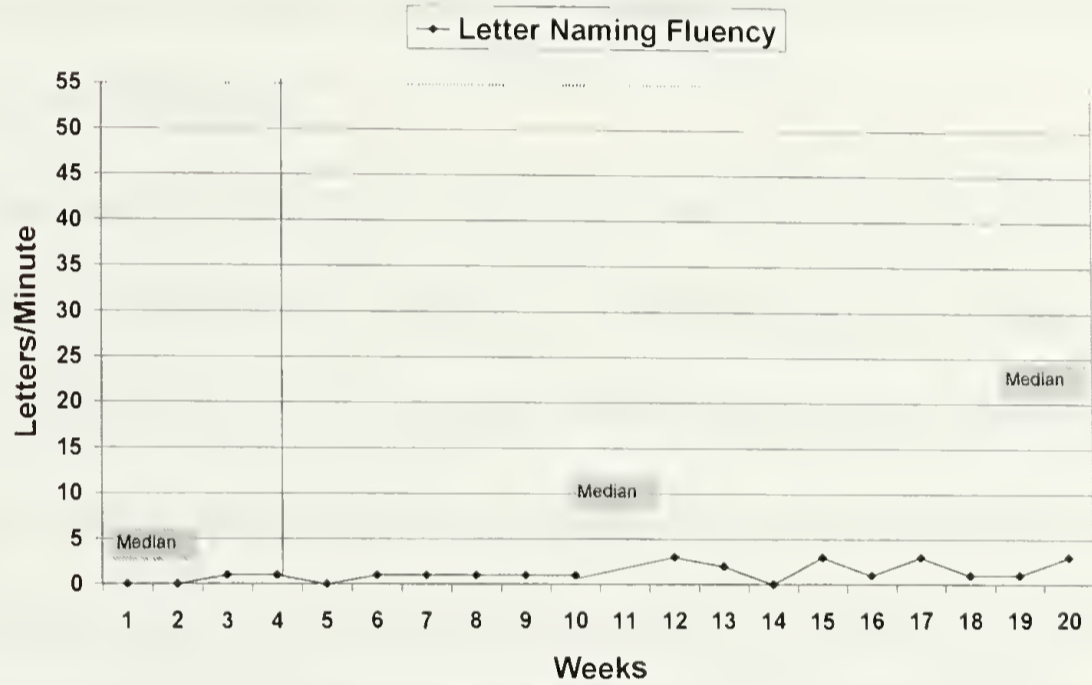
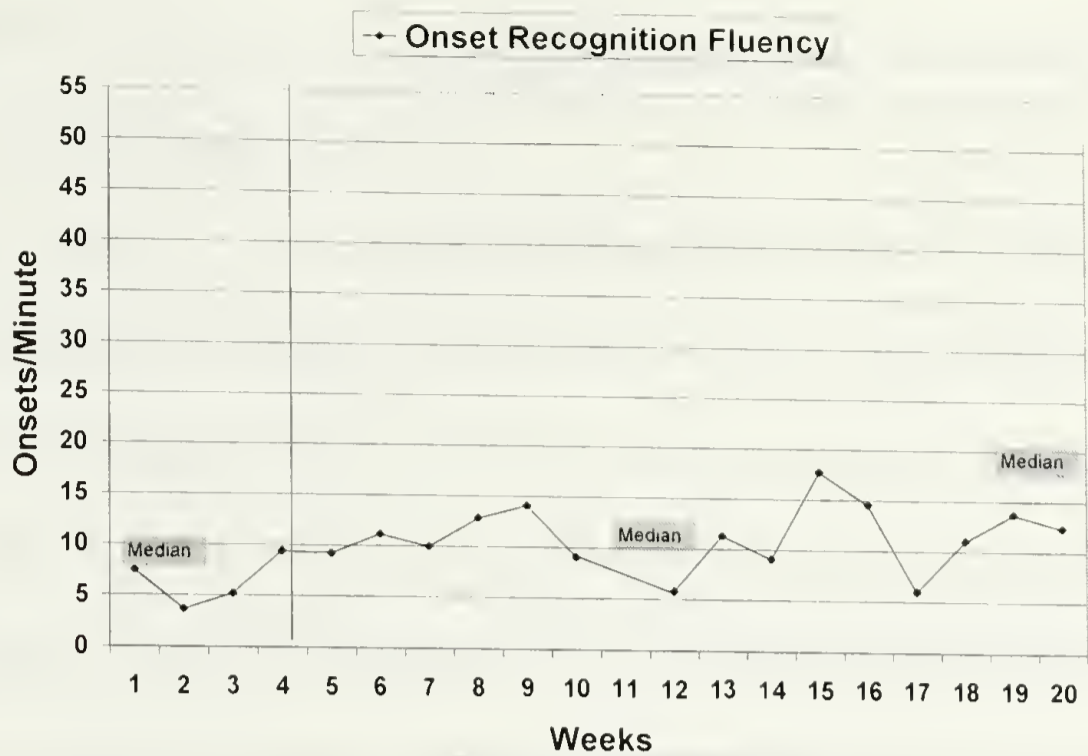


Figure 10. Erica's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norms

lack of growth on both of the phonological tasks indicates she will need more explicit instruction to develop skills in this area.

Erica's slope of .11 on Letter Naming Fluency indicates very limited growth on this skill. The group's mean slope for this task was 1.02. Her limited progress in letter naming occurred despite the extra attention her teacher provided to her in the classroom. Her specialist also presented letters to reinforce speech therapy. Erica's mother worked on letters at home. Her lack of progress on all of the tasks was surprising, given her early performance on Onset Recognition Fluency and the age level concept development she demonstrates in the classroom.

The final case presented is a young boy named Bob who was not involved in the small group interventions, but was enrolled in one of the intervention classes. Bob was only monitored using the three sets of probes administered to the local normative group. Thus, there were not enough data points to obtain a slope of progress. He was monitored for initial screening purposes and to collect data used in the group comparisons. His teacher presented large group activities aimed at building phonemic awareness in the classroom. Bob's performance on the three measures is illustrated in Figure 11. Lines have been drawn to connect his three sets of data points. His initial score on Onset Recognition Fluency was well above the median of the local normative group and his performance on Letter Naming Fluency was within the range of the median. Thus, he was not considered for participation in the small group training. A review of his data in Figure 11 suggests that he has developed a high level of fluency in letter naming skills. However, his negative trendline on Onset Recognition Fluency and his lack of growth on

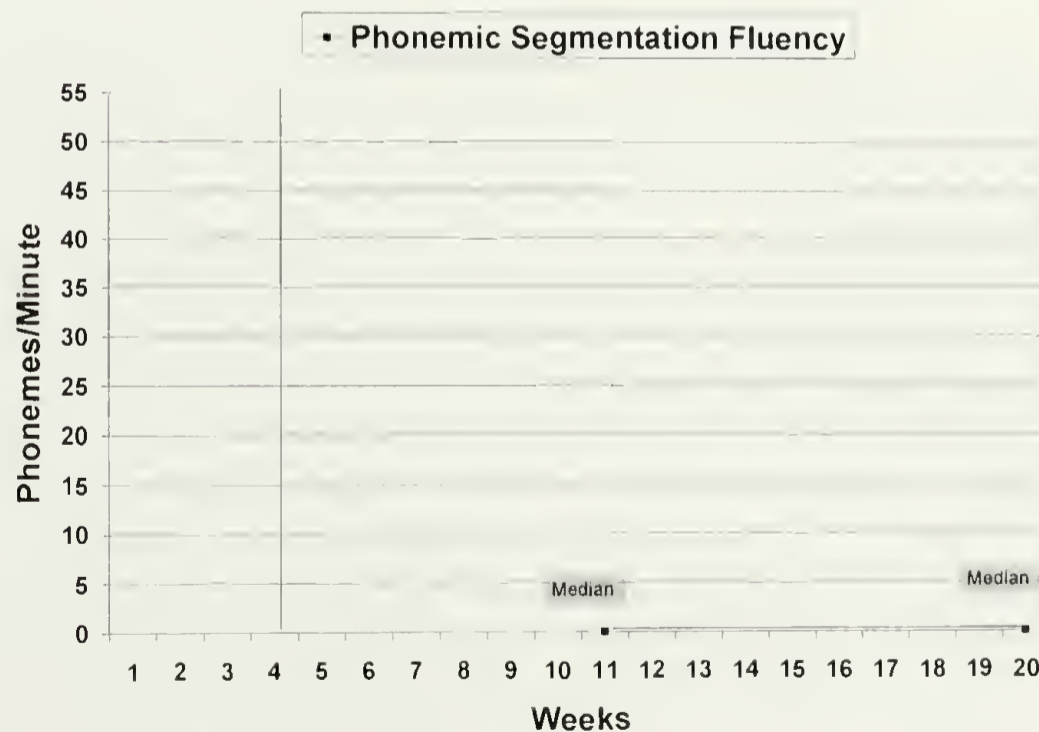
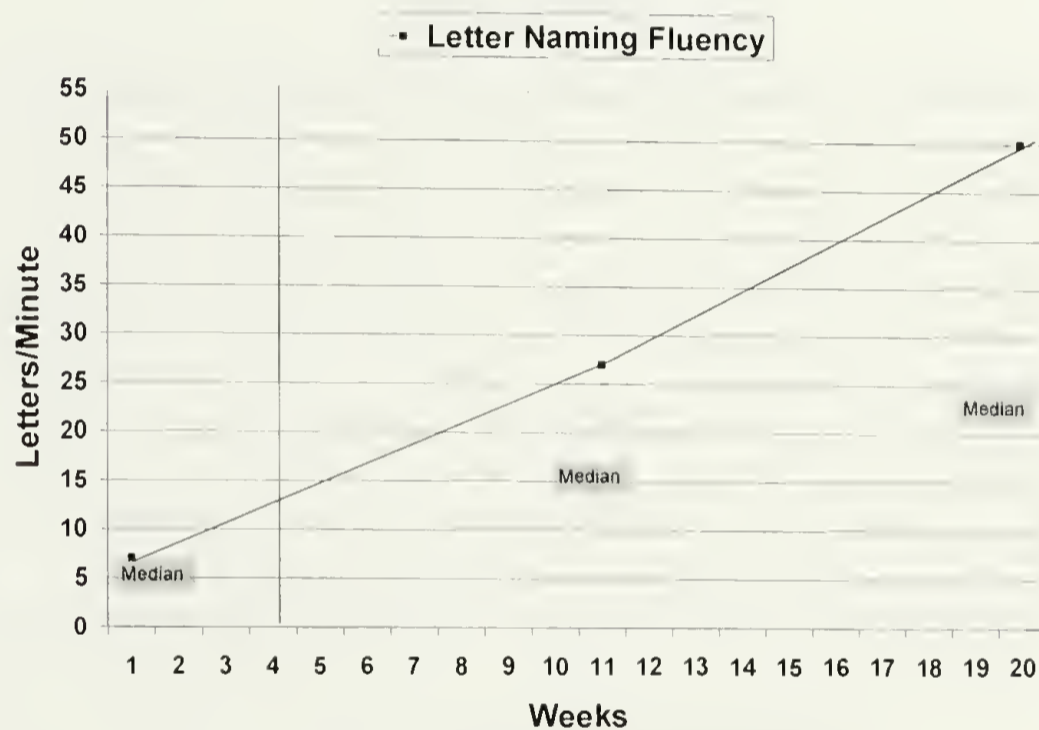
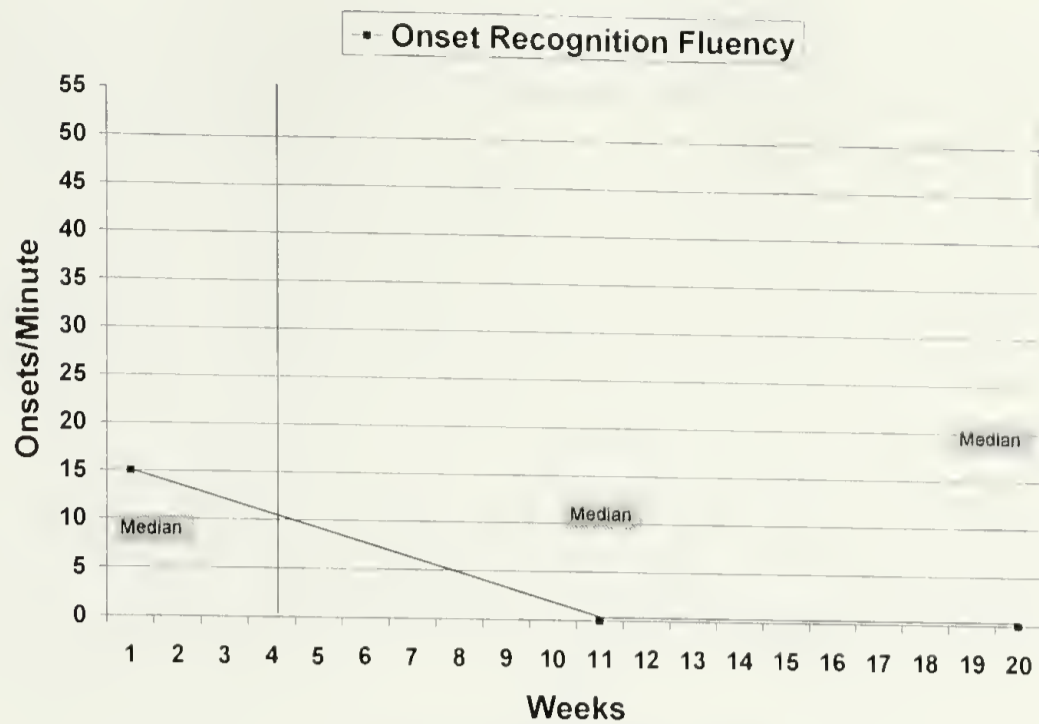


