

The Pennsylvania State University

The Graduate School

College of Education

**FULL-DAY KINDERGARTEN IN MANHEIM CENTRAL SCHOOL DISTRICT:
EXPLORING EARLY LITERACY GROWTH AND PROFICIENCY**

A Thesis in

Educational Administration

by

R. Thomas Stone

© 2006 R. Thomas Stone

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Education

August 2006

The thesis of R. Thomas Stone was reviewed and approved* by the following:

J. Daniel Marshall
Professor of Education
Thesis Advisor
Chair of Committee

William T. Hartman
Professor of Education

Roger C. Shouse
Associate Professor of Education

Brandon B. Hunt
Associate Professor of Counselor Education

Carol Y. Phillips
Executive Assistant to the President and Associate
Provost of Millersville University
Special Member

Nona A. Prestine
Professor of Education
Professor in Charge of Graduate Programs in
Educational Leadership

*Signatures are on file in the Graduate School

ABSTRACT

The purpose of this study was to determine the efficacy of Manheim Central School District's full-day kindergarten program as compared to their half-day kindergarten program relative to students' reading levels through the end of grade 3. Additionally, this study sought to determine if MCSD's full-day kindergarten program is supporting the district's mission and educational goals while providing a cost-effective alternative to their half-day kindergarten program. This longitudinal study analyzed DRA scores over a five-year period and employed cost-effectiveness analysis strategies to compare costs related to full- and half-day kindergarten programs.

While the statistical hypotheses tested in this research study did not reveal significance through grade 3, the descriptive data analyses presented provides clear evidence that the proportion of students scoring proficient on the end-of-year Developmental Reading Assessment (DRA) increased steadily over the five-year period of this study, most significantly during the kindergarten year. This upward trend becomes even more powerful when considered within the context of a simultaneous upward trend in the number of low income students entering MCSD's kindergarten program.

Additionally, this study produced a significant positive correlation between students' grade 3 PSSA reading scores and their corresponding end-of-grade 3 DRA scores for students from Cohort 1 and Cohort 2. This important finding suggests the DRA was a strong choice as an assessment tool connecting achievement results from MCSD's early literacy program to the reading portion of the PSSA.

This research study provides the policy makers within the Manheim Central School District with a wealth of reading proficiency data over time as well as cost-effectiveness data related to their full-day kindergarten program. These data may be utilized to assist the Board of School Directors and central office administrators in the decision making process regarding the future of full-day kindergarten at Manheim Central School District. Based on the data analyzed and presented for this research study, Manheim Central School District is making substantial progress towards its district goals of raising student achievement for all students and implementing an appropriate curriculum and support system based on the diverse needs of all students through its full-day kindergarten initiative.

TABLE OF CONTENTS

	Page
List of Tables	vii
List of Figures	ix
Acknowledgements.....	x
Chapter 1. INTRODUCTION.....	1
Manheim Central School District Adopts Full-Day Kindergarten	2
Purpose and Need for the Study.....	4
Theoretical Framework.....	5
Research Questions.....	6
Chapter 2. REVIEW OF LITERATURE.....	8
NAEYC and Developmentally Appropriate Practices.....	8
Vygotsky and Early Literacy Development.....	10
Full-Day Kindergarten vs. Half-Day Kindergarten	11
Literacy Instruction and Assessment in Kindergarten	15
Program Evaluation and Cost-Effectiveness Analysis	19
Full-Day Kindergarten at Manheim Central School District.....	22
Conclusion	25
Chapter 3. DESIGN AND METHODOLOGY	27
Research Design.....	27
Methodology	30
Sample.....	30
Instrumentation	33
Data Analysis	34
Operational Definitions.....	42
Chapter 4. PRESENTATION AND ANALYSIS OF DATA	44
Description of Individual Cohorts	46
Description of Combined Cohorts	55
Answering the Research Questions	57
Research Question #1	58
Research Question #2	66
Research Question #3	71
Research Question #4	72
Conclusion	83

Chapter 5. DISCUSSION, CONCLUSIONS, AND FUTURE POSSIBILITIES	87
Discussion of Findings.....	87
Developmental Reading Assessment and PSSA Correlations.....	88
Raising Achievement Levels of All Students	90
Meeting Students’ Diverse Needs.....	91
The Price of Success	94
Limitations of the Study.....	95
Future Possibilities.....	99
Conclusion	100
Beyond the Numbers.....	102
References	105

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 DRA Proficiency Levels.....	34
2 Distribution of Demographic Characteristics Within Cohort 1 from Kindergarten Through Grade 3.....	46
3 Gender and Low Income Status by Kindergarten Program Type for Cohort 1.....	47
4 Distribution of Demographic Characteristics Within Cohort 2 from Kindergarten Through Grade 3.....	48
5 Gender and Low Income Status by Kindergarten Program Type for Cohort 2.....	49
6 Distribution of Demographic Characteristics Within Cohort 3 from Kindergarten Through Grade 2.....	50
7 Gender and Low Income Status by Kindergarten Program Type for Cohort 3.....	51
8 Distribution of Demographic Characteristics Within Cohort 4 from Kindergarten Through Grade 1.....	52
9 Distribution of Demographic Characteristics Within Cohort 5.....	53
10 Distribution of End-of-Year DRA Proficiency Levels by Cohort and Program Type.....	54
11 Percentage of Low Income Students Entering Kindergarten for Cohorts 1 to 5 ...	55
12 Distribution of Demographic Characteristics from Combined Cohorts.....	56
13 Gender and Low Income Status by Kindergarten Program Type for Combined Cohorts 1 to 4.....	57
14 End-of-Kindergarten DRA Proficiency Levels by Program Type.....	60
15 End-of-Grade 1 DRA Proficiency Levels by Program Type.....	60
16 End-of-Grade 2 DRA Proficiency Levels by Program Type.....	61
17 End-of-Grade 3 DRA Proficiency Levels by Program Type.....	62
18 Proportion of Students Scoring Proficient on End-of-Kindergarten DRA Across Cohorts 1 to 5.....	63

19	Proportion of Students Scoring Proficient on End-of-Grade 1 DRA Across Cohorts 1 to 4.....	64
20	Proportion of Students Scoring Proficient on End-of-Grade 2 DRA Across Cohorts 1 to 3.....	65
21	Proportion of Students Scoring Proficient on End-of-Grade 3 DRA Across Cohorts 1 and 2.....	65
22	2x2x2 ANOVA Comparing End_of_Kindergarten DRA with Kindergarten Program Type, Gender, and Low Income.....	67
23	2x2x2 ANOVA Comparing End_of_Grade 1 DRA with Program Type, Gender, and Low Income.....	68
24	2x2x2 ANOVA Comparing End_of_Grade 2 DRA with Program Type, Gender, and Low Income.....	69
25	2x2x2 ANOVA Comparing End_of_Grade 3 DRA with Program Type, Gender, and Low Income.....	70
26	Pearson Correlation Coefficients (r) for Grade 3 PSSA Reading Scores and End-of-Grade 3 DRA Scores for Cohorts 1 and 2.....	72
27	Total Cost of Full-Day and Half-Day Kindergarten for Cohorts 1 through 5.....	74
28	Half-Day and Full-Day Effectiveness Measures for Cohorts 1 through 5.....	77
29	Half-Day and Full-Day Costs for Cohorts 1 through 5.....	77
30	Half-Day and Full-Day CERs for Cohorts 1 through 5.....	78
31	Half-Day and Full-Day Effectiveness Measures for Combined Cohorts.....	80
32	Half-Day and Full-Day Costs for Combined Cohorts.....	80
33	Half-Day and Full-Day CERs for Combined Cohorts.....	80
34	Half-Day Effectiveness Measures from Cohort 1 versus Full-Day Effectiveness Measures from Cohort 5.....	82
35	Half-Day Costs from Cohort 1 versus Full-Day Costs from Cohort 5 (in 2004/05 dollars).....	82
36	Half-Day CER from Cohort 1 versus Full-Day CER from Cohort 5.....	82

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	MCSD Full-Day Kindergarten Cohorts 1 to 5	31
2	Proportion of Low Income Students from Cohort 1 to Cohort 5.....	58
3	Proportion of All Students Scoring Proficient on End-of-Year DRA from Cohort 1 to Cohort 5	84
4	Proportion of Full-Day Kindergarten Students Scoring Proficient on End-of-Year DRA from Cohort 1 to Cohort 5	97
5	Cohorts 3, 4, and 5 Extended Through the End of Grade 3	98

ACKNOWLEDGEMENTS

Many individuals were responsible for assisting me throughout the course of this doctoral dissertation. My deepest appreciation is extended to Dr. Dan Marshall, thesis advisor, chair of committee, and mentor for his inspiration and insight. He unselfishly shared his valuable time and expertise in the evenings and on weekends as he provided tremendous guidance in assisting me with completing this study.

I would also like to thank the members of my committee. I very much appreciate their willingness to support me in this endeavor. Dr. William Hartman, my academic advisor, provided many insights that added to the overall depth of this study. Dr. Roger Shouse and Dr. Brandon Hunt offered excellent suggestions and contributions along the way. Finally, Dr. Carol Phillips provided much-needed home support as well as assistance with the statistical analyses throughout the study.

I would be remiss if I failed to mention Dr. Nancy Hall. She selflessly provided guidance, insight, and wisdom throughout the entire project. Also, Becky Contestabile's knowledge of procedures and guidelines was invaluable to me throughout my years at Penn State.

Finally, I must thank the members of my family who have encouraged me throughout this process: My parents, Jerry and Judy Stone; my sisters, Teresa and Lisa; my mother-in-law, Josie Lewis; and my brother-in-law and sister-in-law, Justin and Angie. Most importantly, I thank my wife, Michelle, and my three children, Adam, Alex, and Olivia, for their many sacrifices over the past 18 months. Without

their unwavering support during my weekly writing trips to the cabin this accomplishment would not have been possible.

Chapter 1

INTRODUCTION

In recent years, federal and state governments have placed an increased emphasis on the development of early literacy skills for students in our public schools. The Bush Administration's No Child Left Behind Act (NCLB) demands that every child (100%) will be proficient in reading and mathematics by 2014 (U. S. Department of Education, n.d.). A secondary goal of NCLB is for districts to ensure all students are reading on grade level by the end of third grade. Districts are required to meet AYP (adequate yearly progress) targets; otherwise they may be subject to penalties.

In response to NCLB, the Pennsylvania Department of Education, under the leadership of the Rendell Administration, has created Accountability Block Grants (Pennsylvania Accountability Block Grant, 2004). Designed to reflect research findings that students from full-day kindergarten programs out perform their half-day counterparts in various measures of academic proficiency (Cryan, Sheehan, Wiechel, & Bandy-Hedden, 1992; Elicker & Mathur, 1997; Fusaro, 1997; Gullo, 2000; Hildebrand, 1997; Hough & Bryde, 1996; Morrow, Strickland, & Woo, 1999; Walston & West, 2004), these block grants provide \$200 million to districts for developing and/or expanding proven educational programs. In 2004, Pennsylvania school districts used over two-thirds of this grant money to implement early childhood programs such as full-day kindergarten (Pennsylvania Accountability Block Grant, 2004). With these initial academic successes in full-day kindergarten, however, there is a question about whether or not students can

maintain the academic progress above half-day students over time (Karweit, 1992). The focus of this study is to determine to what extent, if any, Manheim Central School District's full-day kindergarten program has affected the reading proficiency levels of students from kindergarten through grade 3.