Figure 11. Bob's Rate of Growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency Compared to the Median Based on the Local Norms

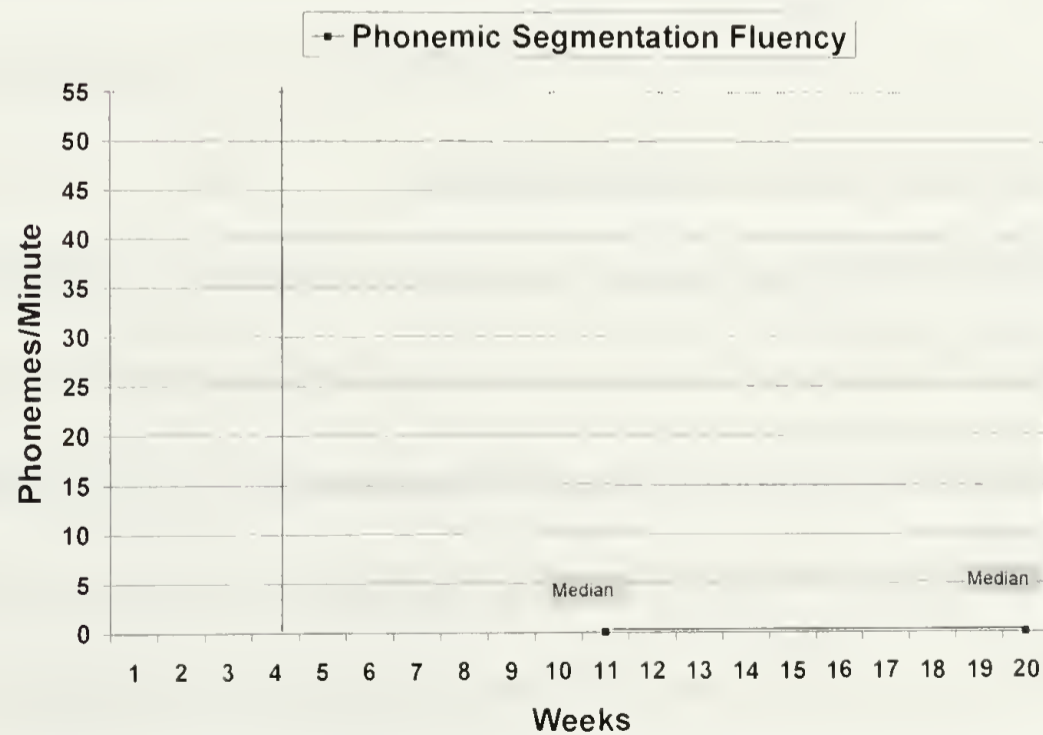
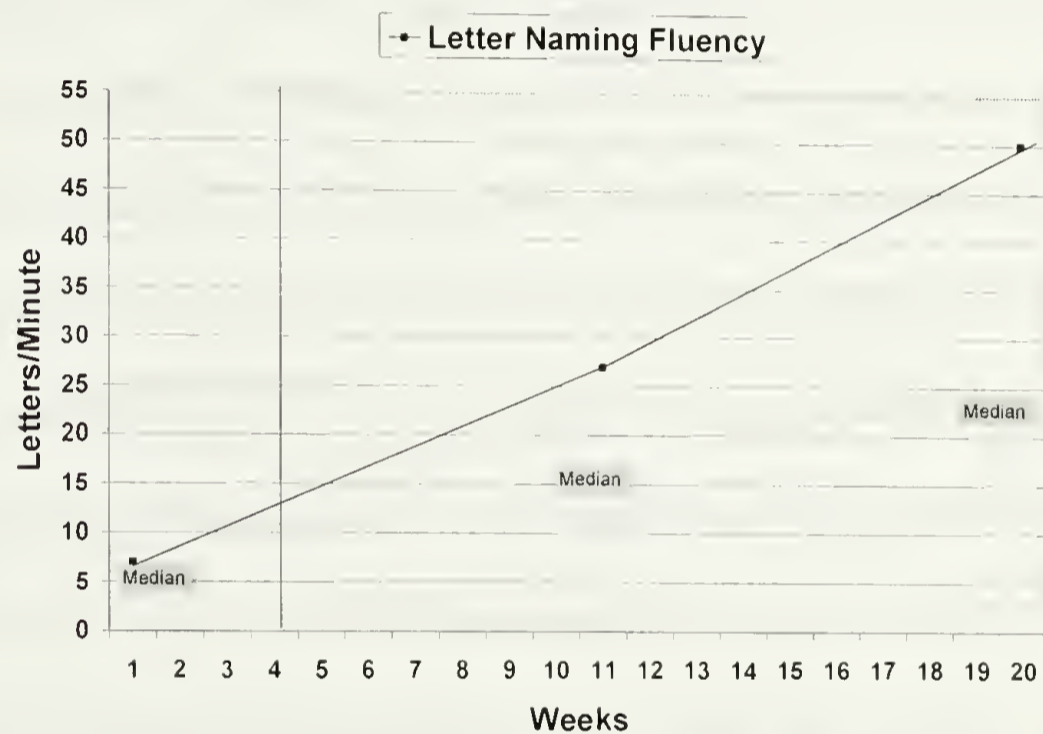
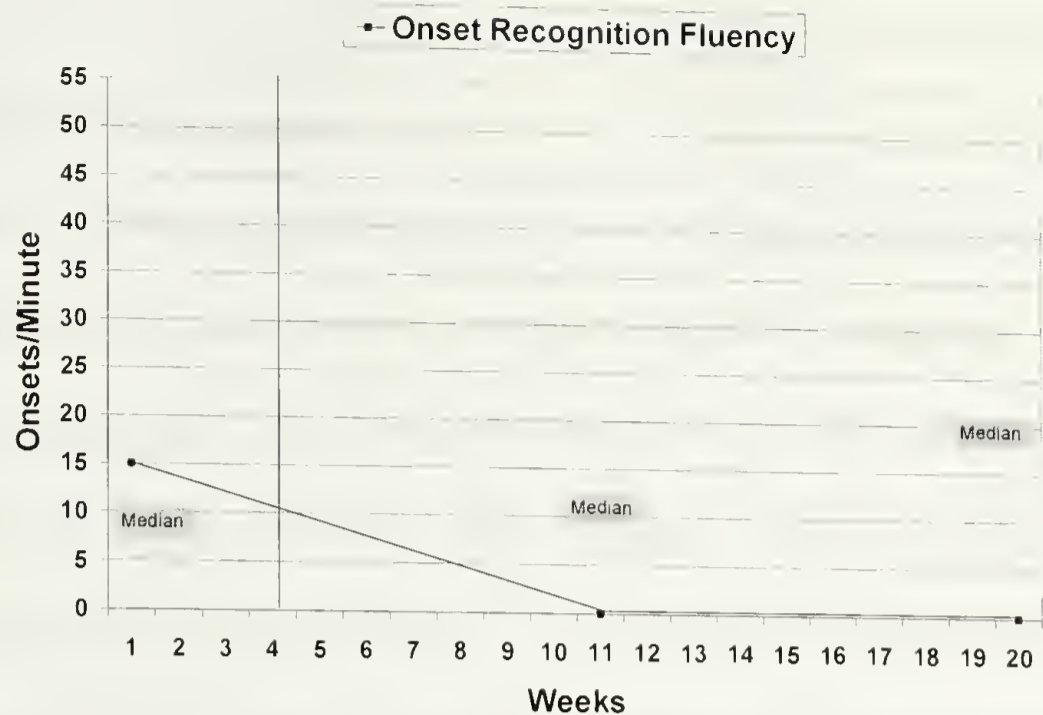


Figure 9. Bob's rate of growth on Onset Recognition Fluency, Letter Naming Fluency, and Phonemic Segmentation Fluency compared to the median based on the local norms

Phonemic Segmentation Fluency indicates that his phonemic awareness skills are not adequate for literacy development.

A review of Bob's initial performance on Onset Recognition Fluency indicates he accurately identified six out of the sixteen phonemes by pointing to them. His rate of response was fast enough to earn him a score that was above the median. After reviewing his performance on the same measures later in the year, one can conclude that his initial responses were most likely random in nature. He was assessed under identical conditions for each of the three sets of probes. He did not experience any illnesses such as ear infections that might have contributed to a regression of these skills. His performance on the second set of probes was an indicator that he should be assessed carefully for several weeks. If his performance remained consistently low, he should have been provided with more intensive programming in phonemic awareness. This is the point at which Elizabeth, who was presented earlier in this discussion, could have been discontinued from the program because of her significant progress. This would have allowed Bob to participate in the small group work that by its very nature had to have a limited number of students participate.

Qualitative Data

Information from interviews and observations were reviewed for themes. As these themes emerged from the data, a matrix was developed to examine the presence and nature of relationships among concepts. For example, both time and communication emerged as important themes. Placing them in a matrix revealed the strength of their connection. The teachers discussed the need to communicate with parents, to discuss progress with the trainers, to share ideas with one another about curriculum, and to

connect with specialists when making decisions about children. The lack of time was often presented as a real obstacle in being able to accomplish these activities. Issues that arose in the training and assessment portions of this study were first separated and compared to determine if there were connections between them. These connections were studied in an attempt to find alternative points of concern and differences in perspective. These phases within the process were important steps in analyzing data and in formulating implications for practitioners.

Time as a Factor in Implementation

Time was a factor mentioned by all of the staff as they discussed issues related to implementation. As mentioned earlier, time was a theme that had emerged from a pilot study and so it was addressed through the structured interview format. However, it was also an issue often mentioned in the weekly curriculum meetings, during informal conversations with staff, and as teachers and staff members answered other questions. It was a source of concern throughout the study.

As the data was sorted, it became clear that many issues connected with time revolved around the need to conform to schedules. School schedules are often carefully constructed to fit the demands of multiple mandates. Staff members are held accountable for following these schedules closely. The paraprofessionals felt pressured because they were allotted fifteen minutes to deliver the lessons. Any delay in their schedules meant they would have to shorten the lesson time. The teachers felt pressured to fit the curriculum into their day and to make sure that the children were on time for their sessions. The lack of consistency in the scheduling of the training sessions (i.e., 10:00

one day, 10:30 the next) served as a major source of stress. This had to be done to work around other people's schedules, to fit in specials such as gym, and to provide coverage for other teacher's classes. It is a reality faced by individuals working in schools. Initially one of the teachers noted, "it creates frustration and confusion when we run late." She added that, "It's new and once we work the bugs out, it will be okay." Staff did adjust, but it was not an optimum situation.

In contrast to the training sessions, a routine did develop in administering the assessments. Children were assessed on Wednesdays at the same time every week. This increased the efficiency of data collection, assisted the teachers and paraprofessionals in preparing their schedules, and helped the children develop a sense of routine with the assessment process. One little boy was observed watching the teacher get her stopwatch as they headed to the computer lab. He quickly noted to another child, "It's DIBELS today." He did this in an upbeat factual manner, and appeared proud that he had noticed.

Implementing the new curriculum in the classroom meant adjusting schedules and activities that the teachers had become accustomed to in their classrooms. This necessitated making decisions about what could be changed or eliminated. One of the teachers commented, "All the academic tasks are getting done, but the art projects are not, so we'll revamp the schedule." Teachers continuously found themselves having to make decisions about what could be modified or eliminated.

It became apparent in reviewing the data that routines are an important strategy staff members rely on to facilitate efficiency and cope with the stress that time pressures create. Teachers have very little flexibility built into their schedules. The individuals providing the training did not have adequate preparation time built into their schedules

and so they often developed materials and lessons at home. They gave up their lunch one day each week to meet with the school psychologist and discuss the progress of the children and the direction of the lessons. One of the teachers came in early to help copy probes for the weekly administrations and stayed late to fill-out the graphs on the children. Everyone acknowledged that time was an issue as they attempted to develop strategies to incorporate the new activities.

Time required planning throughout the implementation process. Many details needed to be handled in scheduling the dates for the local norming sessions. Because the assessments took place over a two-day period, the team of trained staff members needed to be released from their duties to participate in this process. This meant clearing schedules and checking with multiple personnel. Time was needed to contact individuals, coordinate schedules, and prepare materials. Issues that arose in this process illustrated how time often dictates what can happen in a school day.

The teachers completed logs, which were reviewed to obtain the information about average length of administration. The assessment process did take approximately four to seven minutes for each child when time to sit and settle in was considered. They also kept track of interruptions. These ranged from 2 to 12 per assessment session. The majority of interruptions were from children, but staff also interrupted at times. Kindergarten classrooms are busy places that require a lot of attention. Having extra adults in the classroom is necessary for assessment sessions to run smoothly. All of the teachers felt strongly that the extra adult should not take over the assessment process. They could assist with the assessments, but the teachers felt it was an important process for them to engage in with the students.

The teachers reported that the data obtained and the graphs created from that data helped them communicate with other staff members about the progress of each child. This in turn increased their efficiency in preparing for the staff meetings held to discuss children experiencing difficulty learning.

In the end, one of the teachers commented, "it worked out wonderful and was well worth the time." Another teacher noted, "I can't imagine not continuing this for next year, I don't understand other people's hesitation, except that I know they think it is too much time." This statement was made in response to concerns voiced by other teachers at a staff meeting about the expansion of the program for next year. An advantage listed by the teachers in evaluating the effectiveness of the program involved the time that the weekly monitoring afforded them to spend with each child. All of the teachers felt they knew these children much better than they had known past students. One teacher noted, "I learned a lot about their personality and motivation, in addition to their literacy skills." Another teacher reported, "I have a much better feel for these children, you can see where they are getting stuck."

Making DIBELS Part of the Routine

Developing a routine in the assessment process involved learning how to administer, score, graph, and evaluate progress on the measures. Each of the measures presented their own challenges that needed to be addressed in developing a level of comfort and in ensuring that a standard was followed.

The teachers initially had difficulty adjusting to the use of a stopwatch. It is not something that is customarily used in their classrooms. The children did not appear to be

bothered by the use of the stopwatches and in fact, many of them appeared motivated to “beat” the time during Letter Naming Fluency. All of the teachers reported that the most difficult task to administer was Onset Fluency because of the coordination required in timing the task. All of the staff reported a high level of comfort with this process after several weeks of repeated measurement. They did note that initially children had difficulty shifting from one task to another, when asked to move from pointing to a picture to then naming the initial onset of the word. Although the children developed a sense of this process with experience, different directions such as “tell me the sound” on the fourth item would have been a helpful signal for them.

Staff members also noted that Letter Naming Fluency was the easiest of the three measures to administer. However, it was observed during the pilot phase last year that many children did not have the return sweep to complete the task efficiently. The standard was then set that staff would assist the children in keeping their place by pointing with their own finger, until it was clear that the children could do this on their own.

Phonemic Segmentation Fluency was the measure that had been modified by the developers in between the pilot and implementation phases of the project. The change resulted in an easier administration procedure. The challenge faced by practitioners is in making judgements about the scoring of this task. Thus, additional time was required to confer with one another as they made these judgements. They found that it was initially helpful to have someone sit near the administrator and child to also listen and score the child. Discussing judgements made after the children had been assessed was also helpful in clarifying questions about scoring. Initially this procedure can be easy to administer

because many children cannot perform the task and are discontinued. However, as children's segmentation skills emerge, it becomes far more challenging. Staff made a concerted effort to work together to follow the rules for scoring. Accurate scoring involves listening very carefully to what children say, which necessitates a quiet area for the administration process.

All of the teachers commented that some of the pictures in Onset Recognition Fluency were confusing for the children. For example, one of the pictures of a snake looks more like a worm. They expressed the need to modify some of them in the future. They also noted that some of the words were unfamiliar, such as postal carrier and felt that this confused the children at times. In addition, they noted that there were too many probes asking children to differentiate between an initial /p/ and /b/. Discerning the difference between a voiced and unvoiced consonant is difficult and it often confused the children in the beginning. Placing the forms that ask children to make that differentiation later in the year may be considered for next year.

All of the teachers agreed that the assessment process needed to take place in a quiet area with an extra adult in the room to minimize interruptions. They also concluded that as the process became routine, it became more efficient. The teachers became more skilled in the administration process and the children knew what was expected of them.

During the pilot study one of the teachers noted that she evaluated an assessment by the value of the information she was able to learn about the children. She noted that a criterion for determining its value was the usefulness of the information it provided in relation to the time it took away from direct teaching. This same teacher judged DIBELS to be the "best tool I've used for assessing growth. I have a better grasp of where they

are.” Another teacher discussed how useful it was in “guiding curriculum”. She also noted that the process of assessing the children had made her much more aware of how to frame questions about sounds while teaching. An interesting point made by all of the staff members relates to the fact that the assessment process itself appeared to be an intervention. This has been demonstrated in the literature (Fuchs and Fuchs, 1986) for other curriculum-based measures and it was a significant factor considered by the teachers in their final evaluation of the project.

The other important component of the process was the graphing of the data. The majority of the graphing was completed by one of the teachers and the school psychologist. All of the graphs were regularly reviewed and analyzed by all staff to examine the growth of individual children. Graphing is not difficult, but does add to the amount of time that the process takes from other activities. Computer software was used to obtain slopes, medians and percentiles, but the majority of the work was done through hand plotting scores on charts or graph paper. The teachers felt the graphs were an important tool to document progress. They also felt it was important to see the growth as they assessed the children. They commented about the other ways that the graphs could help them in their work. “It was helpful when doing my report cards and when talking to parents.” Another teacher was excited about being able to share them with first grade teachers. “If I was a first grade teacher and able to read this, which isn’t difficult, I would be able to see the growth the child had made. That would be wonderful information to have at the beginning of the year.” The teachers reported a lack of clarity about specific decision rules and noted that it was difficult not having a sense of where the norms were on an on-going basis.

The individuals conducting the trainings voiced that it was important for them to view the graphs regularly in order to compare the children's progress on DIBELS to their performance in the groups. They also thought it was important for them to see DIBELS being administered so that they could hear how the children were performing in a more standardized situation. Their impression of the children's progress was often consistent with performance on the measures.

The teacher evaluations of DIBELS as an assessment tool was overwhelmingly positive. They felt that it was well worth the time it took away from their busy days. They came to believe that the assessment process itself was a teaching tool that helped children develop skills, as it provided them with invaluable information about the growth of their students in their class. The need for other adults in the room during assessments was clearly stated by the teachers and revealed in the number of interruptions that were recorded in the logs. Interruptions are commonplace in a busy classroom of young children. The need for a quiet assessment was also considered an important factor in implementation. The teachers felt that it played a crucial role in the effectiveness of the project; however, a quiet area is not always an easy place to find in an early childhood center.

Evaluating the Curriculum

The curriculum used in the small group training program was judged by both trainers to be easy to prepare and present. There are materials needed for lessons that can be made, purchased, or that are commonly found in a kindergarten classroom. The trainers noted that it would have been helpful to have more of the purchased materials on hand because of time constraints. The trainers both agreed that the materials were

developmentally appropriate and easily modified to meet a range of skill levels. They did note that they would have liked more variety on some of the activities that needed repetition. This was especially true for the phonemic blending and segmenting activities, which the children found initially difficult. They both liked the game-like nature of many of the activities. "It's like a game to them and they get excited."

Both of the trainers were able to see the children in their classrooms and in the small group sessions because of other duties they performed within the school. They both stated that the students were more relaxed participating in the small groups. One of the trainers noted,

I think they are less apt to get lost in the shuffle and the opportunity for practice really seems helpful. They are not afraid to try when there are only a few children with them. They have gotten very comfortable in the groups.

The trainers were both surprised at the progress that the children made. They initially thought some of the lessons would be too difficult, but noted that the program systematically built on skills such as sequencing. This prepared the children to manipulate more abstract levels of sounds as they performed familiar tasks. The trainers also noted that the training needed to take place in an area free from distractions. They agreed that the level of focus many of the children needed to complete these tasks necessitated a quiet area.

The teacher's appraisal of the curriculum they used in the classroom was also positive. In fact, they all concluded that it was superior to the curriculum that has been adopted by the system for kindergarten children. One teacher felt strongly that, "There seems to be no specific reasoning behind when and what is introduced in the current series. *Ladders to Literacy* seemed to draw more out of children and is a much better

reading curriculum.” The other teachers echoed this sentiment and discussed the ease with which the lessons were presented. They also liked the notes to teachers and the breakdown of the skill areas covered in each of the lessons. They all commented on wanting to use the suggestions for home-school connections that are offered for each lesson, but admitted that they had not yet been able to do much with this aspect of the program.

The teachers noted that they saw a real difference in the performance of children in the small groups during literacy based activities in the classroom. The children were often able to point out similarities between activities conducted in the small group and those presented in class. They often informed the teachers of what they had done and offered to show members of their class how to perform a task. One of the teachers commented that, “ I found there was a lot of overlapping (between the two phonological awareness curricula) and the children seemed to be stronger for it.” She also noted that she could see the impact of the growth in their journal writing. “I’m not doing anything else differently, except for the phonemic awareness training, and I can really see a difference in how these children are aware of the sounds in words as they write in their journals.” She also noted that the small group sessions had helped her address the needs of a broad range of students.

I know I couldn’t have given them what they are getting in the small groups. There is just not enough time in our day. I would try though, because I’ve seen what it does for them...maybe during journal time or at a time when the assistant could get involved with the other children.

Both trainers and teachers expressed a strong interest in meeting regularly as a group to discuss and plan curriculum. They all felt that it would be helpful to overlap the presentation of more skills and to coordinate pre-teaching of skills presented in the

classroom. The need for more time and a greater level of communication between service providers often arose in discussions with staff.

The Need for Communication

All of the team members indicated that working together had been helpful and that the project had promoted collegiality. As one teacher noted, "The feedback has been great." Another teacher noted, "working together has been very helpful." However, they all indicated the need for greater communication among one another. They also indicated that time and communication among staff were the most critical aspects of implementation. Teachers wanted more consultation time with specialists to interpret graphs and discuss decisions about children's programming. They also wanted planning time with each other and with the trainers. The trainers wanted time to communicate with the teachers about curriculum and the individual progress of the children. All of the staff thought that more communication with the home was necessary.

The lack of data related to parent-teacher communication about literacy reflects the limited nature of this activity. Teachers send home communications to parents on an intermittent basis. These include monthly letters from teachers and quarterly newsletters from the school at large. These cover various topics, resulting in a limited amount of information about literacy being disseminated. There are three days and two evenings set aside in the year for teachers to schedule conferences with parents. Many parents who work during the day have a difficult time scheduling conferences during work hours. Some have difficulty arranging for childcare in the evening. The teachers have discussed the need to put literacy packets together for parents and to have workshops offered at

different times in order to share information with parents. They also want to provide activities for children during these times so that parents would be able to participate. All of this takes time to plan and resources from administration. This is viewed as a major obstacle in offering these types of services.

Everyone agreed that greater interaction between home and school would serve to facilitate the development of literacy in children. They reported that parents often ask for suggestions on developing literacy skills. The teachers explained that this is often difficult to cover in the twenty-minute sessions they are typically limited to during conferences. The collaborative nature of the project seemed to encourage discussion around the need to communicate with parents. Teachers reported this as the next logical step in a comprehensive literacy program.

Student Responsiveness

An important aspect of evaluating the effectiveness of an instructional program involves reviewing student responsiveness. This was accomplished through observations and interviews. Teachers noted that the children never resisted lining up for their groups or sitting down to be assessed. They usually responded immediately to their teachers' requests to line up. One of the teachers noted that it is often difficult for the children to transition out of center or choice time, but indicated that "they will gladly get up and go to group when called." This was substantiated through observations. The children would even sometimes rush to get in line and were often smiling as they walked with the trainers to their sessions.

Although it sometimes took several minutes to get the children focused in order to begin the lessons, they typically settled in and remained on task. The short length of time that the students had in the groups sometimes limited what could be done, but it was also well suited to keeping their attention. The activities were often presented in a game-like fashion. The children readily clapped out syllables, listened for the sequence of sounds, made new words with sound segments and spoke to each other using “troll talk”. One of the teachers noted, “They have gotten a kick out of it and they are learning.” Several of the children were asked why they liked to go and they related that it was “fun”.

A similar type of response was noted during the assessment activities, although some children were initially apprehensive. After several administrations; however, they appeared more comfortable with the situation. There were never any instances of refusal to participate. Some of the children experiencing difficulty on the tasks would comment that this was hard for them, but they would attempt the tasks with minimal encouragement. Other children would attempt to hover around the teachers as they administered the tasks, asking when it would be their turn. Some children seemed unaware of the timers, while other children would take a deep breath and try to say the letter names as quickly as they could. A few children who had difficulty on the tasks seemed relieved when the timer signaled that they were through. Several children asked for feedback about their performance each week.

One of the teachers described the children who weren’t regularly assessed as “almost begging for a turn”. Several of the children in the class who were only assessed as part of the norming procedures responded to their call to come to DIBELS with a smile accompanied by the comment, “It’s finally our turn.” Some of the children in the local

normative group were initially unsure of the situation, but many of them appeared to enjoy the process. They often remembered the task from the previous administration and answered the sample question as it was being asked. Most of the children readily accompanied the adults to the assessment areas. Other children in their classrooms would approach the examiners and ask if they could come too. Even the teachers who initially seemed apprehensive about having their children participate in the norming procedures relaxed as they observed the children's positive reaction to the process.

Juan's case presented earlier illustrates the impact that an increasing level of success had on some of the children. Initially he was somewhat unsure of himself when performing Onset Recognition Fluency. When the task was presented to him, he would verbalize that it was hard. After responding to an item, he would look up for reassurance from his teacher. He also often said that he liked the letter naming task best and told his teacher that he was good at that. By the end of the program, his attitude in approaching this task was very different. His teacher reported a dramatic change in his demeanor when he was presented with the task. He appeared more confident of his performance and responded at a faster rate. On the day that his class was assessed for the last set of norms, Juan offered to help the children who had been assessed infrequently as part of the norming procedure. He announced to staff members that he could help the other children with segmenting and offered to help administer the assessment. His skill level had increased and he was aware of this fact. His increased confidence may have facilitated his performance. The relationship between his increased confidence and skill level was reciprocal, as is true in so many aspects of learning.