Manheim Central School District Adopts Full-Day Kindergarten

Manheim Central School District (MCSD) is a small rural school district of approximately 3,100 students in south central Pennsylvania. MCSD's mission statement is, "Empowering Individuals Through Development of Academic and Social Skills to Become Responsible Citizens in a Changing World" (Manheim Central School District, 2005). To support the mission statement, MCSD developed the following goals to drive the educational programs offered by the district:

- Raise student achievement for all students.
- Implement an appropriate curriculum and support system based on the diverse needs of all students.
- Curriculum and its delivery will be based on current research and data.
- Provide adequate and flexible buildings with appropriate services.
- Foster positive family and community partnerships.

With the leadership and support of an elementary principal focused on early childhood programs, several teachers began exploring and researching full-day kindergarten programs in the late 1990s. These teachers reviewed the current research literature on full-day kindergarten and visited schools offering full-day kindergarten.

Their findings suggested a full-day kindergarten program could strongly support the district's mission statement and the first two educational goals. Consequently, Cathy Gust, an elementary teacher representative, submitted a proposal to the MCSD administration and school board to begin a pilot program consisting of one section of full-day kindergarten (Gust, 2000).

While MCSD is a typical rural school district with budget constraints, a declining enrollment experienced by the district in the late 1990s provided a unique opportunity for the administration and school board. Rather than furloughing elementary teachers as the total number of student sections began to decrease, MCSD's Board of School Directors approved the adoption of a full-day kindergarten program. Consequently, from the 2000/2001 school year to the 2003/2004 school year, MCSD increased the number of full-day kindergarten sections from one to ten through the reallocation of staff and facility resources. Ten sections allowed for every kindergarten student in the district to receive full-day kindergarten.

Manheim Central School District is currently in the third year of offering ten full-day kindergarten sections to all of the district's incoming students. The ease in transition for the Board of School Directors to MCSD's full implementation schedule suggests the teachers and parents overwhelmingly supported the district's full-day kindergarten program. During the 2003/2004 school year and the 2004/2005 school year, for example, the district was willing to offer a section of half-day kindergarten, if enough parents requested this option. Out of approximately 200 eligible families, eleven families requested a half-day program in 2003/2004 and one family requested a half-day program during 2004/2005.

Purpose and Need for the Study

With declining enrollment, MCSD was able to fully implement a full-day kindergarten program without adding staff or building additional classrooms; however, in 2003 student enrollment leveled off followed by slight increases in 2004 and 2005. Additionally, several large housing developments have been approved by local borough and township officials. The Board of School Directors and administration must now justify the dollars dedicated to the full-day kindergarten program. Manheim Central School District must use data and current research to demonstrate that full-day kindergarten is supporting the district's first two educational goals: (1) Raise student achievement for all students, and (2) Implement an appropriate curriculum and support system based on the diverse needs of all students substantially better than the half-day kindergarten program of the recent past. Furthermore, MCSD must determine if full-day kindergarten is cost-effective relative to half-day kindergarten.

With ten sections of full-day kindergarten, Manheim Central School District will pay a total of \$685,290 in salary and benefits to ten professional employees for the 2005/2006 school year. If MCSD still offered half-day kindergarten, they would save approximately \$342,645 during the current school year where the total district budget is about 32 million dollars (G. Ioannidis, personal communication, September 26, 2005). If student enrollment begins to increase significantly, the school board and administration will need to decide if their full-day kindergarten program results in raising student achievement for all students, thus, justifying the increased expense necessary to sustain it.

The results of this study may help the MCSD Board of School Directors make a policy decision regarding the future of their full-day kindergarten program.

Theoretical Framework

At the core of effective early childhood programs is a curriculum rich in developmentally appropriate practices designed to meet the diverse needs of early learners (NAEYC, 1996). In designing such programs, professionals must have a thorough knowledge of cognitive development among children. Properly designed full-day kindergarten programs support these guiding principles by offering teachers the opportunities to individualize instruction to meet the diverse needs of their children (Gullo, 1990). Cathy Gust's initial proposal to start a pilot full-day kindergarten program at Manheim Central School District recognized the importance of developmentally appropriate practices in effective full-day programs (Gust, 2000).

According to Blanck (1990), Vygotsky defined the zone of proximal development (ZPD) as, "the distance between the real level of development and the potential level of development" (p. 50). In developmentally appropriate full-day kindergarten classrooms, differentiated instruction and scaffolding strategies are used to instruct students within their ZPD (NAEYC, 1996). Additionally, developmentally appropriate programs today consist of a literature-rich environment where written language develops out of oral language through symbolic play activities (NAEYC, 1996). As school districts seek programs designed to improve the reading proficiency of all students and meet tougher federal and state accountability requirements, it is important for educators to understand

how effective instruction within the ZPD and symbolic play activities accelerate the acquisition of early literacy skills.

Developmentally appropriate full-day kindergarten programs provide the extra time necessary to improve students' reading proficiency under increased accountability and pressure from federal and state governments (Elicker & Mathur, 1997; Hough & Bryde, 1996; Karweit, 1992; Morrow, Strickland, & Woo, 1999). With the paucity of research available on the effectiveness of full-day kindergarten programs over time, this study seeks to determine the sustained efficacy of Manheim Central School District's full-day kindergarten program. More specifically, this study will analyze the relationships between Developmental Reading Assessment (DRA) scores, half-day kindergarten, full-day kindergarten, and associated costs, including teacher salary and benefits, to determine the extent to which Manheim Central's full-day kindergarten program is supporting the district's mission and first two educational goals.

Research Questions

The central challenge of this research study is to determine the efficacy of full-day kindergarten on students' reading levels at the end of kindergarten and through the end of grade 3. Specifically, this study will address the following questions

1. To what extent, if any, did MCSD's full-day kindergarten program impact the proportion of full-day kindergarten students scoring proficient on the end-of-year DRA, over time, as compared to students from MCSD's half-day kindergarten program?

2. To what extent, if any, did kindergarten program type (i.e., half- or full-day), low income status, and gender impact end-of-year DRA reading scores, over time?
3. To what extent, if any, do end-of-grade 3 DRA reading scores correlate to grade 3 Pennsylvania System of School Assessment (PSSA) reading scores?
4. Is MCSD's full-day kindergarten program a cost-effective alternative to a half-day kindergarten program?

Chapter 2

REVIEW OF LITERATURE

School districts across Pennsylvania, like districts in so many other parts of the country, are feeling the pressures of increased accountability regarding student achievement, especially in reading. The increased awareness of research surrounding the importance of emergent literacy skills and the effectiveness of early childhood programs have caused many state departments of education to consider funding for full-day kindergarten programs (Plucker et al., 2004). As more districts begin offering full-day kindergarten, Karweit (1992) warns that quality use of time in kindergarten may be more important than the amount of time spent in the classroom. Profound effects on students may result from changes to a developmentally appropriate curriculum (Karweit, 1992).

NAEYC and Developmentally Appropriate Practices

Advocates of full-day kindergarten programs argue the extra time provided by a full-day, everyday kindergarten program will naturally increase reading achievement in our young children. Rothenberg (1984, 1995) contends that the extended time from full-day kindergarten programs is only one factor in a child's kindergarten experience. Among other things, Rothenberg (1995) suggests developmentally appropriate kindergarten programs emphasize development of early literacy skills and language

development, provide opportunities for children to develop social skills, and closely monitor and collect students' work to evaluate their progress.

In 1996, the National Association for the Education of Young Children (NAEYC, 1996) adopted a position statement to provide a framework state education departments and school boards could follow when developing early childhood programs. Included in the position statement is a definition of developmentally appropriate practice along with the theoretical viewpoints related to early childhood development.

According to NAEYC (1996), developmentally appropriate practices result from educators making decisions based on three important types of information:

1. What is known about child development and learning – knowledge of age-related human characteristics that permits general predictions within an age range about what activities, materials, interactions, or experiences will be safe, healthy, interesting, achievable, and also challenging to children;
2. What is known about the strengths, interests, and needs of each individual child in the group to be able to adapt for and be responsive to inevitable individual variation; and
3. Knowledge of the social and cultural contexts in which children live to ensure that learning experiences are meaningful, relevant, and respectful for the participating children and their families. (p. 4)

To gain this information for each child, appropriately designed early childhood assessment tools must be deployed [NAEYC & National Association of Early Childhood Specialists in State Departments of Education (NAECS/SDE), 2003]. When this knowledge is acquired, teachers are able to differentiate instruction to better meet the

diverse needs of their children (NAECS/SDE, 2002). Furthermore, Vygotsky and other experts in the study of human development believe fostering age-appropriate social and cultural interactions promotes language development and cognition for young children (Wells, 1994), thus, contributing to their development of emergent literacy skills (Dwyer, Chait, & McKee, 2000).

The challenge is in applying these theories to everyday practices in the early childhood classroom. With proper training, teachers in full-day kindergarten classrooms have the extra time necessary to offer child-centered activities that promote the development of early literacy skills (Elicker & Mathur, 1997; Hough & Bryde, 1996; Martinez & Snider, 2001; Morrow, Strickland, & Woo, 1999). Developmentally appropriate kindergarten programs provide many opportunities for teachers to use scaffolding strategies to instruct children at their proper cognitive level of understanding (NAEYC, 1996).

Vygotsky and Early Literacy Development

According to Blanck (1990), Piaget believed maturity precedes learning. Vygotsky disagreed, arguing that effective pedagogy, “creates learning processes that lead development” (Blanck, 1990, p. 50) and this learning occurs in the zone of proximal development. Vygotsky defined the zone of proximal development (ZPD) as, “the distance between the real level of development and the potential level of development” (Blanck, 1990, p. 50). He asserted that the learning processes created by pedagogy lead the development of children. Consequently, a classroom teacher will set a goal for a

child within the child's "zone." With the guidance of an adult, the child will reach the goal. Another more challenging goal is set and the child will either attain this goal independently or require some assistance from an adult. Within the ZPD, adults are using scaffolding strategies to provide the amount of support necessary for children to progress through the stages of early literacy development (Leong, Bodrova, Hensen, & Henninger, 1999).

Vygotsky viewed the acquisition of language as, "the most significant moment in the course of cognitive development" (Blanck, 1990, p. 47). During symbolic play activities written language develops out of oral language (NAEYC, 1996). Changes in development, which Vygotsky attributes to play, can be described as a transition from reactive behaviors to deliberate behaviors (Leong et al., 1999). Furthermore, Leong et al. (1999) assert that play promotes four major skills necessary for the development of literacy: ability to learn deliberately, symbolic representation, oral language development, and concepts about print. As a result, developmentally appropriate full-day kindergarten programs can provide the enculturation necessary to stimulate a child's early cognitive development.