Teachers, trainers, and specialists agreed that the experiences of the children were overwhelmingly positive. They enjoyed going to the sessions, became engaged in the classroom activities, and participated willingly in the assessment process. A view of the student-based activities in the project through their eyes suggests that it was a welcomed opportunity for special attention from adults.

Weighing the Costs and Benefits of Implementation

Staff members became more enthusiastic about the program as they became more involved in the process. They attributed this to the fact that they were able to see the growth of the children in a variety of ways. One of the trainers noted, "I never thought they would get this far, they really surprised me." The other trainer described the program as "very beneficial." When asked about continuing the program, there was a very strong sentiment to do so for next year. A teacher strongly asserted that, "If we let this go we are really doing a disservice to the children." Another commented that it was a real learning experience for her and had shown her how many of the children were very capable of learning tasks that had initially seemed well beyond their capacity. However, most practitioners noted that there had been obstacles to overcome during the process.

Everyone acknowledged that it had not been easy. Learning how to administer the assessments had been somewhat stressful. Trying to make time in their schedule had meant eliminating some valuable activities. Adjusting to the schedule for the sessions represented another new time pressure and proved to be initially confusing. Incorporating the new curriculum into the classroom had taken valuable preparation time. Although

working as a team was helpful and it offered new opportunities for sharing and learning, it also placed increasing demands upon staff members to communicate with one another.

The teachers expressed their concerns that there was still more work to be done. They pointed to the need for more flexibility in the system and noted that children should be able to move in and out of the different levels of interventions at various points in the year. They expressed concerns about developing clearer guidelines regarding when and if changes in curriculum should be made. They recognized the need for a stronger home-school connection. They commented about the need to share this information with receiving teachers and questioned the type of format that would be best. They indicated their readiness to continue and expand the program because they believe it was successful in developing important skills for children. However, they stated that it would be difficult without continued support from the trainers and specialists.

The teachers noted that without the trainers, it would have been difficult to meet the needs of the children, given their wide range of skills. They noted that they were able to present activities for some of the higher level children, because they were not feeling as pressured to provide the intensive work that the neediest students were receiving in the small group sessions. Thus, this model helped the teachers meet the needs of all students. The teachers noted that they would attempt delivering the small group sessions by themselves if the additional support was not available because of the benefits it had for the children. However, they noted that it would probably not be as systematic or effective because of the constraints of a half-day program.

CHAPTER V

DISCUSSION

This study has employed a variety of techniques to investigate the feasibility of linking formative assessment with early literacy training. An analysis of the research findings is presented in this chapter. Judging the value of a program includes the consideration of its effect on students and the examination of obstacles faced by individuals responsible for implementation. This investigation has attempted to address both of these issues. Interpretations are discussed using questions posed earlier as a framework. Limitations posed by the design of the study and the nature of the data are considered. Implications for the practitioner are highlighted throughout the discussion and recommendations for future studies are offered.

Is the Model Effective in Developing the Early Literacy Skills of Participants in the Study?

What Do the Numbers Tell Us?

The question at hand involves the effectiveness of the model in improving the early literacy skills of children in the study. The students in the intervention group were exposed to the general kindergarten curriculum and received training in phonemic awareness using research-based curriculum. They were also carefully monitored using curriculum-based measures targeting important early literacy skills. The comparison group was exposed only to the general curriculum and was administered DIBELS at three points during the study.

A review of the descriptive and inferential statistics presented in the previous chapter suggests that the program presented to the intervention group was more effective

in developing phonemic awareness skills than the general curriculum presented to the local normative group. Roughly 35% (30) of the students in the local normative group scored within a range that falls within or beyond the benchmark for Onset Recognition Fluency by the end of the project. Approximately 56% (35) of the students from the intervention group met that same benchmark at the end of the study. Sixteen children from the local normative group continued to perform within a range indicating a random response set at the end of the project. Only 5 children from the intervention classes scored within that range. Only 3 of the 84 students from the local normative group had arrived at the benchmark for Phonemic Segmentation Fluency at the conclusion of the project and the majority of them (43) were functioning at a very low level of performance. However, 18 of the 62 students from the intervention group arrived at the benchmark with almost two months of instructional time left in the school year. Only 14 of those 62 students were functioning at a low level. Considering the strong relationship between phonemic awareness skills and reading that was discussed in the literature review, the intervention group appears better prepared to meet the demands of formal reading instruction.

Results of the repeated-measures ANOVA indicate the difference between the means over time is significant by group on Onset Recognition Fluency and Phonemic Segmentation Fluency. This is true when the larger groups and the groups representing the lowest quartiles are compared. The local normative and intervention groups differed dramatically in growth on phonemic awareness tasks. The results indicate powerful effects for the intervention in improving performance on phonemic awareness tasks. This indicates that the model linking formative assessment and phonemic awareness training was more effective in building phonemic awareness skills than the current program used

in the school system's general kindergarten classrooms. Many children in the intervention group who initially scored low on these tasks reached or surpassed the median of the local normative group.

The descriptive statistics do not reveal any clear differences in regards to the performance of children in the groups on Letter Naming Fluency. There is no firm benchmark that has been reported in the literature for this measure. However, Koehler (1996) reports preliminary evidence indicating a significant relationship between reading skills and performance on this task up to a threshold of 38-42 letters per minute.

The local normative group began the project with a wide range of skills. Twelve of the 84 students were performing at or beyond a rate of 30 letters per minute when the project began. Thirty-eight of them scored below five letters or less. At the end of the project, 47 were performing at 30 letters per minute or higher, yet six were still identifying five letters or less per minute. This demonstrates overall growth as a group and variable individual growth.

The intervention classes appeared to have a greater percentage of students with low skills in this area. Initially, only 1 of the 62 students scored at or above 30 letters per minute. Forty-six of the 62 children identified five letters or less per minute. At the end of the project 21 of the students identified 30 letters or more per minute. Eleven identified five letters or less per minute. Again, this demonstrates overall growth as a group and limited growth for some of the students.

Results of the repeated measures ANOVA indicate no significant differences found in growth when comparisons were conducted for Letter Naming Fluency by group. This suggests that the instructional programs did not differ in their effectiveness at

teaching letter identification skills. It should be noted that the small group training did not begin to incorporate printed symbols into its lessons until the last two weeks of training. The teachers in the intervention classes focused on the phonemic awareness activities in *Ladders to Literacy* and generally used materials from the general reading series for their letter identification lessons. This resulted in very similar letter identification instruction for both groups of children. Thus, the lack of differentiation between the groups is not surprising.

Although the intervention was highly effective in teaching phonemic awareness skills to the group as a whole, the limited growth made by children like Erica indicates the effectiveness of the program was variable when individual response to intervention is considered. The lack of individual growth in phonemic awareness skills within the intervention groups is revealed in looking at the distribution of scores on the posttest measures and in examining the differences in slope between children. The progress of many children in the study indicates that phonemic awareness is a teachable skill and there are many experimental studies that have demonstrated the effect teaching this skill has on reading. However, the curricula used in the study were not effective for all children. Erica's case illustrates the lack of response to intervention that occurred in a small group of children. Thus, more explicit programs will need to be utilized to teach phonemic awareness to a relatively small number of children.

The low performance on Letter Naming Fluency demonstrated by some students in both the intervention and local normative groups indicates that the current instructional methods used to teach letter identification skills to students does not meet the needs of some children. Many students did make progress in letter identification skills over the

course of the project. However, the data indicates there is a need to find a more effective means of teaching some students this skill. Andrew's case also points to the powerful effects that parents can have in teaching this and certainly other early literacy skills. His case has implications for schools to develop strong home-based literacy components in their curriculum.

What Do the Participants Tell Us?

The teachers' judgements should also be considered in the determination of program effectiveness. They noticed a significant difference in the children's performance on other tasks such as journal writing, which they attributed to the effects of the training. This is consistent with results from the clinical trials conducted by Ball and Blachman (1991) that found significant effects on invented spelling tasks when children were provided with systematic instruction in phonemic awareness. This needs to be substantiated with tangible data, but the teachers have years of experience behind them to make this type of an evaluation. Their judgement should not be discounted by the lack of hard numerical data. Instead, it should be viewed as a source of initial support that requires further validation.

The overall judgement of effectiveness by the staff members involved in the process was very positive. They were surprised by the level of growth they witnessed in many of the children. Their growth taught the teachers about the type of activities and the level of child involvement needed to produce these results. This data also emphasizes the need for a general and systematic phonemic awareness curriculum in the classrooms.

The reactions of the children showed the staff that this type of instruction is developmentally appropriate and effective at the same time. Both curricula presented activities that systematically built an awareness of very abstract units of sound. The children had fun and were not stigmatized by getting special attention. Their behaviors indicated that they enjoyed the process. This is a very real benefit of an early intervention model. It does not wait for children to fall behind and then notice that they need help because of weaknesses.

The improvement of the children has sparked a great deal of interest from system administrators who are ready to allocate additional resources to expand this model for the upcoming school year. Although violations created by the lack of random assignment remain a critical flaw of this study, administrators recognize that the number of students who developed critical skills was significant. Faced with educational mandates that raise performance standards for all children, this early intervention model is seen as a wise investment.

Is it Feasible to Administer DIBELS in a Diverse Urban School System?

This question is one that is best addressed by the qualitative data. The word feasible is defined as “capable of being done”. The staff members who participated in this project are best able to address the manageability of the process and to report what is needed to make its implementation practical. A review of the teachers’ comments indicates that time is a critical factor in the data collection. Other issues related to space, support from personnel, and need for collaboration were also raised by the practitioners in this study. The teachers viewed these as obstacles that needed to be overcome. The

level of administrative support and time needed for organizing activities was considered substantial and should not be underestimated by systems trying to implement this model. Teachers are often restricted by schedules and mandates imposed by agencies and individuals unaware of many of the realities faced within the classroom. Support is needed on many different levels. This ranges from allocation of monies to cover the cost of substitutes for local norming procedures to access to a copy machine for copying the probes.

The teachers readily acknowledged that factors such as level of support in the room and time play an important role in being able to conduct the actual assessments. Additional adults are needed to reduce the number of interruptions from other students and staff while conducting the assessments. The actual time that is needed to conduct the measures depends on the number of probes administered. Teachers judged that it took between four to seven minutes to administer the three sets of probes to each child. They noted that the assessments themselves were easily administered once they had been properly trained. Time needs to be allocated for training teachers to use the measures. This includes practicing administration procedures and meeting to discuss scoring questions that arise. It also includes time to graph charts and interpret data. Graphing the data was judged to be a relatively simple task, but again it took time. Specialists also need to allocate time to collaborate in this process. They are needed to help plan activities, collect and interpret data, and generate possible solutions when strategies need to be modified. They can also be valuable resources for materials. Speech and language pathologists in particular have expertise in phonological awareness. This model involves a team of individuals working collaboratively. The process itself creates new demands for

communication, which require time and commitment. Practitioners should be aware that data collection is manageable only when a teacher has the support of the administrator, who allocates the resources and prepares the schedules, and the commitment of other staff members to collaborate in the process.

The teachers judged the process of administration to be well worth the time needed to complete the process. They also raised several important points in their comments. First, they felt that the process of administration served as a teaching tool to help children develop phonemic awareness. Although this serves as a confounding variable in the design of the study, it is a plus for practitioners because meaningless assessments often squander valuable teaching time. Secondly, they felt that it presented an opportunity to become better acquainted with their students. These factors played a significant role in their evaluation of the manageability of the process. Because administration of the probes served several purposes, the process was not viewed as deducting from instructional time.

Are the Measures from DIBELS Useful in Identifying Students Who Would Benefit from Additional Programming and in Monitoring Their Progress?

The question of usefulness relates to purpose. Are the measures functional in how they identify students in need of programming and are they effective in monitoring their progress over time? How do they align with other measures currently used? Do they compliment current assessments or are they redundant and therefore not needed? These questions are best addressed through a review of both the quantitative and qualitative data.

What Do the Numbers Tell Us?

The question regarding usefulness of the measures can be examined through determining their accuracy in identifying children in need of direct instruction, their sensitivity to growth in skills, and their redundancy with other measures of growth used by the teachers. Figures 1 through 6 depict the distribution of scores for all of the DIBELS measures. The skewed nature of the data on the initial administrations of Onset Recognition Fluency and Phonemic Segmentation Fluency indicate floor effects for these measures. This suggests that they were not as sensitive to a broad range of skills as one would have hoped. The lack of differentiation of children at the lower end of the distribution suggests an easier task may be more suitable when identifying children who need a high level of teacher directed instruction early in the year. This is important for curriculum planning and if teachers have limited resources. It also indicates that other factors should be considered as they make decisions. Performance on other measures such as Letter Naming Fluency and input from other sources of information (i.e., specialists working with children, family and developmental histories, and teacher observations) are important in identifying children at risk.

The high number of children who had low scores on Onset Recognition Fluency points to the arbitrariness of choosing a cut-off score at the 25th percentile. The data suggests that at least 40% of children scored within a range that could be considered random. Thus, procedures need to be implemented to prevent children with limited skills from being missed because of arbitrary cut-off points. Any child responding at a level that is random on the probes should be earmarked for additional screening at designated intervals that are reasonable for teachers and educationally sound for children. The large

number of children scoring at this level also sends a strong message to teachers about the need to introduce phonemic awareness activities into the curriculum early in the year.

The change in slope depicted in the individual case studies and in the mean slopes presented in that discussion indicate that DIBELS measures were sensitive to change in skills. This is also evident in reviewing the distribution of scores depicted in Figures 1 through 6 and in looking at the measures of central tendency contained in Tables 7 through 9. The effects found in the ANOVA also indicate sensitivity of the measures.