Full-Day Kindergarten vs. Half-Day Kindergarten

Full-day kindergarten is not a new concept for many parts of the country. In fact, many poor urban school districts in other geographic regions of the United States have had full-day kindergarten programs for many years. The percentage of students enrolled in full-day kindergarten programs increased from 27% in 1977 to 60% in 2001

(Rosenthal & Rathbun, 2005). This dramatic increase in enrollment is a result of various societal factors, including the upsurge in the number of working mothers which has directly impacted the need for all-day child care arrangements for 4 and 5-year-old children (Clark, 2001; Gullo, 1990).

The Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 is a comprehensive national study comparing full-day and half-day kindergarten students in the United States (Walston & West, 2004). Over 3,000 teachers and 20,000 parents and children participated in the first year of this study as researchers visited over 1,000 schools across the country.

Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 showed that children in full-day kindergarten generally come from a lower socio-economic background than their counterparts in half-day kindergarten, full-day kindergarten programs are more likely to be in schools in large cities, and Catholic and private schools are more than twice as likely to offer full-day kindergarten programs than half-day kindergarten (Walston & West, 2004). Full-day kindergarten is more prevalent in the south than any other region in the United States whereas kindergarteners in the west are least likely to attend a full-day kindergarten program (Rosenthal & Rathbun, 2005). Rural schools in the northeast are the least likely to offer full-day kindergarten than any other region. As indicated by Rosenthal and Rathbun (2005), 68% of all students attended preschool prior to entering kindergarten.

Trends in research during the 1970s and 1980s suggested the efficacy of full-day kindergarten related to academic achievement gains was mostly for at risk students (Clark, 2001; Karweit, 1992). A review of the research comparing full-day and half-day

kindergarten programs since 1990 reflects positive academic gains for ALL students (Cryan, Sheehan, Wiechel, & Bandy-Hedden, 1992; Elicker & Mathur, 1997; Fusaro, 1997; Gullo, 2000; Hildebrand, 1997; Hough & Bryde, 1996; Walston & West, 2004; Wang & Johnstone, 1999). Few of the studies, however, follow students' progress beyond their full-day kindergarten experience, thus, are unable to assess the efficacy of full-day kindergarten programs over time. Reflecting the recent research suggesting positive outcomes for all students, ten states now require districts to offer full-day kindergarten programs (Plucker et al., 2004).

Full-day kindergarten significantly increases the amount of time our young children spend in classrooms; however, experts caution school leaders and policy makers that how teachers utilize this increased time is equally, if not, more important (Fromberg, 1992; Gullo, 1990; Karweit, 1992; Nelson, 2000; Rothenberg, 1995). Elicker and Mathur (1997) conducted an extensive 2-year evaluation of a new full-day kindergarten program in Wisconsin. They found that students spent more time in child-initiated activities such as learning centers as well as teacher-directed individual work, and less time in teacher-directed large group activities. Because this system emphasized developmentally appropriate practices in the full-day classrooms, the extra time allowed teachers to better meet students' individual needs within their zone of proximal development, while also fostering symbolic play activities (Elicker & Mathur, 1997).

The Ohio Department of Education sponsored a statewide longitudinal study led by Cryan, Sheehan, Wiechel, and Bandy-Hedden (1992) designed to explore the effects of full-day kindergarten. The researchers found that full-day kindergarten students spent the same amount of time proportionately on reading activities as did the students in half-

day programs; however, students in full-day programs spent more time proportionately in active free play (Cryan, Sheehan, Wiechel, & Bandy-Hedden, 1992). Additionally, the researchers found significant benefits in many behavior outcome measures as well as standardized test score performance at least through grade 1 for students in full-day kindergarten programs.

A similar and more recent study was conducted by researchers in Indiana, which was sponsored by the Center for Evaluation and Education Policy (Plucker et al., 2004). In one of the three main areas of their study, Plucker et al. (2004) sought to find out how time was used in full-day kindergarten classrooms based on national and Indiana data. They found major differences in full-day kindergartens not only in the quantity of time but in the quality of time as compared to half-day kindergarten programs. Full-day kindergarten programs in the Indiana sample had 40 to 50% more instructional time over half-day kindergarten programs as well as evidence suggesting this extra time was spent in child-initiated activities (Plucker et al., 2004). Consequently, full-day kindergarten programs in Indiana were found to be effective in areas of academic achievement as well as in social and behavior ratings, which reflects national trends.

Hough and Bryde (1996) found similar results regarding developmentally appropriate uses of time in their comparison of full- and half-day kindergarten programs in Missouri. In their study, six schools offering full-day kindergarten were compared to schools with similar demographic patterns offering half-day kindergarten. The researchers found that the full-day programs offered more small-group activities with a greater number of social interactions. Additionally, students in the full-day kindergarten programs outscored their half-day counterparts on most of the language arts criteria used

for the study as well as scoring higher marks on a norm-referenced achievement test (Hough & Bryde, 1996).

Walston and West (2004) found significant differences in the amount of instructional time spent in full-day kindergarten programs over half-day programs. This extra time was spent in a variety of ways, including an increased percentage of time spent on 19 of 36 reading and language arts skills, especially the skills considered to be more advanced for kindergarten students. Additionally, students in full-day kindergarten programs spend more time on mathematics, science, and social studies activities. Full-day kindergarten is equally effective for children from different social backgrounds, contradicting the research from the 1970s and 1980s that suggested at-risk students benefited more from full-day kindergarten programs (Walston & West, 2004).

The research clearly suggests full-day kindergarten may have positive effects in many areas of a young child's early development. It is equally clear in the research, however, that while planning full-day kindergarten programs, administrators and teachers must adopt curricula that are developmentally appropriate, especially in the areas of literacy instruction and assessment.

Literacy Instruction and Assessment in Kindergarten

Current research suggests most full-day kindergarten programs being offered across the United States are developmentally appropriate, combining child-initiated activities promoting free play, and providing more quality time for teachers to differentiate instruction and employ scaffolding strategies to instruct within their

students' zone of proximal development (Leong et al., 1999; NAEYC, 1996). Furthermore, national, state, and local trends have emerged suggesting full-day kindergarten is effective for ALL children. As more districts across the country offer full-day kindergarten, it is important for teachers and administrators to understand clearly how literacy instruction and assessment play major roles in a full-day kindergarten program. Morrow et al. (1999) wrote *Literacy Instruction in Half- and Whole-Day Kindergarten: Research to Practice* to better inform the educational community on best practices relating to kindergarten literacy.

In reviewing the issues relevant to half-day and full-day kindergarten programs, Morrow et al. (1999) summarized the importance of developmentally appropriate practices recommended by NAEYC along with the theoretical framework of child development related to social interaction and free play advanced by Piaget and Vygotsky. The large blocks of time necessary for this type of learning are not always available in half-day kindergarten programs. Furthermore, Morrow et al. (1999) suggest

Linking theories such as those mentioned...to literacy development leads to the notion that learning experiences in kindergarten should be designed to be meaningful and functional for children. Literacy activities should be integrated into content-area subjects such as art, music, social studies, science, math, and play through the use of thematic instruction, with equal emphasis placed on the teaching of reading, writing, listening, and oral language...Teachers should provide models of literacy activities for children to emulate, encouraging adult and peer interaction...Assessment is continuous with the use of multiple authentic measures...Literacy learning should be consciously embedded throughout the

curriculum in the entire school day with large blocks of time used for literacy projects. (p. 11).

Kindergarten programs with a strong emphasis on the development of early literacy skills must also incorporate a valid and reliable assessment tool as a central component of the entire program (NAEYC & NAECS/SDE, 2003). While many people associate the term assessment with standardized tests, appropriate assessment for young children involves a formative ongoing process that the classroom teacher uses to guide instruction. Many school districts across the country are using the Developmental Reading Assessment (DRA) as an integral part of their early literacy assessment program. In Louisiana, the state Department of Education requires the use of the DRA for every first, second, and third grade student in the state (Denton, 1999). Additionally, in Kentucky, the DRA is used to evaluate the effectiveness of the statewide Kentucky Reading Project (Almasi, Culver, & Montgomery, n.d.).

The DRA was developed from 1986 to 1988 by Joetta Beaver in collaboration with primary teachers in the Upper Arlington City School District in Ohio. The DRA is a criterion-referenced tool designed for classroom teachers to assess their students' reading progress and to guide instruction. The DRA is administered to each individual student in the classroom. Depending on the student's reading level, this assessment may take up to 20 minutes to determine accurate instructional and independent reading levels for the student. From 1988 through 1996 the DRA was piloted and field tested by numerous districts throughout the country (Pearson Learning Group, n.d.).

In 2000, a test-retest reliability study was conducted using 306 students and 68 teachers ranging from first through third grade (Weber, 2000). The results indicated

consistent evaluations over time. Williams (1999) of Ohio State University conducted a reliability study on the DRA that included 87 teachers across 10 states. Williams (1999) found that the inter-rater agreement using a Rasch rating scale was a strong 0.80 for the first two raters, but fell to 0.74 for three raters, and the internal consistency using Cronbach's alpha was a strong 0.98. Additionally, the construct validity of the DRA was found to be very strong when measuring Spearman's Rho rank order correlation to the Iowa Test of Basic Skills Subscales: Vocabulary, Reading Comprehension, and Total Reading. All correlations were significant at the 0.01 level, with the most significant correlation with Total Reading (Williams, 1999).

Morrow et al. (1999) cite several research studies (Humphrey, 1980; Neiman & Gastright, 1981; & Cryan, Sheehan, Wiechel, & Bandy-Hedden, 1992) that provide evidence of long-term academic gains for students in full-day kindergarten programs over students from half-day kindergarten programs. Many experts, however, argue that much of the research on full-day kindergarten programs has not included true experimental studies, thus, they are skeptical of the positive results reported (Morrow et al., 1999). Because of the conflicting results of earlier studies on full-day kindergarten, Morrow et al. (1999) developed a study to determine the effect of full-day kindergarten and half-day kindergarten programs on literacy achievement of children from inner-city schools.

Morrow et al. (1999) found evidence that full-day kindergarten students outperformed half-day kindergarten students in ALL areas of literacy tested. Moreover, their study supports NAEYC's recommendations for developmentally appropriate practices to be included as an integral part of any full-day kindergarten program. Based on the results of their full-day kindergarten study along with their knowledge of the

development of emergent literacy skills, Morrow et al. (1999) provide several different frameworks for developing a literacy curriculum, integrating literacy into content-area teaching, creating literacy-rich environments, and organizing the instructional day for half- and full-day kindergarten programs.