A review of the relationship of DIBELS to existing measures used by teachers indicates that performance on the untimed letter identification task and Letter Naming Fluency is highly related. The correlations fall between .63 and .85. However, they do not appear to be redundant. The untimed task is a systematic means by which teachers can determine which letters may need emphasis for a particular child or for the class at large. The random nature of the probes on Letter Naming Fluency does not facilitate systematic error analysis. However, performance on Letter Naming Fluency provides a measure of the rate of access to these names. Both yield valuable information for teachers. Letter Naming Fluency enables teachers to obtain information efficiently and to compare it to other important skill areas on a regular basis. This enables teachers to make changes in instruction before children fall too far behind their peers.

A question related to redundancy involves the determination of whether or not it is necessary to overlap the administration of the phonemic awareness tasks. The differences between some of the children's rate of growth on the two phonemic awareness tasks supports the theory that phonological awareness has multiple dimensions. It suggests there may be a benefit to overlapping the administration of these

measures for at least a period of time and illustrates the variations in performance that may be due to differences in the cognitive demands of the tasks. This is consistent with recommendations made by Yopp (1988) to administer two phonemic awareness tasks in order to improve the reliability of measures. Phonemic segmentation is thought to be a more difficult task than the identification of initial sounds in words and has been found to have a stronger correlation with reading achievement (Adams, 1990; Kaminski & Good, 1996; Stanovich, Cunningham, & Cramer, 1984). At this point, one can only speculate as to how the differences in the cognitive demands of the tasks influenced the little boy known as Juan in the case study. However, his case indicates the need to consider that performance on these tasks may be impacted by learning two languages simultaneously.

A note of caution is warranted when discussing the relationships among the various measures. Floor and ceiling effects suggest that the scores were not differentiated enough at the time they were measured. This may have served to reduce the coefficient of correlations. This may have occurred for several of the other measures. For example, color identification scores demonstrated ceiling effects, while floor effects were found on the Onset Recognition Fluency and Phonemic Segmentation Fluency when they were first administered. There is little correlation between performance on Onset Recognition Fluency and Phonemic Segmentation Fluency until the final administrations of each measure. The increase in the coefficients may reflect the changes in the distribution of those measures rather than a strengthening of the relationship.

A point worth noting when examining the appropriate use of measures is illustrated in examining the distribution of scores on the color identification task. If the majority of children enter kindergarten with color identification skills, knowledge of

colors is not a good measure for assessing growth for the population at large. However, it is a good indicator of whether or not a child may be at risk for learning difficulties. Teachers often indicate that they use this as a measure of growth over the year. In fact, all children are assessed at three points during the year. The data from September reveals ceiling effects for this assessment. It would seem more efficient to use it as a one time screening tool and then only monitor those children who do not demonstrate mastery of the task at the beginning of the school year. This would allow teachers to spend time conducting more meaningful assessments.

Another point worth noting involves the lack of any significant relationship between age and performance on any of the measures. Inferences that can be made about this are limited by the restricted age of the children in the study. The lack of correlation does not mean that age in general is not related to performance on the tasks; however, it does suggest that age does little to differentiate performance on these tasks (Hinkle, Wiersma, & Jurs, 1988). This is important to consider because teachers often cite age to explain a child's lack of progress. This often results in the retention of children in kindergarten or transitional programs. The lack of differentiation seems to support research cited earlier in the paper regarding the lack of substantial evidence for a maturational view of reading readiness. It emphasizes the need to deliver more effective programming to students in a timely manner, rather than rely on educational solutions based on false assumptions.

What Do the Participants Tell Us?

The teachers' responses throughout the qualitative study validated the usefulness of the measures. The differences demonstrated by individual children in the development of their letter naming versus the development of phonemic awareness skills emphasize the need for careful assessment in a variety of skill areas to determine readiness for reading instruction. The teachers felt that the phonemic tasks added an important element to their assessment process that had been missing up to this point. They also reported that the letter naming task was very helpful in providing information regarding the fluency of this skill. The assessments were described as both useful and efficient. One teacher noted that the process of administration helped her to develop new ways of teaching these abstract concepts to children. The lack of differentiation on the initial administrations of the phonemic awareness tasks did impede the teachers' ability to decide which children needed supplemental programming early in the year. However, this information was also helpful in pointing out the need for systematic instruction in these skills.

The monitoring phase of the project involved plotting the progress of each student on a graph. All of the staff members indicated that the visual analysis of growth on the charts was helpful in guiding curriculum and in communicating about specific children in their discussions with parents, specialists, and first grade teachers. Teachers found this process very worthwhile and reported that it provided them with a much better sense of the progress that each child had made throughout the year.

A point raised by one of the teachers that should be noted relates to those children who entered kindergarten knowing all of upper and lowercase letters and to the 25 children in January who could do the same. These children's skills do not indicate that

they need close monitoring; however, the teacher felt that assessment with letter naming fluency may be an appropriate way to assess further growth in letter identification. An example of one child's data indicates that upon entrance to kindergarten she knew all of her letters in both cases. Her initial score on Letter Naming Fluency was 43 letters per minute. Her score at the midpoint was 50 letters per minute and her final assessment fell at 66 letters per minute. This provided an opportunity for her teacher to demonstrate continued growth in this area that could not have been documented through untimed measures. A more appropriate measure of progress for a child demonstrating a high level of literacy in kindergarten might include progress in sound symbol correspondence, which is another measure included in the DIBELS battery usually recommended for first grade children. As mentioned earlier, Koehler (1996) has proposed that performance on Letter Naming Fluency beyond a threshold of 38 to 42 letters per minute does not significantly effect performance on decoding skills. Thus, a more meaningful assessment would target the next step in reading acquisition.

It should be noted that student responsiveness to the assessment procedure suggests the children enjoyed the attention that this opportunity offered them. This one-on-one attention resulted in an increase in the knowledge that teachers held about each child. This was considered a very positive outcome of the study by all of the staff members.

Clearly, no one assessment can offer all of the information a teacher needs to make informed decisions. Data from DIBELS needs to be integrated with information regarding family and developmental histories, level of language proficiency, qualitative observations of skilled practitioners and classroom performance. Specialists working with

children also serve as valuable sources of information in the identification process.

Teachers may want to reassess children they feel may have been guessing on the first set of probes, even if their scores fall somewhat above the median. A child who is overly cautious when faced with tasks for the first time may earn a deflated score if they are discontinued because of response rate. This occurred with two of the children who were discontinued after baseline. The existence of many alternative forms and the fast rate of administration allows staff the opportunity to obtain repeated-measures without taking an inordinate amount of time from instruction.

How Feasible is the Integration of the Phonemic Awareness Training Programs into the Current Early Literacy Curriculum?

Again, the feasibility of a process relates to the question of if it can be realistically accomplished. This questions relates to the manageability of the lessons within each of the curricula, the process of integration into the general curriculum, the level of support needed, and its ability to meet a wide range of skill levels. These questions are readily addressed through the qualitative data.

The integration of the training programs into the general literacy program occurred at two levels. At the first level, the teachers integrated lessons from *Ladders to Literacy* into their own classrooms. The teachers reported that this curriculum was easily adapted into their lessons. They liked the format used to present the lessons and reported that it provided them with a useful framework that is absent in the general curriculum planning guides. The teachers actually reported to prefer this curriculum to the one that was adopted for general use within the system. They did not feel that additional support was needed to implement the lessons from this curriculum, but noted that the elimination

of the computer time was necessary to make room for these activities in their busy schedules. The modifications provided for various skill levels assisted them as they tried to design activities that would meet the needs of all children. However, they realized that they would need assistance in instructing students who needed a high level of teacher directed support. The decision to provide additional intervention at a more intensive level was based on the high number of students who demonstrated a high level of need for practice in the skills they were being asked to learn. However, delivering this type of format to students in classrooms is difficult because of the time constraints posed by a half-day program and the need to address a broad range of skill areas in the daily curriculum. The teachers felt that the small group model may be able to be implemented in a full-day kindergarten program if it could be designed at a time that was relatively quiet in the classroom. However, they noted that additional support would probably be needed to prevent interruptions in the lessons.

The curriculum delivered in small groups, *Phonemic Awareness in Young Children*, was targeted for the children who demonstrated the lowest level of skills in phonemic awareness and letter naming skills. This program was well suited for small group lessons. The paraprofessionals delivering the curriculum rated the lessons as well organized and easy to present. They noted that the game-like format of the lessons was very appealing to students. They emphasized the value of the sequence of skills presented in the curriculum and felt that this provided mediated scaffolding for children needing more explicit instruction in phonemic awareness. They noted that the high level of individual practice and the immediate feedback made possible in a small group format provided students with the opportunity to develop proficiency in these abstract concepts.

The paraprofessionals realized early on that they would need a quiet place to implement the program because of the level of focus needed for the children to complete the activities and the variable attention span of young children. This created demands for space and the rescheduling of activities to create the availability of the existing staff. Thus, it meant a high level of support on the administration level.

Although the use of a pullout model necessitates a high level of support from personnel, it provides an effective method of reaching a wide range of students. The availability of the small group sessions assisted the teachers in meeting a wide range of skill levels in their classrooms. They observed that the students working in the groups were better prepared for the activities they introduced in circle. They felt this reduced the time they needed to allocate for practice in the large groups and provided for a higher level of feedback to the students than they could provide during the large group sessions. All of the staff members reported that the pullout method was effective in providing individualized instruction for most of the children with limited entrance skills. However, they also noted that the lack of progress of demonstrated by some students indicates even more explicit approaches to building phonemic awareness skills are needed.

Is the Model Useful in Guiding Teachers as They Make Curriculum Decisions?

The teachers reported that the model of linking formative assessment with researched-based training programs was very useful in helping them to make decisions about their own curriculum. It provided them with systematic feedback regarding the progress that children were making in important skills. They were able to adjust their lessons accordingly and in a timely manner. They also felt that the data depicted in the

charts was helpful in communicating with parents and staff. In addition, they noted that the data substantiated the need for a broader range of instructional alternatives. A review of several children included in the case studies illustrates this issue.

The lack of growth in skills demonstrated by children like Erica, who made limited progress, demonstrates the need for classrooms to offer different levels of instruction. Erica should have been provided with a more explicit approach as her lack of growth became apparent to the staff. However, a lack of resources limited the scope of this project. Erica's lack of substantial progress illustrates the need for educational systems to offer an array of programs early on to ensure that children like her do not encounter continued failure on such critical skills.

Bob's lack of progress on the three sets of classroom norms also suggests that the system needs to have flexibility in when it identifies children in need of programming and in how it implements appropriate instruction. Because there were so many children in need at the beginning of the year, Bob was not followed during baseline. His low performance on Onset Recognition Fluency midway through the year indicates that the large group activities were not explicit enough for him to develop these skills. Thus, his instruction needed to become more teacher directed and he should have been provided with more sustained opportunities for practice. To be effective for all students and useful for practitioners, formative assessment needs to be supported by flexible and responsive instruction.

Schedules need to remain flexible so students can receive appropriate instruction when the need arises. This may involve accepting new students into the small group work at various points in the training or intensifying instruction for students who are not

responding to a specific intervention. Classrooms need to offer a progressive set of instructional programs for children ranging from student directed activities to very systematic and explicit teacher directed programs of instruction (Kaminski & Good, 1998).

Erica's case demonstrates the diagnostic value of providing structured intervention early on in a child's education. Response to intervention can provide the type of diagnostic information necessary in differentiating a child with a serious learning problem from one who lacks the experiences critical to literacy development (Vellutino, Scanlon, & Sipay, 1997). Careful monitoring of young children coupled with appropriate intervention strategies can aid in the diagnosis of a serious learning problem early on in a child's schooling. Use of DIBELS linked with the small group instruction assisted the teachers in this project as they decided who should be referred for more comprehensive evaluations.

The message in the variability of response to intervention is clear. No one instructional program can be effective for all children. Systems cannot adopt a single program of instruction and expect that it will work for all children. Systems need to have a spectrum of services available to ensure that no children are left behind struggling. A means of evaluating when there is a need to change paths is crucial. The reality is that many children begin kindergarten with low levels of literacy skills, and they are able to master these skills with varying levels of intervention.

The next step for the individuals in this study is the establishment of a clear set of rules for when children should receive more intensive instruction and when the classroom is adequately meeting their needs. The set of local norms that have been collected can

assist the practitioners to determine these guidelines. Strict decision rules should be used when determining these guidelines for students receiving special education services (Kaminski & Good, 1998; Shinn, 1995). Use of this model in an early intervention approach affords practitioners with more flexibility. However, Erica's lack of progress and Elizabeth's early and dramatic response to intervention illustrate the need to have more defined guidelines. Although the level of support Elizabeth received in the small group setting did not pose any restrictions for her, she may not have needed the explicit programming offered through this approach. She enjoyed the sessions and was often the first child to line up at the door when her teacher announced it was time to get ready for group. However, limitations in the resources of the school should be considered when making programmatic decisions. This becomes a critical issue when one child's participation in a program eliminates opportunities for another child. It is a dilemma that many educators are often faced with in their work.