As a result of Vygotsky's theories related to early literacy, specifically the ZPD (zone of proximal development), and NAEYC's recommendations for developmentally appropriate practices related to instruction and assessment of early learners, kindergarten programs have changed dramatically over the past several decades (NAEYC, 1996). Full-day kindergarten provides the extra time necessary to individualize literacy instruction (Elicker & Mathur, 1997; Hough & Bryde, 1996), while the DRA offers a developmentally appropriate tool for teachers to assess students' progress on early literacy skills and guide instruction within the students' ZPD (Beaver, 1997). While many studies have been conducted to compare full-day kindergarten and half-day kindergarten programs relative to behavioral or achievement outcomes, this researcher found no examples of employing evaluative techniques that combine effectiveness measures with associated costs.

Program Evaluation and Cost-Effectiveness Analysis

Program evaluation, first pioneered by Dr. Robert Rippey while evaluating a decentralization project in Chicago in the 1960s (LeCompte, 1994), is defined as, "A systematic process of describing the components and outcomes of an intervention or service" (NAEYC & NAECS/SDE, 2003, p. 27). The importance of providing

information regarding the quality and efficacy of an educational program is paramount in an age of increased accountability for publicly-funded programs (Gilliam & Leiter, 2003). At the local level, school boards may use program evaluation to provide valuable information to constituents to justify dollars spent on expensive early childhood programs (Donaldson & Christie, in press). School boards may elect to hire an external evaluator or use internal staff to conduct the evaluation.

There are three main components of program evaluation research: process studies, outcome or impact studies, and cost analyses (Gilliam & Leiter, 2003). Individual evaluations may contain any or all of these components. The main goal of a process study, also known as a formative evaluation, is to determine how a program works. Outcome or impact studies are intended to determine to what extent the program achieved the desired goals initially established. There are four different types of cost analysis: cost-effectiveness analysis, cost-benefit analysis, cost-utility analysis, and cost-feasibility analysis (Levin & McEwan, 2001). More commonly used to analyze educational programs, cost-effectiveness analysis seeks to determine a ratio of the costs incurred by a program relative to the outcomes achieved (Gilliam & Leiter, 2003).

Cost-effectiveness analysis is a tool used to compare the effectiveness of two or more educational programs relative to the cost necessary for each program to accomplish a similar measurable objective (Levin & McEwan, 2002). Cost-effectiveness analysis yields a ratio of a program's cost measured in dollars compared to a program's measurable outcomes, which shows how much student achievement is gained for every dollar spent on a particular program (Ashdown & Hummel-Rossi, 2002). According to Ashdown and Hummel-Rossi (2002), the resulting cost-effectiveness ratio is an attempt

to combine the policy maker's desire to be fiscally responsible with the teacher's concern for improving academic gains.

The main purpose of cost-effectiveness analysis is, "to provide a method for choosing among alternatives in order to select those that are able to accomplish a given result most parsimoniously" (Levin & McEwan, 2001, p. 1). According to Levin and McEwan (2001), the United States spends over \$700 billion on education. With the educational accountability movement pressuring educational institutions, strategies to improve efficiency by only 2% would save \$14 billion. Employing cost-effectiveness analysis strategies, while making tough educational policy decisions, may help remove some of the guesswork or politics from the decision-making process (Levin & McEwan, 2001).

This evaluation of Manheim Central School District's full-day kindergarten program includes elements of an impact study and a cost-effectiveness analysis. Relative to impact, this study explores the change in kindergarten offerings with respect to both academic achievement and meeting diverse students' needs. Additionally, detailed quantitative analyses of students' Developmental Reading Assessment (DRA) results as well as teachers' salary and benefits from the initial pilot cohort in year 2000/2001 through the year 2004/2005 will be presented. The results will help to determine if MCSD's full-day kindergarten program is successfully supporting the district's mission and educational goals as a cost-effective alternative to increase student achievement for all students.

Full-Day Kindergarten at Manheim Central School District

Manheim Central School District (MCSD) is a small rural school district of approximately 3,100 students in south central Pennsylvania that for several years leading up to the adoption of full-day kindergarten had been experiencing declining enrollments. Like most small middle-class school districts, MCSD had budget constraints that factored into all major policy decisions regarding educational programs. In 1996, MCSD adopted the following mission statement along with the accompanying educational goals (Manheim Central School District, 2005), “Empowering Individuals Through Development of Academic and Social Skills to Become Responsible Citizens in a Changing World.”

- Raise student achievement for all students.
- Implement an appropriate curriculum and support system based on the diverse needs of all students.
- Curriculum and its delivery will be based on current research and data.
- Provide adequate and flexible buildings with appropriate services.
- Foster positive family and community partnerships.

To specifically address the goal of raising student achievement for all students, MCSD believed every child should be reading on grade level at the end of grade 3. Four educational programs and/or strategies were implemented to address this reading goal: (a) Reading Recovery (Clay, 1993), (b) a comprehensive review of the language arts curriculum, (c) Kid Writing (McCloy, 2002) in kindergarten, grade 1, and grade 2, and (d) full-day kindergarten.

All six district reading specialists were moved to the elementary level, specifically in the primary grades, to establish a preventative literacy model rather than an intervention model. They all received extensive training in Reading Recovery with the goal of intensively serving the lowest 10% of first graders during a daily 30-minute block of one-on-one instruction.

The district adopted a language arts curriculum with a focus on the four blocks of literacy. All primary teachers in grades kindergarten through grade 3 attended intensive training in comprehensive literacy, formerly called block literacy. This training focused on word work, self-selected reading, guided reading, and writing. Primary teachers were required to spend a minimum of 2.5 hours per day on language arts. To assist teachers in effectively implementing these reading strategies, the school board committed resources to maintaining smaller class sizes in the primary grades.

Kid Writing was adopted as the core writing component of the kindergarten and first grade language arts program. Developed by Feldgus and Caronick, Kid Writing is a child-centered journal writing program designed to support the developmentally appropriate practices supported by NAEYC as well as Piaget's and Vygotsky's child development theories (McCloy, 2002). Student journals are set up so the students may draw and color a picture of their choice on the left-hand page. On the right side, students write a story describing their picture. Each student meets individually with the teacher to read the story and correct misspelled words. Forty-five to sixty minutes is devoted to this process daily.

Finally, MCSD adopted a pilot program for one section of full-day kindergarten to help support the increased emphasis on early literacy. The proposal, submitted by

kindergarten teachers with the support of an elementary principal, presented research supporting increased student achievement for students from urban settings (Gust, 2000). Rather than furloughing teachers due to declining enrollment, MCSD reallocated staff to offer one section of full-day kindergarten during the 2000/2001 school year. This section was piloted in the district's largest elementary building and students were selected by a lottery system.

At the end of the first pilot year, students in the full-day kindergarten section scored higher than their half-day counterparts in letter identification, written vocabulary, and the Developmental Reading Assessment. Additionally, students in full-day kindergarten had significantly fewer absences. MCSD noted other significant benefits of the pilot program, including the teacher had a greater knowledge of each child by conference time, children felt secure in the building, over two-thirds of the children chose to read and write during free choice time, strategies learned in reading and writing were used more consistently across the curriculum, mid-morning snacks were needed during the first two months of school, medical and dental appointments were scheduled either at the beginning or ending of the day, and ALL children exited kindergarten with reading and writing skills in place (Manheim Central School District, 2005).

The first section of full-day kindergarten in the Manheim Central School District exceeded everyone's expectations. Consequently, MCSD decided to develop plans to fully implement full-day kindergarten across the district. During the 2001/2002 school year out of ten total kindergarten sections four were full-day and six were half-day. During the 2002/2003 school year out of ten total kindergarten sections six were full-day and four were half-day. Finally, during the 2003/2004 school year, MCSD fully

implemented full-day kindergarten by offering ten sections that served all of the students in the district. Currently, MCSD is in the third year of offering full-day kindergarten to all of the district's incoming kindergarten students.

Integral to MCSD's comprehensive literacy plan was a thorough assessment plan to be used by classroom teachers and reading specialists to guide instruction. In the spring of the 2000/2001 school year, all students in kindergarten through grade 3 were given the Developmental Reading Assessment. The following year the DRA was expanded to include fall, winter, and spring assessments for all students in kindergarten through grade 3. The DRA is a tool specifically designed to assess a student's reading progress over time and guide instruction (Beaver, 1997).

Manheim Central School District's full-day kindergarten program was implemented to support the district's goals as mentioned above. This study assumes that characteristics of this program reflect developmentally appropriate practices as recommended by NAEYC. Moreover, the intensive training provided to the classroom teachers and reading specialists is assumed to have enabled them to use differentiated instruction and scaffolding strategies to instruct students within their zone of proximal development.

Conclusion

Over the last several decades of the 20th century, significant changes occurred related to full-day kindergarten programs across the country. While Rosenthal and Rathbun (2005) call attention to the tremendous increases in full-day kindergarten

offerings across the United States, Karweit (1992), Rothenberg (1995), Morrow et al. (1999), and NAEYC (1996) emphasize the importance of incorporating developmentally appropriate practices within a full-day kindergarten program's curricular, instructional, and assessment framework.

Recent studies have shown that when districts implement full-day kindergarten programs based on current research related to Vygotsky's theories of human development (Wells, 1994) and NAEYC's (1996) recommendations for developmentally appropriate practices, ALL students may benefit in the acquisition of early literacy skills (Cryan, Sheehan, Wiechel, & Bandy-Hedden, 1992; Elicker & Mathur, 1997; Fusaro, 1997; Gullo, 2000; Hildebrand, 1997; Hough & Bryde, 1996; Morrow, Strickland, & Woo, 1999; Walston & West, 2004).

The researcher found no full-day kindergarten studies across the country that analyzed consistent student reading data through grade 3 AND included a cost-effectiveness analysis comparing full-day kindergarten expenses to those from half-day kindergarten. This longitudinal study analyzed DRA scores over a five-year period to determine to what extent, if any, full-day kindergarten has positively impacted students' reading levels. Additionally, this study employed cost-effectiveness analysis strategies to compare costs related to full- and half-day kindergarten programs.

Chapter 3

DESIGN AND METHODOLOGY

The central challenge of this research study is to use elements of program evaluation and cost-effectiveness analysis to determine the efficacy of Manheim Central School District's full-day kindergarten program as measured by DRA reading levels of students. More specifically, this study is designed to determine to what extent, if any, MCSD's full-day kindergarten program has affected the DRA reading levels of students from kindergarten through the end of grade 3. Furthermore, it is designed to determine if MCSD's full-day kindergarten program is supporting the district's mission and educational goals while providing a cost-effective alternative to a half-day kindergarten program. Ultimately, the Manheim Central School District Board of School Directors, based on recommendations from the central office administration, must make a policy decision regarding the future of their full-day kindergarten program.