The difference between the benchmarks proposed by the developer and the average performance of children in this study may reflect differences in the make up of the students studied. However, it suggests the need for the school system to carefully review the adequacy of its general curriculum. The local norms collected for this study may not be appropriate for setting standards of performance if the majority of children are not performing at levels adequate to support literacy development. Children's progress should be compared to both local standards and benchmarks based on the research. Aim lines should be developed and children's progress should be evaluated according to how close their performance falls within the expected levels. Timeframes should be established for making decisions that coincide with the availability of new

intervention strategies. This may involve seeking assistance from specialists, obtaining new materials for instruction, and allocating more time for sustained practice. These are resources that often involve the support of administrators. This type of change cannot be successfully implemented by teachers working in isolation.

There were a substantial number of children in the project who demonstrated difficulty learning letter identification skills. The classrooms offered rich literacy environments and the teachers provided daily instruction in letter names. The difficulty that some children encounter in learning letter names points to the need for a program of instruction that is more explicit and provides more practice in these skills than the curriculum that is currently available in the classrooms. Keeping in mind that children who experience difficulties learning the names of letters may need an approach that focuses on the sound versus the name of the letter (Adams, 1990), the practitioners involved in this study are in the process of evaluating alternative methods for teaching this skill. They are also exploring the development of a project aimed at improving the home-school connection. Andrew's case illustrates that a valuable source of instruction lies beyond the walls of the school. Parents need to be acknowledged for the role they play in their children's learning and provided with effective tools as they work to develop literacy skills at home.

The model of linking formative assessment procedures with research-based training programs was rated highly by the teachers because it provided an efficient means of obtaining meaningful data. At the same time, it revealed the need for a wider range of instructional programs to meet the needs of a diverse set of students. Thus, more relevant and effective assessments can help teachers evaluate the efficacy of programs and lead to

more appropriate instructional practices. However, the level of change needed to successfully implement this model extends beyond the walls of any one classroom. An important factor in determining its usefulness lies in the degree of support offered by administration.

Limitations of the Study

There are inherent flaws in the design utilized by this study. Students in the intervention were an intact group (class) which is a reality often faced by educators working in the field. Random assignment is often not feasible in the field, yet this poses threats to both the internal and external validity of the study that need to be acknowledged. Gall, Borg and Gall (1996) note that the non-equivalent control group design is the most widely used quasi-experimental design in educational research. However, it cannot provide definitive answers about the effectiveness of the programs. Lack of random assignment leads to violations of independence that are critical assumptions in conducting ANOVA's. Violations of assumptions can lead to overestimating the effect of an intervention, particularly when the sample sizes are unequal (Hinkle, Wiersma, & Jurs, 1988).

Repeated-measures designs involve assumptions of normality and homogeneity of variance, like other ANOVA's. The unbalanced numbers within the groups create difficulties in the technical adequacy of the comparisons. ANOVA is "robust with respect to violations of the assumptions, except in the case of unequal variances with unequal sample sizes" (Hinkle, Wiersma, & Jurs, 1988, p. 348). The repeated-measures design also requires that the correlations among the repeated-measures are constant (Howell,

1995). Mauchley's sphericity test was used to check for the covariance of the groups. Because sphericity could not be assumed, more conservative procedures were utilized in the analysis. Results of both the Greenhouse-Geisser and the Huynh-Feldt procedures resulted in powerful effects for the intervention. However, the use of these procedures do not address the issue of independence. Children were not randomly assigned to the classes, thus, there may have been preexisting differences between the groups.

Additional data points would have allowed a comparison of differences in growth rates between the groups using hierarchical linear models. Bryk and Raudenbush (1987) note that traditional measures of comparison between pre and posttests are not adequate in measuring rate of change. The three sets of scores obtained through the local norming were not sufficient to conduct this type of an analysis. Additional data points for the local normative group would have allowed for a comparison of slopes between the groups. It would also have provided more definitive information regarding the effect of assessment on the growth of skills. However, the limited resources in this study did not allow for this type of an analysis.

There were many confounding variables that pose a threat to the internal validity of this study. The teachers may have emphasized literacy more in their curriculum than other teachers. The fact that the three teachers participating in the study volunteered suggests they may be more invested in early literacy. They may spend more time on activities that foster its development. This poses a major threat to the validity of the study and limits the generalizations that can be made between the comparison of the various groups. Their willingness to participate and interest in early literacy may also limit the generalizations that can be made from the qualitative data. They may have been more

tolerant of the issues that arose in implementation and may have been less likely to criticize the process. This was discussed with them as the qualitative data was collected.

There may have been differences between the teachers in the study. However, the decision not to examine the effect of teacher on outcome was a deliberate one to preserve the collaborative nature of the study. Attempts were not made to factor out the effect that assessment itself had on outcome. This was not felt to be a pertinent question to the study. However, it is a relevant issue and a variable that needs to be mentioned.

The instrumentation utilized in the study may also have impacted on the internal validity of the study. The sensitivity of the measures to growth in skills were examined. Floor effects found for Onset Recognition Fluency at the beginning of kindergarten and mid-year in Phonemic Segmentation Fluency limit the sensitivity of the measures to be studied and the types of analyses that can be completed with the data. Instability of the measures themselves impact the internal validity of the results. More data points for all participants would have allowed for a closer look at this variable; however, the constraints of time and limited resources were realities that had to be managed.

Although these measures are easily administered, errors in administration may occur. To control for this systematic training occurred and response sheets were reviewed for accuracy in scoring. However, measures of interrater reliability were not completed because of limitations in the amount of training time allotted to the project and limits in personnel. The absence of interrater reliability poses a threat to the validity of the study, but also reflects what occurs in the field. In an effort to control for this type of error, teams of individuals worked together and were rotated during the collection of local

norms. They consulted with one another and with the researcher when procedural questions arose.

Other teachers within the system have become more aware of the importance of phonemic awareness training since the reasoning behind collecting local norms with DIBELS was presented to them. As a result, some of the teachers have incorporated more activities such as rhyming into their curriculum. The current reading system offers activities aimed at developing phonemic awareness. Although it does not present these skills in the type of systematic manner included in the research-based training programs, this may have limited the effects of the treatment.

Random assignment of students to experimental and control conditions and controlling for confounding variables such as instructional content and staff contact would have greatly contributed to the validity of the study. However, there have been many studies on this topic that have utilized these methods. As mentioned earlier, the effectiveness of early phonemic awareness training has been well established in the literature (Blachman, Ball, Black, & Tangel, 1994; Foorman, Francis, Beeler, Winkates, & Fletcher, 1997; O'Connor, Jenkins, & Slocum, 1995; Torgesen, Wagner, & Rosette, 1994). Although the presence of confounding variables significantly limits the comparison of the groups within the study, this quasi-experimental model is often the only type of research that educators and administrators can conduct to evaluate program effectiveness.

The random sampling procedure used in collecting the local normative data was an attempt to ensure the representativeness of the local norming group. The use of the local norming group as a means of comparison to the training groups represents an

attempt to control for maturational factors. Without this comparison group, there would be no way of knowing if changes in skills were due solely to changes in maturation and/or the result of the reading curriculum that is currently being used.

The feasibility of linking formative assessment and research-based curriculum as a supplement to existing curriculum and evaluation methods involves weighing the costs of implementing such a program with the benefits that result from its implementation. Certainly, student performance was a critical component of this study. The time series analyses of children with low levels of skills provided teachers with the ability to systematically assess the rate of progress of their students. In this process, individual changes were not formally compared to the rates of growth in other children. These types of analyses were not impacted by the types of confounding variables that effect group comparisons, but they are less generalizable.

The teachers' evaluations of the individual data made available through DIBELS and its effectiveness in tracking growth was the critical component of this study. Bloor (1983) asserts that recognition and acceptance of qualitative research findings by those who have been involved in a study serves as a means of validation. He also describes the difficulties in validating findings that can occur because members of a study are unwilling to confront differences of opinion and agree with the findings as a means of seeking consensus. In order to prevent this from occurring, teachers were encouraged to offer differences in interpretation and opinion as they reviewed the themes and categories that emerged from the data. However, any reluctance on their part to do so could have presented as a limitation to this study. My own subjectivity could also have served as a

factor with the potential to shape the outcome of the study. As stated previously, efforts were made to consciously monitor this.

The goal of this project was to assist the practitioners involved in the study to determine the feasibility of using specific methods to improve the early literacy skills of students. Their evaluation of its effectiveness was the determining factor in adopting these methods for the upcoming school year. This study was implemented as a form of action research and may not be generalized beyond the school system that was studied. However, this may be the type of research that will lead to change within the field.

Recommendations for Future Studies

There are several areas of research that need to be addressed within the current system and other questions that need to be addressed through further research in the field. The school system that has been studied needs to examine the long term effects of this program by continuing to follow the children into first grade. The question of effectiveness ultimately needs to address whether or not the model has an impact upon children's reading acquisition. There will be many confounding variables involved in this type of analysis, such as the type of instruction they receive in first grade. However, this question needs to be addressed for the long term effectiveness of the program to be evaluated. In addition, the system must continue to examine children's response to intervention as more kindergarten classrooms adopt this model. This will assist teachers in making decisions about interventions within a local context. Feasibility issues also continue to need monitoring as the model expands to other classrooms. Increased

demands on specialists and resources such as space may seriously affect the integrity of the programs.

Additional research needs to be conducted to investigate the predictive validity of measures included in DIBELS. The predictive validity of phonemic awareness tasks to reading acquisition has been well validated in the field (Smith, Simmons, & Kameenui, 1995). However, the question of how accurately these specific measures predict reading acquisition skills has not been fully investigated (Kaminski, 1992). In addition, preliminary benchmarks established by the developers need to be more fully investigated to determine if they accurately represent levels of achievement needed to develop proficiency in early reading. The development of new measures should also be explored in an attempt to eliminate the floor effects found at the beginning of the year on Onset Recognition Fluency and mid-year on Phonemic Segmentation Fluency. Development of a task that would measure earlier developing phonological skills may help to differentiate lower performing children at the beginning of the year.

Research aimed at exploring the effect second language acquisition has on the development of phonemic awareness skills is needed. This needs to be evaluated in light of both the strengths and weaknesses children learning two languages simultaneously may bring to the learning process. This needs to be investigated in relation to the cognitive demands of the tasks used to measure this multidimensional skill and in regards to the need for differences in instructional strategies. Research has shown that these children are at great risk of encountering difficulties as they learn to read (Snow, Burns, & Griffin, 1998). However, the investigation of the specific linguistic skills these students may have developed in coding two languages has not been explored. This type

of research could lead to the development of teaching strategies that capitalize on these skills, leading to more effective instruction. Changing demographics indicate that schools are responsible for educating a greater number of dual language learners (Carnegie Corporation of New York, 1996). This area of research is imperative because no children can be overlooked in the endeavor to improve reading outcomes.

Research is also needed to determine appropriate instructional strategies for building letter identification and fluency skills. This study improved phonemic awareness skills in many children. However, children like Erica did not respond to the interventions provided in the small group work and in the classroom. As mentioned earlier, Wolf (1997) notes that those children who are most resistant to change seem to have both difficulties with phonological awareness and rapid naming skills. Erica's lack of progress in the program, suggests she may be a child who has difficulties in both areas and will need intensive programming to learn. Further research needs to address the needs of these children.

The efficacy of teaching letter naming skills is an area of research that warrants special attention (Koehler, 1995). The questions that need to be asked involve whether or not building fluency in letter naming is feasible and if it is an effective intervention. Does limited fluency reflect an inherent deficit in phonological coding? Is it a skill that can be learned? What strategies are most effective in building this skill? What is the level of fluency that is prerequisite for adequate reading skills? These questions are complex in nature and are beyond the scope of practitioners working in the field. They involve longitudinal and clinical studies conducted by researchers. However, the ultimate test of

the relevance of their research can only be answered in the field through the expertise of skilled practitioners.

Summary and Conclusion

This study was an attempt to link both assessment practices with curriculum and research with practice. The need to bridge the gap between research and practice can be found in the high number of children demonstrating limited reading proficiency, despite the significant degree of research related to developing early literacy skills. A review of the literature indicates that researchers have identified phonemic awareness as a critical skill that when taught at an early age can significantly improve reading outcomes (Adams, Foorman, Lundberg, & Beeler, 1998; Blachman, Ball, Black, & Tangel, 1994; Wagner & Roshette, 1994; Smith, Simmons, & Kameenui, 1995). Yet, these skills are often not presented in a systematic fashion in early literacy programs. Until recently, research-based training programs to address phonemic awareness have not been readily available to practitioners. In addition, time consuming assessments used in research projects have not been pragmatic for use in the field. Curriculum-based measures aimed at targeting important early literacy skills offer teachers an opportunity to evaluate phonemic awareness and monitor student progress in an efficient manner. This study utilized a model linking curriculum-based measures with research-based curriculum aimed at improving phonemic awareness. It employed both quantitative and qualitative methodologies to address questions related to the effectiveness and feasibility of this model when used in a diverse urban school system. It focused on the documentation of issues faced by practitioners as they implement a comprehensive early literacy program. Specific questions addressed issues related to the manageability of data collection, the

usefulness of assessment results for practitioners, and the feasibility of program implementation. This type of feasibility study is not present in the literature, but it is a critical element that has the potential to link current research with practice in the field.

Staff working in a small urban school system monitored early literacy skills using Dynamic Indicators of Basic Early Literacy Skills over a period of twenty weeks. These measures consisted of a task involving the identification of initial sounds in words, a phonemic segmentation task, and a timed letter naming task. Teachers and paraprofessionals also introduced children to several curricula aimed at improving phonemic awareness skills in young children. The curriculum, *Ladders to Literacy*, was integrated into the general lessons presented in the classroom. *Phonemic Awareness in Young Children* was delivered in a small group format to children identified as at risk for developing difficulties in early reading acquisition.