Research Design

Manheim Central School District administers the Developmental Reading Assessment three times a year to all students in kindergarten through grade 3. The district collected reading data over a five-year period ranging from fall of 2000 through the spring of 2005. Over the course of this five-year period, MCSD went from offering

one pilot section of full-day kindergarten to offering ten full-day kindergarten sections to all of the district's incoming students. The implementation process was as follows:

Year 1 (00/01): 1 full-day section and 9 half-day sections	(Cohort 1)
Year 2 (01/02): 4 full-day sections and 6 half-day sections	(Cohort 2)
Year 3 (02/03): 6 full-day sections and 4 half-day sections	(Cohort 3)
Year 4 (03/04): 10 full-day sections and 0 half-day sections	(Cohort 4)
Year 5 (04/05): 10 full-day sections and 0 half-day sections	(Cohort 5)

Manheim Central School District granted the researcher access to the necessary data from the five cohorts. The composition of student characteristics within each of the five cohorts related to the students' abilities to work independently, as well as their early literacy skills upon entering kindergarten, presented a potential threat to the internal validity of this study (Shadish, Cook, & Campbell, 2002). In addressing this issue, the researcher used descriptive statistics to compare demographic data of all students across the five cohorts. Additionally, the researcher combined full-day and half-day kindergarten sections across cohorts where appropriate, thus creating a significantly larger sample size of full- and half-day students.

Quantitative data analyses were utilized to determine the proportion of full-day kindergarten students scoring proficient on the end-of-year DRA as compared to their half-day counterparts, over time. Additionally, the researcher conducted a cost-effectiveness analysis of full-day and half-day kindergarten programs relative to students' end-of-year DRA scores, over time. Results of these findings are presented in Chapter 4. Specifically, this study addressed the following questions

1. To what extent, if any, did MCSD's full-day kindergarten program impact the proportion of full-day kindergarten students scoring proficient on the end-of-year DRA, over time, as compared to students from MCSD's half-day kindergarten program?
2. To what extent, if any, did kindergarten program type (i.e., half- or full-day), low income status, and gender impact end-of-year DRA reading scores, over time?
3. To what extent, if any, do end-of-grade 3 DRA reading scores correlate to grade 3 Pennsylvania System of School Assessment (PSSA) reading scores?
4. Is MCSD's full-day kindergarten program a cost-effective alternative to a half-day kindergarten program?

The researcher provided demographic data for full- and half-day kindergarten students in all cohorts (See Tables 2-12, Chapter 4). The researcher used the findings from questions 1 and 2 to determine if there is longitudinal evidence on the efficacy of full-day kindergarten programming on reading scores for ALL students, as well as students from low income families. Furthermore, questions 1 and 2 may supply evidence that Manheim Central School District's decision to offer full-day kindergarten supports two of their five educational goals: raise student achievement for all students and implement an appropriate curriculum and support system based on the diverse needs of all students. Outcomes from question 3 support the use of the DRA as a valid and appropriate early childhood assessment tool. Finally, the results from question 4 may help policy makers decide if full-day kindergarten is a cost-effective alternative to half-day kindergarten.

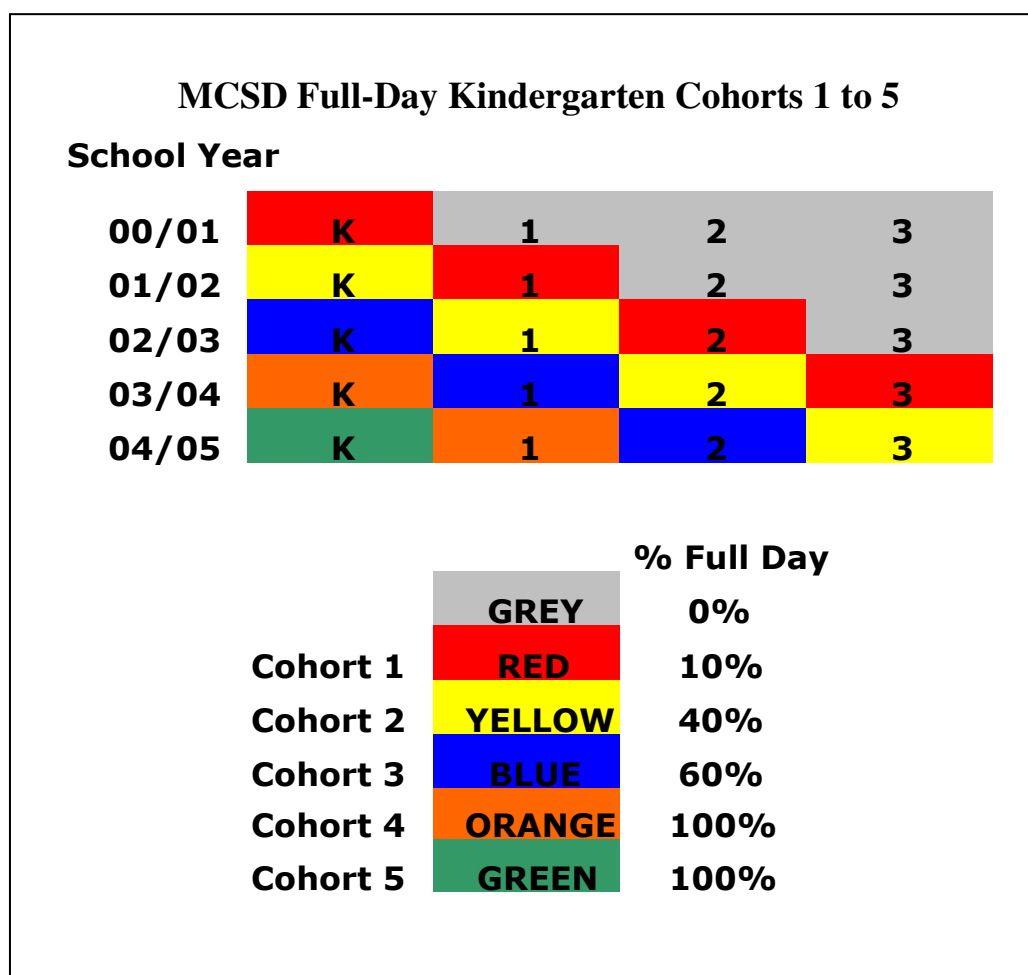
Methodology

Reading data (DRA scores) were collected for all students as well as total dollar amounts for teacher salaries and benefits in every cohort from the 2000/2001 school year through the 2004/2005 school year. Additionally, the following data have been collected for each student: gender, free and reduced lunch status for each year in the study, kindergarten program (full-day or half-day), and PSSA reading scaled score (grade 3 only).

Sample

This study analyzed student reading data as well as the total program costs in kindergarten teacher salary and benefits from five cohort groups (figure 1).

Figure 1

MCS D Full-Day Kindergarten Cohorts 1 to 5

Cohort 1 represents students who entered kindergarten in the fall of 2000 and were continuously enrolled in MCS D throughout the entire kindergarten year. The total number of students in Cohort 1, as well as subsequent cohort groups, gradually decreases over the course of the study, reflecting students who moved out of the district as well as students who were placed in special education. During the 2000/2001 school year, MCS D offered one pilot section of full-day kindergarten and nine sections of half-day kindergarten. During the spring of this school year, MCS D adopted the DRA; consequently, the researcher collected only end-of-kindergarten DRA scores for each

student in this cohort. The researcher collected total district expenditures related to kindergarten teacher salary and benefits for this, and subsequent, cohorts.

Cohort 2 represents students who entered kindergarten in the fall of 2001 and were continuously enrolled in MCSD throughout the entire kindergarten year. During the 2001/2002 school year, MCSD offered four sections of full-day kindergarten and six sections of half-day kindergarten. During this school year and subsequent years in the study, MCSD administered the DRA in the fall, winter, and spring. The researcher collected fall and spring DRA data for each student in this, and subsequent, cohorts.

Cohort 3 represents students who entered kindergarten in the fall of 2002 and were continuously enrolled in MCSD throughout the entire kindergarten year. During the 2002/2003 school year, MCSD offered six sections of full-day kindergarten and four sections of half-day kindergarten.

Cohort 4 represents students who entered kindergarten in the fall of 2003 and were continuously enrolled in MCSD throughout the entire kindergarten year. During the 2003/2004 school year, MCSD offered 10 sections of full-day kindergarten. The district was willing to offer a section of half-day kindergarten, if 15 or more families requested this option. Out of approximately 200 eligible families, 11 families requested half-day kindergarten. Consequently, all students in Cohort 4 participated in full-day kindergarten.

Cohort 5 represents students who entered kindergarten in the fall of 2004 and were continuously enrolled in MCSD throughout the entire kindergarten year. During the 2004/2005 school year, MCSD offered 10 sections of full-day kindergarten. Again, the district was willing to offer a section of half-day kindergarten, if 15 or more families

requested this option. Out of approximately 200 eligible families, only one family requested half-day kindergarten. Consequently, all students in Cohort 5 participated in full-day kindergarten.

Instrumentation

Manheim Central School District uses the Developmental Reading Assessment to assess the reading progress of all students in grades kindergarten through grade 3. The DRA was selected as a result of a Language Arts Task Force recommendation to implement a literacy assessment tool for primary students (kindergarten through grade 3) that offers authentic, developmentally appropriate strategies for monitoring students' reading progress over time.

During the 2000/2001 school year, students in the Manheim Central School District were administered the DRA during the spring semester only. All students in subsequent years were administered the DRA at the beginning, middle, and end of the school years; however, only beginning and ending scores from these years were utilized by the researcher in this study.

MCS D established fall and spring proficiency levels for kindergarten through grade 3 according to Table 1 below based on grade level benchmarks from the *Developmental Reading Assessment Resource Guide* (Beaver, 1997). For the purposes of this study, students were considered proficient if they scored at the Proficient or Advanced level from Table 1. Students scoring at the Partially Proficient level were coded as not yet proficient.

Table 1

DRA Proficiency Levels

	<u>Partially Proficient</u>		<u>Proficient</u>		<u>Advanced</u>	
	<u>Fall</u>	<u>Spring</u>	<u>Fall</u>	<u>Spring</u>	<u>Fall</u>	<u>Spring</u>
KDG	<0	0,1	0	2	1+	3+
Grade 1	0-2	0-12	3	14-16	4+	18+
Grade 2	0-16	0-24	18	28	20+	30+
Grade 3	0-28	0-34	30	38	34+	40+

Data Analysis

Research Question #1: To what extent, if any, did MCSD's full-day kindergarten program impact the proportion of full-day kindergarten students scoring proficient on the end-of-year DRA, over time, as compared to students from MCSD's half-day kindergarten program?

As noted in Chapter 2 (see p. 13), the researcher found few studies that followed students beyond kindergarten. Research Question #1 was designed to determine if MCSD's full-day kindergarten program resulted in growth and maintenance patterns related to reading growth and proficiency as measured by the DRA.

To answer this question frequency counts, percents from tallies, and crosstabulation of end-of-year DRA proficiency level reading data were examined for all students from Cohorts 1 through 5 as the students progressed from kindergarten through grade 3, where possible. This question was answered using a chi-square test of association to test the following null hypotheses:

Hypothesis #1a: There is no significant difference in the proportion of students scoring proficient on the end-of-kindergarten DRA between students in half- and full-day kindergarten programs from Cohorts 1 through 4.