Local normative data was collected to establish standards of performance and to serve as a means of comparing the efficacy of the traditional system of assessment and instruction to the model used by the participating teachers. Students in the local normative group were exposed to the general curriculum used in the kindergarten and were administered DIBELS at three points during the project.

The individual and overall outcomes of students receiving phonemic awareness instruction were evaluated by examining a set of descriptive statistics and conducting a repeated-measures analysis of variance (ANOVA) design. Several different groups were compared in the study. The local normative group

was made up of 25 % of the kindergarten population. Children were selected for participation in this group on a random basis. The intervention group was an intact group made up of children enrolled in the classrooms of the teachers who volunteered to participate in the intervention. Comparisons between the two groups were made to evaluate the effectiveness of the intervention in developing early literacy skills measured through DIBELS. The lowest performing students from these groups were also compared to examine the effectiveness of the program in meeting the needs of the students with the lowest level of early literacy skills upon entrance into kindergarten. Although restricted by the limitations of design and nature of the data, descriptive and inferential statistics indicate that the intervention was more effective in building phonemic awareness skills than the general curriculum. Both the intervention group at large and the group representing the lowest quartile of the intervention group outperformed the local normative group on measures of phonemic awareness. No significant differences were found in the development of letter naming skills between the groups.

Statistics were also examined to study the relationship between DIBELS and other measures used by teachers within the kindergarten programs and the sensitivity of measures within DIBELS. The phonemic awareness tasks included in DIBELS enhance the current assessment protocol used by teachers because they assess a critical skill not currently addressed through their assessments. Correlations between untimed letter naming tasks and the timed letter naming task in DIBELS are high, but each provide valuable information. The untimed task

takes longer to administer but lends itself to error analysis. The fluency task in DIBELS provides a means to monitor progress efficiently and thus more regularly. It also provides critical information regarding the fluency of this skill.

Floor effects were found for Onset Recognition Fluency at the beginning of the year and for Phonemic Segmentation Fluency at mid-year. It is difficult to identify children who will need help in developing these skills when there are floor effects. This indicates that recommended schedules of administration may need to be adjusted and easier tasks developed. Until more measures are developed, practitioners must consider important factors such as developmental and family histories. Forms used in mandatory screening programs for kindergarten should be adjusted if they do not include questions related to the language development of the child, exposure to literacy, and the presence of a history of reading difficulties in the family. Parents should be informed as to why questions are being asked and should be acknowledged as valuable sources of information.

Time series analyses were employed to illustrate the process used in making programmatic decisions. These analyses indicated that measures were sensitive to change in skills and also emphasized the need for a wider range of instructional services or options for children demonstrating limited progress. Teachers should be provided with the resources necessary to provide a spectrum of services that range from student directed activities to highly explicit and teacher directed programs. For successful implementation of this model to occur, decision guidelines need to be developed to determine when students should be provided

with a higher level of services because of limited progress or when they are ready for more student directed activities because of growth in skills.

Staff members were interviewed at regular intervals to obtain feedback about the implementation process and the usefulness of the measures. Students and staff were observed during the administration of assessments, during lessons, and while transitioning between activities to obtain information about student responsiveness and to document obstacles in implementation. Staff indicated that the measures were useful in guiding curriculum and in communicating information about individual progress to parents and staff. Observations conducted to measure student responsiveness indicate that the students enjoyed the individual attention during the administration of the assessments and had fun participating in the game-like lessons in the training programs. The curricula were rated highly by all staff members. They reported that the lessons were well organized and easily implemented. They emphasized the value of linking formative assessment with the curriculum, but noted that there is a high level of support from all levels needed for successful implementation. Administrators need to allocate a variety of resources. Specialists need to collaborate in data collection and in helping teachers to develop effective solutions. Finally, support staff are needed to help implement instructional programming that provides a high level of explicit feedback and student practice.

An issue that arose in reviewing one of the case studies and in interviewing the teachers relates to the need to develop stronger links between home and school. The progress of one of the students in the study dramatically increased

when his parents were asked to teach letter naming skills at home. His case illustrates the important role that parents play in teaching their children. The teachers acknowledge that the limited connection between home and school is a weakness in their programs. They realize that strengthening this link will be an important step to improving the reading outcomes of their students. The strength of home-school connections has been documented to have a significant impact on reading acquisition (Chall, Jacobs, & Baldwin, 1990). A study conducted by Snow, Barnes, Chandler, Goodman, and Hemphill (1991) revealed the frequency of teacher initiated contacts was related to higher levels of reading comprehension and higher teacher expectations. Thus, schools attempting to develop comprehensive early literacy programs need to develop strong home-based components and provide parents with the resources they need to facilitate the reading acquisition of their children.

This study has focused on a cognitive view of early reading development in examining the efficacy and feasibility of phonemic awareness training. This is a critical component of early reading development that should be incorporated into early literacy programs. However, many other factors not explored in this study effect early reading development. Factors such as overall school quality, the appropriateness of a school's cultural climate, community support for literacy, and family stability have not been addressed in this study, but they can play a significant role in the reading development of young children (Chall, Jacobs, & Baldwin, 1990; Halle, Kurtz-Costes, & Mahoney, 1997; Heath, 1983; Snow, Barnes, Chandler, Goodman, & Hemphill 1991). Although this study

did not address these issues they warrant continued research and the careful consideration of practitioners.

The significance of this study lies in the findings that point to both the effectiveness of the model and the documentation of issues affecting feasibility. This form of collaborative research has the potential to create meaningful change in school systems by bridging the gap between current research and practice in the classroom. The teachers' overall evaluation of linking formative assessment with research-based curriculum was very positive. They found that the assessments were both effective teaching and assessment tools. They indicated that the effectiveness of the training program lay in the high level of involvement that it offered the children. Although restricted by the limitations of design and the nature of the data, descriptive and inferential statistics confirm the evaluations made by staff members involved in the project. Obstacles mentioned in this study should not be underestimated, but the benefits of the program were judged to clearly outweigh the costs of implementation. In the end, it was the commitment of the practitioners, the appropriateness of the instructional strategies, and the relevancy of the assessments that resulted in children's growth.

APPENDIX A

INFORMATIONAL LETTER TO ALL PARENTS

Dear Parent/Step-Parent/Guardian:

I am writing to inform you of an assessment program that will be conducted this year at *School Name*. In an effort to improve the early literacy skills of children, we will be administering some informal assessments to a randomly selected group of children. The assessments are very brief and do not take more than five minutes to administer to each child. One of the assessments measures letter identification. The two other assessments examine a child's awareness of the sounds within words. They do not assess a child's knowledge of letter sound relationships, as this is a skill that is expected to develop in first grade.

Twenty five percent of the children in the centers will be selected to participate in this process. Their participation will involve being assessed at three different times during the school year. This will occur once in the fall, winter, and spring. The results of these on-going assessments will help staff learn how our students perform as a group. The group data will also be used as part of Ms. O'Hearn-Curran's dissertation. Ms. O'Hearn-Curran is the school psychologist for the early child programs and is conducting research on the prevention of reading difficulties in young children. No type of identifying information will be used in publishing her research. Eventually information learned from this process will help our staff identify children who need instruction in particular skills in order to develop basic reading skills. We began assessing children in a similar manner last year and found that the children enjoyed participating in the process.

If you have any questions about this project, please contact Meg O'Hearn-Curran, school psychologist for the early childhood programs at (phone number). Please feel free to contact me as well within any questions or concerns that you may have.

Sincerely,

Principal

APPENDIX B

INFORMATIONAL LETTER TO CLASSROOM PARENTS

Dear Parent/Step-Parent/Guardian:

I am writing to inform you of a new program that will be implemented in your child's classroom this year. As part of our efforts to improve the early literacy skills of our students, we will be using new programs aimed at developing important skills related to reading readiness. Each of these programs has been documented to be successful in improving the early reading skills of young children. Ms. _____ will be using activities from these programs in her classroom on a regular basis. She will also be working closely with Ms. O'Hearn-Curran, school psychologist for the early childhood programs, to monitor the progress of each child in her class. The assessments that will be used are referred to as curriculum-based measures. They are brief (taking only several minutes to administer) and at this grade level provide important information about the growth of letter naming skills and the awareness of the individual sounds in words. Curriculum-based measures are being adopted by the school system to monitor the progress of our students. We actually began assessing our kindergarten children last year using these tasks and found that children enjoyed them.

This year we will be using the information from the assessments to guide teachers in incorporating specific activities aimed at building pre-reading skills. We will also provide small group work within the classroom for children who demonstrate the need for some additional activities. As always Ms _____ will provide updates for you regarding the individual progress of your child and give you some suggestions for activities to do at home to start your child on the road to successful reading.

Ms. O'Hearn-Curran is currently working towards her doctorate in School Psychology at the University of Massachusetts/Amherst and she will be using the data from this project in her research. She will be analyzing the results of the curriculum-based measures and interviewing your child's teacher to determine the effectiveness of this type of monitoring program. No type of identifying information will be used in publishing this research. Group data will be reported and case studies used within her publication will not provide any identifying information. If you have any questions about this project, please contact Ms. _____ or Meg O'Hearn-Curran, at (*phone number*). Please feel free to contact me as well within any questions or concerns that you may have.

Sincerely,

Principal

APPENDIX C

STAFF CONSENT FORM

This study examines of the feasibility implementing phonemic awareness curriculum and curriculum-based measures in the classroom. You were selected to participate in this study because of the curriculum you will be incorporating into your classroom this school year and the use of curriculum-based measures in your school system. I will ask for your feedback regarding;

- ◆ the quality of specific activities within the phonemic awareness curriculum
- ◆ the manageability of the data from curriculum-based measures-Dynamic Indicators of Basic Early Literacy Skills (DIBELS)
- ◆ the usefulness of the information available from DIBELS
- ◆ the impact of the curriculum and the results of DIBELS measures on your literacy program

Your participation in this study will contribute to research in this area. It may also assist other teachers who choose to adopt these methodologies in their classroom. If you should decide to participate in this study, you will be asked to complete a series of three-30 minute interviews during the school year addressing the above topics. Each of the interviews will be recorded and transcribed. You will also be observed in your classroom as you implement the curriculum and assess the children. You will also be asked to complete a time log documenting the time spent on assessment activities. You will also be asked to review the data from the interviews to validate its accuracy and will have access to all notes taken by the researcher. Any information obtained in connection with this study that can be identified with you will remain confidential. Reports generated from this research will not contain any identifying information. If you decide to participate, you are completely free to withdraw consent and discontinue participation at any time. You will have the right to request copies of the reports generated from this data when they are completed and can review materials from the observations and interviews at any time during the process. If you decide to participate, you are completely free to withdraw consent and discontinue participation at any time.

You may keep a copy of this form.

I have decided to participate in the study of early literacy skills. My signature indicates that I have read the information above and have decided to participate. I realize that I may withdraw at any time after signing this form without penalty should I decide to do so.

Name: _____

Teacher's Staff Member's Signature

Date

APPENDIX D
DIBELS MEASURES

DIBELS Overhead

Onset Fluency

Materials

1. Examiner score sheet
2. Student copy of picture probes
3. Stopwatch
4. Pencil

Directions for Administration

1. Place the student copy of 4 randomized pictures in front of the child.
2. Place the examiner score sheet in front of you, but shielded so that the student cannot see what you record.
3. Say these specific directions to the child:

"This is a square, an umbrella, milk, and a pumpkin (point to each picture while saying its name).

/Umbrella/ begins with the sounds /um/ (point to the umbrella). Listen: um, umbrella. Which one begins with the sounds /sq/? (If incorrect, go to correction procedure #1. If correct, proceed).

"Good. /Square/ begins with the sounds /sq/.

Correction Procedure #1

"Square begins with the sounds /sq/ (point to the square). Listen: sq, square. Let's try it again. Which one begins with the sounds /sq/. (If incorrect: "Point to it with me." Take child's finger, point to square, and say, "Square begins with the sounds /sq/").

"Good! Square begins with the sounds /sq/."