Hypothesis #1b: There is no significant difference in the proportion of students scoring proficient on the end-of-first grade DRA between students coming from half- and full-day kindergarten programs from Cohorts 1 through 4.

Hypothesis #1c: There is no significant difference in the proportion of students scoring proficient on the end-of-second grade DRA between students coming from half- and full-day kindergarten programs from Cohorts 1 through 3.

Hypothesis #1d: There is no significant difference in the proportion of students scoring proficient on the end-of-third grade DRA between students coming from half- and full-day kindergarten programs from Cohorts 1 and 2.

Hypothesis #1e: There is no significant increase in:

- i. The proportion of ALL students scoring proficient on the end-of-kindergarten DRA relative to students from Cohorts 1 through 5.
- ii. The proportion of ALL students scoring proficient on the end-of-first grade DRA relative to students from Cohorts 1 through 4.
- iii. The proportion of ALL students scoring proficient on the end-of-second grade DRA relative to students from Cohorts 1 through 3.
- iv. The proportion of ALL students scoring proficient on the end-of-third grade DRA relative to students from Cohorts 1 and 2.

Research Question #2: To what extent, if any, did kindergarten program type, low income status, and gender impact end-of-year DRA reading scores, over time?

Trends from full-day kindergarten studies during the 1970s and 1980s suggested full-day kindergarten is more beneficial for at-risk students (see p. 12). Research Question #2 was designed to determine if factors other than kindergarten program type significantly effected end-of-year DRA reading scores.

To answer this question a 2x2x2 analysis of variance (ANOVA) model was developed using end-of-year DRA scores as the criterion variable and kindergarten program type, low income status, and gender as the predictor variables for each grade level, kindergarten through grade 3. The 2x2x2 ANOVA was used to test the following null hypotheses:

Hypothesis #2a: There is no significant interaction between end-of-kindergarten DRA scores and any combination of kindergarten program type, low income status, and/or gender for ALL kindergarten students from Cohorts 1 through 5.

Hypothesis #2b: There is no significant interaction between end-of-grade 1 DRA scores and any combination of kindergarten program type, low income status, and/or gender for ALL grade 1 students from Cohorts 1 through 4.

Hypothesis #2c: There is no significant interaction between end-of-grade 2 DRA scores and any combination of kindergarten program type, low income status, and/or gender for ALL grade 2 students from Cohorts 1 through 3.

Hypothesis #2d: There is no significant interaction between end-of-grade 3 DRA scores and any combination of kindergarten program type, low income status, and/or gender for ALL grade 3 students in Cohorts 1 and 2.

Research Question #3: To what extent, if any, do end-of-grade 3 DRA reading scores correlate to grade 3 Pennsylvania System of School Assessment (PSSA) reading scores?

Increased accountability pressures resulting from the federal government's No Child Left Behind Act prompted the Pennsylvania Department of Education to create Accountability Block Grants as a strategy for improving student performance on the PSSA (see p. 1). Research Question #3 was designed to determine if the DRA can be used as a predictor of student performance on the PSSA.

To answer this question a Pearson correlation coefficient was calculated for end-of-third grade DRA scores and the students corresponding third grade PSSA reading scores for students from Cohorts 1 and 2. The researcher used raw data scores, because the Pearson correlation coefficient is used to determine the strength of an association between two numerical, not categorical, variables (Berenson & Levine, 1999).

Research Question #4: Is MCSD's full-day kindergarten program a cost-effective alternative to a half-day kindergarten program?

As noted in Chapter 2 (p. 22), this researcher found no longitudinal, full-day kindergarten studies that analyzed reading data AND employed cost-effectiveness strategies. This question was designed to compare MCSD's full-day and half-day kindergarten programs specifically connecting DRA scores to program costs.

To answer this question a cost-effective analysis was utilized. This analytical technique requires two primary data elements: costs and measurable outcomes for both programs. They are combined to calculate a cost-effectiveness ratio (CER) for each program and the program ratios are compared. The program with the lowest cost per

outcome measure achieved (or the highest outcome measure per dollar spent) is the most cost effective.

The cost of each program included only personnel costs— teacher salaries and benefits. Nonpersonnel costs (purchased services, supplies, equipment) were excluded from the analysis because personnel costs comprise roughly two-thirds of Manheim Central School District’s operating budget (G. Ioannidis, personal communication, February 24, 2006). Further, nonpersonnel costs are relatively uniform between the two types of programs and the school district accounting system did not collect nonpersonnel costs by type of kindergarten program and without further information assignment of nonpersonnel costs to half- or full-day kindergarten programs would have to be arbitrary and uniform. Consequently, excluding these costs would have little impact on the program costs.

Actual salary amounts were obtained from district records for each kindergarten teacher, half- or full-day, for the five years of the study. Benefits were assigned to each teacher based on the average percentage of salary for the district for each year. The total cost for each kindergarten classroom was the sum of salary and benefits for the classroom teacher. The costs for the half-day kindergarten program for a given year were the sum of all half-day kindergarten teachers, while costs for the full-day kindergarten program for a given year were the sum of all full-day kindergarten teachers.

The measure of effectiveness selected was the total number of students scoring proficient on the end-of-year DRA. DRA scores were collected for each student in each cohort for every year they were in school during the study period. All students who began in half-day or full-day kindergarten were included.

With the cost and effectiveness data in place, CERs (cost-effectiveness ratio) were calculated to compare half-day and full-day program results. The ratio calculations were

1. By individual cohort to compare each year in which there were both half-day and full-day programs in operation. Ratios were calculated not only for the end of kindergarten, but for all grade years experienced by each cohort to examine the maintenance of effect over time, if any.

- a. Cohort 1: A CER was calculated for students from full-day kindergarten and for students from half-day kindergarten using as measures of effectiveness:

- i. The total number of students scoring proficient on the end-of-kindergarten DRA.
- ii. The total number of students scoring proficient on the end-of-first grade DRA.
- iii. The total number of students scoring proficient on the end-of-second grade DRA.
- iv. The total number of students scoring proficient on the end-of-third grade DRA.

- b. Cohort 2: A CER was calculated for students from full-day kindergarten and for students from half-day kindergarten using as measures of effectiveness:

- i. The total number of students scoring proficient on the end-of-kindergarten DRA.

- ii. The total number of students scoring proficient on the end-of-first grade DRA.
 - iii. The total number of students scoring proficient on the end-of-second grade DRA.
 - iv. The total number of students scoring proficient on the end-of-third grade DRA.
 - c. Cohort 3: A CER was calculated for students from full-day kindergarten and for students from half-day kindergarten using as measures of effectiveness:
 - i. The total number of students scoring proficient on the end-of-kindergarten DRA.
 - ii. The total number of students scoring proficient on the end-of-first grade DRA.
 - iii. The total number of students scoring proficient on the end-of-second grade DRA.
- 2. By combined cohorts to compare the results for all students in half-day and full-day programs at the end of each grade. The number of cohorts that had completed each grade diminished in the later years of the study.
 - a. Cohorts 1 through 4 combined: A CER was calculated using as measures of effectiveness:
 - i. The total number of full-day kindergarten students scoring proficient on the end-of-kindergarten DRA and the total number of

- half-day kindergarten students scoring proficient on the end-of-kindergarten DRA.
- ii. The total number of full-day kindergarten students scoring proficient on the end-of-grade 1 DRA and the total number of half-day kindergarten students scoring proficient on the end-of-grade 1 DRA.
- b. Cohorts 1 through 3 combined: A CER was calculated using as measures of effectiveness:
- i. The total number of full-day kindergarten students scoring proficient on the end-of-grade 2 DRA and the total number of half-day kindergarten students scoring proficient on the end-of-grade 2 DRA.
- c. Cohorts 1 and 2 combined: A CER was calculated using as the measures of effectiveness:
- i. The total number of full-day kindergarten students scoring proficient on the end-of-grade 3 DRA and the total number of half-day kindergarten students scoring proficient on the end-of-grade 3 DRA.
3. By beginning and ending cohorts to examine the last year of the mostly half-day approach with the latest fully operational year of the full-day kindergarten program.
- a. Cohort 1 versus Cohort 5: A CER was calculated using as the measures of effectiveness:

- i. The total number of half-day kindergarten students from Cohort 1 scoring proficient on the end-of-kindergarten DRA as compared to the total number of full-day kindergarten students from Cohort 5 scoring proficient on the end-of-kindergarten DRA.

Operational Definitions

The variable “gender” was defined as male and female.

The variable “cost” refers to the total number of dollars spent in salary and benefits for full- and half-day kindergarten teachers.

The variable “low income” refers to the free and reduced lunch status of the students and was treated as a dichotomous variable with responses of “yes” or “no.” Students from families with a combined household income at or below 185% of the poverty level were eligible to receive free or reduced lunch.

The variable “kindergarten program” refers to the type of kindergarten program the students received. Students either received a full-day or half-day kindergarten designation.

The variable “beginning DRA” refers to the DRA reading scores students received in September, while “ending DRA” refers to the DRA reading scores students received in May.

The variable “DRA Proficiency Level” was treated as a dichotomous variable. Scores of Proficient or Advanced from Table 1 were coded “yes,” while Partially Proficient scores were coded “no.”

The variable “PSSA reading scaled score” refers to the reading scaled score grade 3 students (Cohorts 1 and 2 only) received on the Pennsylvania System of School Assessment (PSSA).

Chapter 4

PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to determine the efficacy of Manheim Central School District's full-day kindergarten program as compared to its half-day kindergarten program relative to students' reading levels through the end of grade 3.

Furthermore, this study sought to determine if MCSD's full-day kindergarten program is supporting the district's mission and educational goals while providing a cost-effective alternative to the half-day kindergarten program. The dependent variable was end-of-year DRA scores while the independent variables were kindergarten program type, low income status, and gender.

This study analyzed both interval level and categorical data. DRA reading scores and PSSA reading scaled scores are interval level, while DRA proficiency levels, gender, low income status, and kindergarten program type are categorical. Frequency counts, percents from tallies, and crosstabulation were used to describe the distribution of categorical variables where necessary. Descriptive statistics were used to describe student characteristics of each cohort. An alpha level of .05 was used for all hypothesis tests throughout the study.

When comparing categorical data from two or more independent groups, the researcher used a chi-square test of association to determine significant differences in proportions of students scoring proficient or above on the DRA where necessary (Norusis, n.d.). The researcher used the Pearson correlation coefficient to determine the

strength of the linear relationship between two variables as necessary (McKenzie & Goldman, 2005). Finally, the researcher employed analysis of variance (ANOVA) techniques as well as cost-effectiveness analysis (Levin & McEwan, 2001) strategies where appropriate.

Frequency counts and percents from tallies were used to describe kindergarten program type, gender, low income status, and end-of-year DRA proficiency levels as students progressed from kindergarten through grade 3, where possible, for each of the five cohorts. Additionally, frequency counts and percents from tallies were used to describe kindergarten program type, gender, low income status, and end-of-year DRA proficiency levels for all students collectively from Cohorts 1 through 4 as the students progressed from kindergarten through grade 3, where possible.