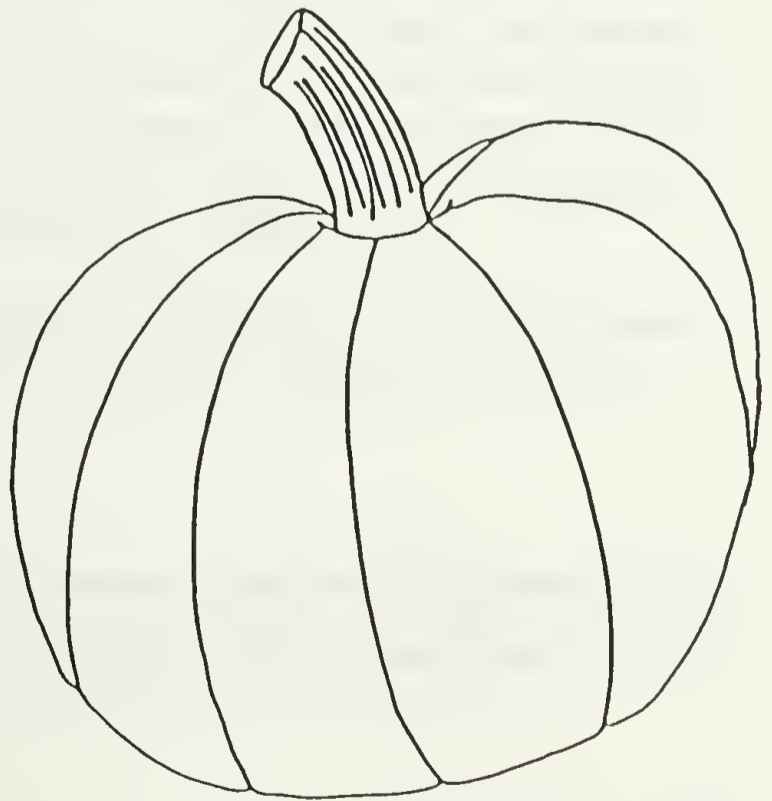
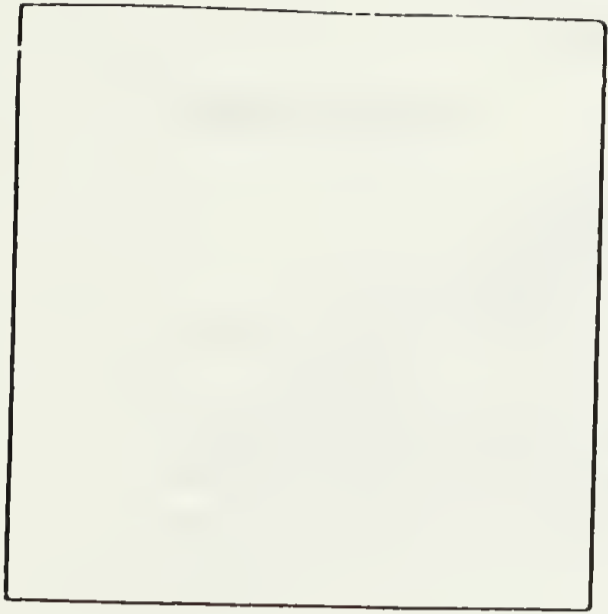
“/Milk/ begins with the sound /m/ (point to the milk). Listen: m, milk. What sound does /pumpkin/ begin with (point to the pumpkin)? (If incorrect, go to correction procedure #2. If correct, proceed).”

Correction Procedure #2.

“Pumpkin begins with the sound /p/. Listen: p, pumpkin.” Let’s try it again. What sound does /pumpkin/ begin with? (If incorrect: “Say it after me. P, pumpkin”).”

“Very good. Here are some more pictures. Listen carefully to the questions.”

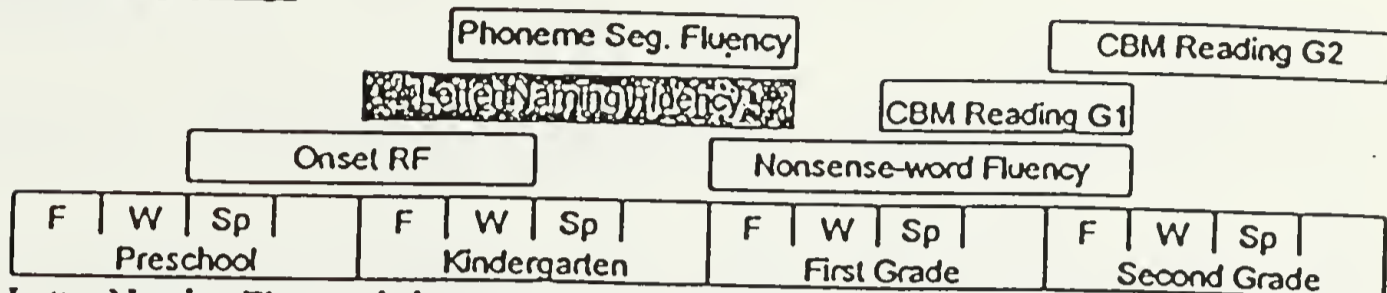
3. Show the child the first picture probe. Point to each picture and say the name (“This is a” as above).
4. Present the first question written on the score sheet. After you finish asking the question, begin your stopwatch. Stop your stopwatch as soon as the child responds. If the child does not respond after 5 seconds, present the second question and score the first question as zero.
5. As soon as the student responds, present the next question promptly and clearly. Begin your stopwatch after you have said the question, and stop it as soon as the child responds, as above.
6. Follow along and mark the child’s response as either correct (1 point) or incorrect (0 points).
7. If the child stops or struggles with a question for 5 seconds, score the question as zero and present the next question.
8. After the first 4 questions, proceed to the next picture probe. Continue until the end of the questions. When the child finishes the last question, record the total time on your stopwatch and add up the correct responses.



Letter Naming Fluency¹
Dynamic Indicators of Early Literacy Skills
University of Oregon

Directions for Administration and Scoring

Target Age Range



Letter Naming Fluency is intended for most children from fall of kindergarten through fall of first grade. It may be appropriate for monitoring the progress of older children with low skills in letter naming.

Materials: Student probe, examiner probe, clipboard, stopwatch, colored scoring pencil, and tape recorder (optional).

Directions for Administration:

1. Place the student probe in front of the student.
2. Place the examiner probe on clipboard and position so that the student cannot see what you record.
3. Say these specific directions to the student:

Here are some letters (point to the student probe). Tell me the names of as many letters as you can. When I say "begin", start here (point to first letter), and go across the page (point). Point to each letter and tell me the name of that letter. If you come to a letter you don't know I'll tell it to you. Do you have any questions about what we are going to do? Put your finger on the first letter. Ready, begin.

4. Start your stop watch. If the student fails to say the first letter name after 3 seconds, tell the student the letter name and mark it as incorrect. Point to the next letter to indicate for the child to move on.

¹ This research was supported, in part, by the Early Childhood Research Institute on Measuring Growth and Development (H1180M10006) funded by the U. S. Department of Education, Special Education Programs. Address all correspondence concerning this measure to Roland H. Good III, School Psychology Program, DABCS College of Education, 5208 University of Oregon, Eugene, OR 97403-5208, roland_good@ccmail.uoregon.edu.

Name: _____

Date: _____

University of Oregon
Dynamic Indicators of Basic Early Literacy Skills
Letter Naming Fluency

Probe 1

c	c	N	u	Q	M	u	h	S	i
n	b	e	N	F	f	o	a	K	k
g	p	k	p	a	H	C	e	G	D
b	w	F	i	h	O	x	j	l	K
x	t	Y	q	L	d	f	T	g	v
T	V	Q	o	w	P	J	t	B	X
Z	v	U	P	R	l	V	C	l	W
R	J	m	O	z	D	G	y	U	Y
Z	y	A	m	X	z	H	S	M	E
q	n	j	s	W	r	d	s	B	l
r	A	E	L	c	c	N	u	Q	M

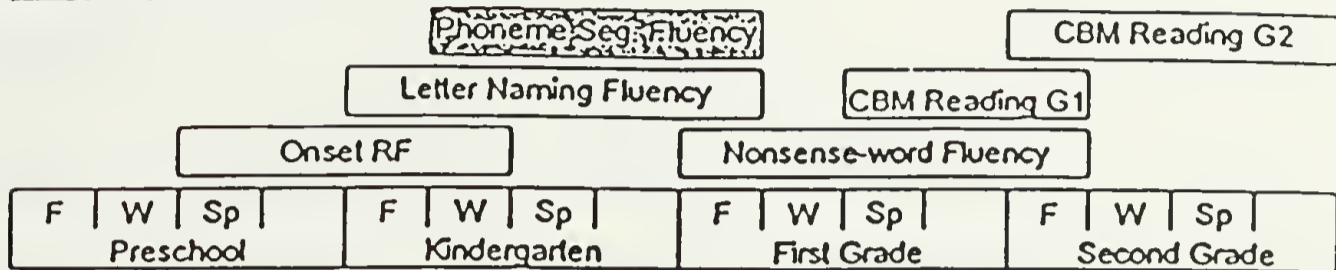
Total: ____/110

Revised: 01/14/98

Phoneme Segmentation Fluency¹
Dynamic Indicators of Early Literacy Skills
University of Oregon

Directions for Administration and Scoring

Target Age Range



Phoneme Segmentation Fluency is intended for most children from winter of kindergarten through fall of first grade. It may be appropriate for monitoring the progress of older children with low skills in phonological awareness.

Materials: Examiner probe, Clipboard, Stopwatch, Colored scoring pencil, and Tape recorder (optional).

Directions for Administration

1. Place examiner probe on clipboard and position so that student cannot see what you record.
2. Say these specific directions to the student:

I am going to say a word. After I say it, you tell me all the sounds in the word. So, if I say, "sam," you would say /s/ /a/ /m/. Let's try one. (one second pause) Tell me the sounds in "mop".

CORRECT RESPONSE: If student says, /m/ /o/ /p/, you say <i>Very good.</i>	INCORRECT RESPONSE: If student gives any other response, you say, <i>The sounds in "mop" are /m/ /o/ /p/. Your turn. Tell me the sounds in "mop".</i>
--	--

OK. Here is your first word.

¹ This research was supported, in part, by the Early Childhood Research Institute on Measuring Growth and Development (H180M10006) funded by the U. S. Department of Education, Special Education Programs. Address all correspondence concerning this measure to Roland H. Good III, School Psychology Program, DABCS College of Education, 5208 University of Oregon, Eugene, OR 97403-5208, roland_good@ccmail.uoregon.edu.

Name: _____

Date: _____

University of Oregon
Dynamic Indicators of Basic Early Literacy Skills
Phoneme Segmentation Fluency

Probe 2

prize	/p/ /r/ /ie/ /z/	sighed	/s/ /ie/ /d/	____/7
tie	/t/ /ie/	noise	/n/ /oi/ /z/	____/5
shirt	/sh/ /ir/ /t/	half	/h/ /a/ /f/	____/6
peek	/p/ /ea/ /k/	south	/s/ /ow/ /th/	____/6
teeth	/t/ /ea/ /th/	patch	/p/ /a/ /ch/	____/6
sled	/s/ /l/ /e/ /d/	buy	/b/ /ie/	____/6
find	/f/ /ie/ /n/ /d/	parked	/p/ /ar/ /k/ /t/	____/8
tell	/t/ /e/ /l/	lead	/l/ /ea/ /d/	____/6
lines	/l/ /ie/ /n/ /z/	day	/d/ /ai/	____/6
pushed	/p/ /uw/ /sh/ /t/	thing	/th/ /i/ /ng/	____/7
got	/g/ /o/ /t/	those	/TH/ /oa/ /z/	____/6
room	/r/ /oo/ /m/	egg	/e/ /g/	____/5

Total ____/74

APPENDIX E

TEACHER ASSESSMENT RESPONSE SHEET

NAME: _____

ASSESSMENTS RECORDED

BEGINNING YEAR- BLACK

MID YEAR -RED

END YEAR-GREEN

DATE: _____

DATE: _____

DATE: _____

COLOR RECOGNITION

(Circle if known)

RED YELLOW PURPLE BLUE BROWN BLACK GREEN ORANGE

RECOGNITION OF UPPERCASE LETTERS. CIRCLE ALL LETTERS KNOWN
KNOWS

B

M

E

☐
☐
☐

A G D J M O R

V E B H Q S U

X K L I F C P

T W Z Y N

RECOGNITION OF LOWERCASE LETTERS. CIRCLE ALL LETTERS KNOWN
KNOWS

B

M

E

☐
☐
☐

a g d j m o r

v e b h q s u

x k l i f c p

t w z y n

APPENDIX F

INITIAL INTERVIEW QUESTIONS

1. Can you comment on the administration of DIBELS and its relation to time?
2. The developers have stated that one individual can administer DIBELS to an entire classroom of children in approximately 1½ hours. How would you evaluate that statement?
3. How would you weigh the amount of time it has taken this for to administer in relation to the value of the information you have obtained from the assessment?
4. How would you evaluate the usefulness of the data obtained from DIBELS?
5. Can you discuss any difficulties you might have encountered in administering DIBELS in your classroom?
6. In addition to the data, what did the experience of administering this tell you about children in your classroom as a group? as individuals?
7. Can you describe the children's reaction to the administration process?
8. Upon reviewing the data, were there any surprises as far as how the children fell along a continuum ?
9. Do you feel that the results have provided you with useful information for the full range of children in your class?
10. How does the data effect your curriculum plans?
11. Could you discuss how your current class compares to the previous classes you have had in terms of social, literacy, language skills?-ethnic diversity?
12. What do you see as important goals for this class?
13. How can support staff best support you as you try to implement the assessment phase of this project?

Phonemic Awareness Curriculum

1. How manageable are the lesson plans?
2. How would you describe student responsiveness to the activities?
3. Are the lesson plans clearly written? Easy to follow?

4. Can you rate the lesson plans on user friendliness, ease of preparation, and appeal to students?
5. Do activities seem developmentally appropriate for the typical child? Can you modify them for children with high and low literacy skills?
6. What would you add to improve the program?
7. Are there components you would delete? Why?
8. What do you like about the activities?
9. Can you rate the progression of tasks as they are presented in the curriculum?

APPENDIX G

LOG FOR ADMINISTRATION OF DIBELS

Date _____

Teacher Name: _____

Number of students administered _____

Start Time _____

Finish Time _____

Total Time Devoted to Administration _____

Approximate time for each student _____

Number of interruptions:

By children _____

By staff _____

Others _____

Activity that other children were engaged in at time of administration:

Other staff members of adults in the room:

Note location of children if other than classroom:

Comments:

STUDENT CHART FOR GRAPHING PROGRESS

Class:

Baseline Data:
Long Range Goal:



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