Description of Individual Cohorts

Cohort 1 represents MCSD students who enrolled in kindergarten in the fall of 2000 and were continuously enrolled throughout the entire academic year. During the 2000/2001 school year, MCSD offered one pilot section of full-day kindergarten and nine sections of half-day kindergarten. Demographic characteristics relating to kindergarten program type, gender, and low income status are summarized in Table 2 as students in Cohort 1 progressed from kindergarten through grade 3. The total number of students in Cohort 1, as well as subsequent cohort groups, gradually decreased over the course of the study, reflecting students who moved out of the district as well as students who were placed in special education.

Table 2

Distribution of Demographic Characteristics Within Cohort 1 from Kindergarten Through Grade 3

	Kindergarten (n=177)		Grade 1 (n=161)		Grade 2 (n=142)		Grade 3 (n=133)	
<u>Program Type</u>								
Half-Day	159	89.8%	144	89.4%	125	88.0%	118	88.7%
Full-Day	18	10.2%	17	10.6%	17	12.0%	15	11.3%
	177	100%	161	100%	142	100%	133	100%
<u>Gender</u>								
Female	79	44.6%	69	42.9%	62	43.7%	58	43.6%
Male	98	55.4%	92	57.1%	80	56.3%	75	56.4%
	177	100%	161	100%	142	100%	133	100%
<u>Low Income</u>								
No	156	88.1%	134	83.2%	123	86.6%	113	85.0%
Yes	21	11.9%	27	16.8%	19	13.4%	20	15.0%
	177	100%	161	100%	142	100%	133	100%

To further analyze potential demographic differences among students in Cohort 1, Table 3 provides a summary of the total number and percentage of students who attended full- and half-day kindergarten by gender and low income status. As shown in Table 3, there are no significant differences in gender ($p = 0.629$) and low income status ($p = 0.917$) between students enrolled in half- and full-day kindergarten programs for Cohort 1.

Table 3

Gender and Low Income Status by Kindergarten Program Type for Cohort 1

	Full-Day (n=18)		Half-Day (n=159)		Total (n=177)	
	n	%	n	%	n	%
<u>Gender</u>						
Female	9	50.0%	70	44.0%	79	44.6%
Male	9	50.0%	89	56.0%	98	55.4%
Total	18	100.0%	159	100.0%	177	100.0%
<u>Low Income</u>						
No	16	88.9%	140	88.1%	156	88.1%
Yes	2	11.1%	19	11.9%	21	11.9%
Total	18	100.0%	159	100.0%	177	100.0%
Gender	$X^2 (1, N=177)=0.234, p=0.629$					
Low Income	$X^2 (1, N=177)=0.011, p=0.917$					

Cohort 2 represents MCSD students who enrolled in kindergarten in the fall of 2001 and were continuously enrolled throughout the entire academic year. During the 2001/2002 school year, MCSD offered four sections of full-day kindergarten and six sections of half-day kindergarten. Demographic characteristics relating to kindergarten program type, gender, and low income status are summarized in Table 4 as students in Cohort 2 progressed from kindergarten through grade 3.

Table 4

Distribution of Demographic Characteristics Within Cohort 2 from Kindergarten Through Grade 3

	Kindergarten (n=195)		Grade 1 (n=175)		Grade 2 (n=166)		Grade 3 (n=157)	
<u>Program Type</u>								
Half-Day	116	59.5%	108	61.7%	102	61.4%	96	61.1%
Full-Day	79	40.5%	67	38.3%	64	38.6%	61	38.9%
	195	100%	175	100%	166	100%	157	100%
<u>Gender</u>								
Female	96	49.2%	92	52.6%	87	52.4%	84	53.5%
Male	99	50.8%	83	47.4%	79	47.6%	73	46.5%
	195	100%	175	100%	166	100%	157	100%
<u>Low Income</u>								
No	165	84.6%	149	85.1%	139	83.7%	130	82.8%
Yes	30	15.4%	26	14.9%	27	16.3%	27	17.2%
	195	100%	175	100%	166	100%	157	100%

As shown in Table 5, there are no significant differences in gender ($p = 0.256$) and low income status ($p = 0.458$) between students enrolled in half- and full-day kindergarten programs for Cohort 2.

Table 5

Gender and Low Income Status by Kindergarten Program Type for Cohort 2

	Full-Day (n=79)		Half-Day (n=116)		Total (n=195)	
	n	%	n	%	n	%
<u>Gender</u>						
Female	35	44.3%	61	52.6%	96	49.2%
Male	44	55.7%	55	47.4%	99	50.8%
Total	79	100.0%	116	100.0%	195	100.0%
<u>Low Income</u>						
No	65	82.3%	100	86.2%	165	84.6%
Yes	14	17.7%	16	13.8%	30	15.4%
Total	79	100.0%	116	100.0%	195	100.0%
Gender	$X^2 (1, N=195)=1.290, p=0.256$					
Low Income	$X^2 (1, N=195)=0.557, p=0.458$					

Cohort 3 represents MCSD students who enrolled in kindergarten in the fall of 2002 and were continuously enrolled throughout the entire academic year. During the 2002/2003 school year, MCSD offered six sections of full-day kindergarten and four sections of half-day kindergarten. Demographic characteristics relating to kindergarten program type, gender, and low income status are summarized in Table 6 as students in Cohort 3 progressed from kindergarten through grade 2.

Table 6

Distribution of Demographic Characteristics Within Cohort 3 from Kindergarten Through Grade 2

	Kindergarten (n=178)		Grade 1 (n=158)		Grade 2 (n=143)	
<u>Program Type</u>						
Half-Day	59	33.1%	45	28.5%	43	30.1%
Full-Day	119	66.9%	113	71.5%	100	69.9%
	178	100%	158	100%	143	100%
<u>Gender</u>						
Female	80	44.9%	73	46.2%	67	46.9%
Male	98	55.1%	85	53.8%	76	53.1%
	178	100%	158	100%	143	100%
<u>Low Income</u>						
No	158	88.8%	130	82.3%	116	81.1%
Yes	20	11.2%	28	17.7%	27	18.9%
	178	100%	158	100%	143	100%

As shown in Table 7, there are no significant differences in gender ($p = 0.869$) and low income status ($p = 0.185$) between students enrolled in half- and full-day kindergarten programs for Cohort 3.

Table 7

Gender and Low Income Status by Kindergarten Program Type for Cohort 3

	Full-Day (n=119)		Half-Day (n=59)		Total (n=178)	
	n	%	n	%	n	%
<u>Gender</u>						
Female	54	45.4%	26	44.1%	80	44.9%
Male	65	54.6%	33	55.9%	98	55.1%
Total	119	100.0%	59	100.0%	178	100.0%
<u>Low Income</u>						
No	103	86.6%	55	93.2%	158	88.8%
Yes	16	13.4%	4	6.8%	20	11.2%
Total	119	100.0%	59	100.0%	178	100.0%

Gender $X^2 (1, N=178)=.027, p=0.869$

Low Income $X^2 (1, N=178)=1.757, p=0.185$

Cohort 4 represents MCSD students who enrolled in kindergarten in the fall of 2003 and were continuously enrolled throughout the entire academic year. During the 2003/2004 school year, MCSD offered ten sections of full-day kindergarten to all students. Demographic characteristics relating to gender and low income status are summarized in Table 8 as students in Cohort 4 progressed from kindergarten through grade 1.

Table 8

Distribution of Demographic Characteristics Within Cohort 4 from Kindergarten Through Grade 1

	Kindergarten (n=190)		Grade 1 (n=171)	
<u>Gender</u>				
Female	94	49.5%	84	49.1%
Male	96	50.5%	87	50.9%
	190	100%	171	100%
<u>Low Income</u>				
No	153	80.5%	130	76.0%
Yes	37	19.5%	41	24.0%
	190	100%	171	100%

Cohort 5 represents MCSD students who enrolled in kindergarten in the fall of 2004 and were continuously enrolled throughout the entire academic year. During the 2004/2005 school year, MCSD offered ten sections of full-day kindergarten to all students. Demographic characteristics relating to gender and low income status are summarized in Table 9.

Table 9

Distribution of Demographic Characteristics Within Cohort 5

Kindergarten (n=190)			
<u>Gender</u>			
Female	88	46.3%	
Male	102	53.7%	
	190	100%	
 <u>Low Income</u>			
No	147	77.4%	
Yes	43	22.6%	
	190	100%	

The information presented in Tables 2 through 9 demonstrates that there were no significant differences among the demographic characteristics within each of the five cohorts. This information plays an important role when comparing DRA reading scores and cost-effectiveness ratios later in Chapter 4.

For all students in Cohorts 1 to 5, Table 10 summarizes the DRA proficiency levels by their kindergarten program type, full-day or half-day kindergarten. For example, out of the 159 students from Cohort 1 who attended half-day kindergarten, 72.3% were proficient on the end-of-kindergarten DRA. Out of the 144 students from Cohort 1 who also completed grade 1 at Manheim Central, 74.3% were proficient on the end-of-grade 1 DRA.

Table 10

Distribution of End-of-Year DRA Proficiency Levels by Cohort and Program Type

	Kindergarten		Grade 1		Grade 2		Grade 3	
	n	% Prof DRA	n	% Prof DRA	n	% Prof DRA	n	% Prof DRA
<u>Cohort 1</u>								
Half-Day	159	72.3%	144	74.3%	125	80.0%	118	78.8%
Full-Day	18	94.4%	17	35.3%	17	35.3%	15	53.3%
	177	74.6%	161	70.2%	142	74.7%	133	75.9%
<u>Cohort 2</u>								
Half-Day	116	57.8%	108	67.6%	102	76.5%	96	80.2%
Full-Day	79	89.9%	67	86.6%	64	84.4%	61	83.6%
	195	70.8%	175	74.9%	166	79.5%	157	81.5%
<u>Cohort 3</u>								
Half-Day	59	79.7%	45	77.8%	43	81.4%		
Full-Day	119	92.4%	113	77.9%	100	83.0%		
	178	88.2%	158	77.9%	143	82.5%		
<u>Cohort 4</u>								
Full-Day	190	92.6%	171	78.4%				
<u>Cohort 5</u>								
Full-Day	190	97.9%						

For all students in Cohorts 1 to 5, Table 11 summarizes the percentage of low income students entering kindergarten for each cohort. Out of the 177 students from Cohort 1 entering kindergarten, 11.9% were classified as low income, while 22.6% out of the 190 students entering kindergarten for Cohort 5 were classified as low income. This upward trend in the percentage of low income students entering kindergarten is significant ($p = 0.011$) at the 0.05 alpha level.

Table 11

Percentage of Low Income Students Entering Kindergarten for Cohorts 1 to 5

Kindergarten		
	n	% Low Income
Cohort 1	177	11.9%
Cohort 2	195	15.4%
Cohort 3	178	11.2%
Cohort 4	190	19.5%
Cohort 5	190	22.6%
Total	930	16.2%

Note: $X^2(4, N=930)=13.042, p=0.011$

Description of Combined Cohorts

The researcher increased the sample size at all grade levels by combining cohorts. Cohorts were combined by grade level as follows: all kindergarten students from Cohorts 1 through 4, all grade 1 students from Cohorts 1 through 4, all grade 2 students

from Cohorts 1 through 3, and all grade 3 students from Cohorts 1 and 2. Demographic characteristics for these combinations relating to kindergarten program type, gender, and low income status are summarized in Table 12.

Table 12

Distribution of Demographic Characteristics from Combined Cohorts

Combined Cohorts:	1 to 4		1 to 4		1 to 3		1 & 2	
	Kindergarten		Grade 1		Grade 2		Grade 3	
	(n=740)		(n=665)		(n=451)		(n=290)	
<u>Program Type</u>								
Half-Day	334	45.1%	297	44.7%	270	59.9%	214	73.8%
Full-Day	406	54.9%	368	55.3%	181	40.1%	76	26.2%
	740	100%	665	100%	451	100%	290	100%
<u>Gender</u>								
Female	349	47.2%	318	47.8%	216	47.9%	142	49.0%
Male	391	52.8%	347	52.2%	235	52.1%	148	51.0%
	740	100%	665	100%	451	100%	290	100%
<u>Low Income</u>								
No	632	85.4%	543	81.7%	378	83.8%	243	83.8%
Yes	108	14.6%	122	18.3%	73	16.2%	47	16.2%
	740	100%	665	100%	451	100%	290	100%

As shown in Table 13, there is no significant difference in gender ($p = 0.938$) between students enrolled in half- and full-day kindergarten programs for combined Cohorts 1 to 4. However, out of the 406 students from Cohorts 1 to 4 enrolled in full-day kindergarten, 69 students (17%) were classified as low income, while only 39 students (11.7%) out of the 334 students enrolled in half-day kindergarten were classified as low income. This difference is significant ($p = 0.041$) at the 0.05 alpha level.

Table 13

Gender and Low Income Status by Kindergarten Program Type for Combined Cohorts 1 to 4

	Full-Day (n=406)		Half-Day (n=334)		Total (n=740)	
	n	%	n	%	n	%
<u>Gender</u>						
Female	192	47.3%	157	47.0%	349	47.2%
Male	214	52.7%	177	53.0%	391	52.8%
Total	406	100.0%	334	100.0%	740	100.0%
<u>Low Income</u>						
No	337	83.0%	295	88.3%	632	85.4%
Yes	69	17.0%	39	11.7%	108	14.6%
Total	406	100.0%	334	100.0%	740	100.0%

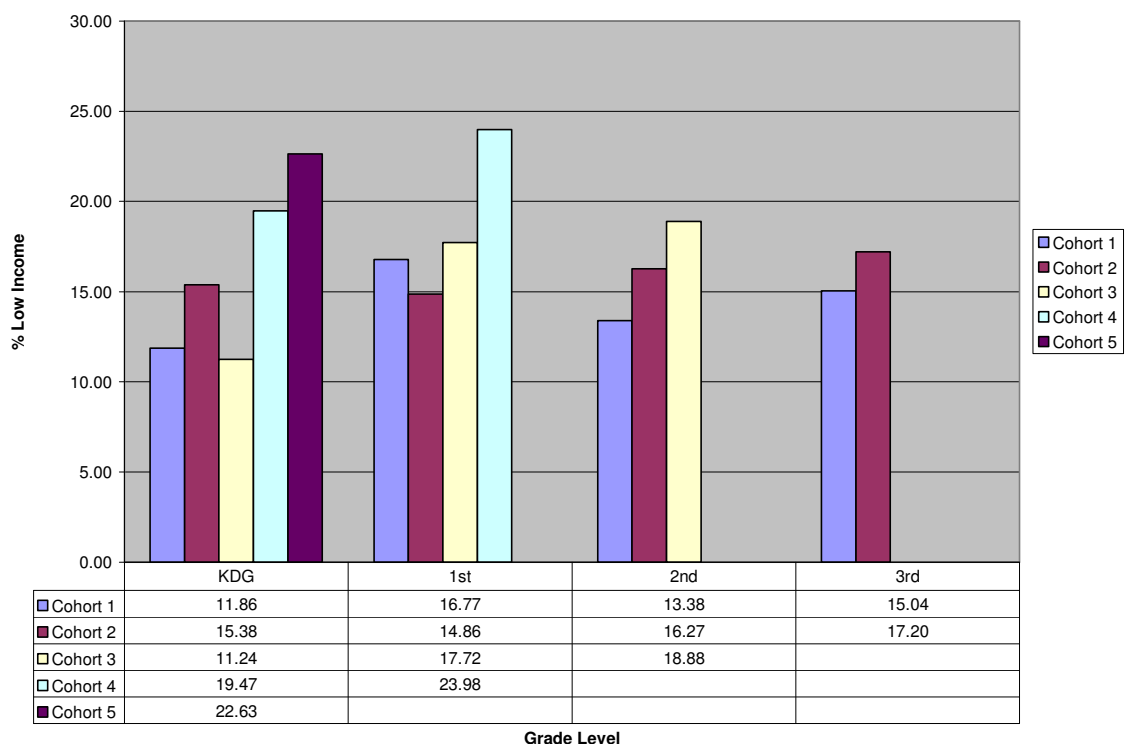
Gender X^2 (1, N=740)=.006, $p=0.938$

Low Income X^2 (1, N=740)=4.158, $p=0.041$

Answering the Research Questions

Throughout the 5-year period of this study, Manheim Central School District experienced statistically significant changes in the percentage of low income students entering kindergarten (see Table 11). Figure 2 demonstrates the upward trend in the proportion of low income students as kindergarten students from Cohorts 1 through 5 progressed through the grade levels. Therefore, the answers to the research questions must be considered within the context of this significant change in demographic information.

Figure 2

Proportion of Low Income Students from Cohort 1 to Cohort 5Research Question #1

The first research question analyzes differences in the percentage of students scoring proficient on the DRA relative to their attendance in full-day or half-day kindergarten. The results of this question connect directly to MCSD's first strategic goal of raising student achievement for all students. Furthermore, results from Research Question #1 will add to the body of research seeking to determine the efficacy of full-day kindergarten programs.

Research Question #1: To what extent, if any, did MCSD's full-day kindergarten program impact the proportion of full-day kindergarten students scoring proficient on the end-of-year DRA, over time, as compared to students from MCSD's half-day kindergarten program?

Based on the research literature presented in Chapter 2, one would expect to find significant differences in DRA scores at the end of kindergarten and, possibly at the end of grade 1, in support of full-day kindergarten programs. There is less evidence supporting the maintenance of these reading gains through the end of grade 3. In parts a through d, the researcher compared end-of-year DRA scores between students from half- and full-day kindergarten programs as these students progressed from kindergarten through grade 3.

Hypothesis #1a: There is no significant difference in the proportion of students scoring proficient on the end-of-kindergarten DRA between students in half- and full-day kindergarten programs from Cohorts 1 through 4.

A chi square test was used to test Hypothesis #1a. As shown in Table 14, the proportion of students scoring proficient on the end-of-kindergarten DRA is significantly higher ($p = 0.000$) for full-day kindergarten students as compared to half-day kindergarten students.

Table 14

End-of-Kindergarten DRA Proficiency Levels by Program Type

Proficiency Level	Full-Day (n=406)		Half-Day (n=334)		Total (n=740)	
	n	%	n	%	n	%
Proficient	374	92.1%	229	68.6%	603	81.5%
Not Yet Proficient	32	7.9%	105	31.4%	137	18.5%
Total	406	100.0%	334	100.0%	740	100.0%

Note: $X^2 (1, N=740)=67.398, p = .000$

Hypothesis #1b: There is no significant difference in the proportion of students scoring proficient on the end-of-first grade DRA between students coming from half- and full-day kindergarten programs from Cohorts 1 through 4.

A chi square test was used to test Hypothesis #1b. As shown in Table 15, the proportion of students coming from full-day kindergarten scoring proficient on the end-of-grade 1 DRA was 77.7% compared to 72.4% of students coming from half-day kindergarten. This increase, however, is not statistically significant ($p = 0.113$).

Table 15

End-of-Grade 1 DRA Proficiency Levels by Program Type

Proficiency Level	Full-Day (n=368)		Half-Day (n=297)		Total (n=665)	
	n	%	n	%	n	%
Proficient	286	77.7%	215	72.4%	501	75.3%
Not Yet Proficient	82	22.3%	82	27.6%	164	24.7%
Total	368	100.0%	297	100.0%	665	100.0%

Note: $X^2 (1, N=665)=2.510, p = 0.113$

Hypothesis #1c: : There is no significant difference in the proportion of students scoring proficient on the end-of-second grade DRA between students coming from half- and full-day kindergarten programs from Cohorts 1 through 3.

A chi square test was used to test Hypothesis #1c. As shown in Table 16, there is no significant difference ($p = 0.976$) in the proportion of students scoring proficient on the end-of-grade 2 DRA between students coming from half- and full-day kindergarten programs. By the end of grade 2, approximately 79% of the students were proficient regardless of their kindergarten program type.

Table 16

End-of-Grade 2 DRA Proficiency Levels by Program Type

	Full-Day (n=181)		Half-Day (n=270)		Total (n=451)	
	n	%	n	%	n	%
<u>Proficiency Level</u>						
Proficient	143	79.0%	213	78.9%	356	78.9%
Not Yet Proficient	38	21.0%	57	21.1%	95	21.1%
Total	181	100.0%	270	100.0%	451	100.0%

Note: $X^2 (1, N=451)=0.001, p=0.976$

Hypothesis #1d: There is no significant difference in the proportion of students scoring proficient on the end-of-third grade DRA between students coming from half- and full-day kindergarten programs from Cohorts 1 and 2.

A chi square test was used to test Hypothesis #1d. As shown in Table 17, there is no significant difference ($p = 0.740$) in the proportion of students scoring proficient on the end-of-grade 3 DRA between students coming from half- and full-day kindergarten programs. Indeed, the percentage of students coming from half-day kindergarten scoring

proficient on the end-of-grade 3 DRA (79%) was slightly higher than the percentage (78%) coming from full-day kindergarten.

Table 17

End-of-Grade 3 DRA Proficiency Levels by Program Type

Proficiency Level	Full-Day (n=76)		Half-Day (n=214)		Total (n=290)	
	n	%	n	%	n	%
Proficient	59	77.6%	170	79.4%	229	79.0%
Not Yet Proficient	17	22.4%	44	20.6%	61	21.0%
Total	76	100.0%	214	100.0%	290	100.0%

Note: $X^2 (1, N=290)=0.110, p=0.740$

Based on the researcher's administrative experience within the Manheim Central School District, the proportion of ALL students scoring proficient on the end-of-year DRA appeared to be increasing as the number of full-day kindergarten sections increased. The following sub-hypothesis of Research Question 1 was written specifically to determine if, in fact, this positive correlation exists for Cohorts 1 through 5.

Hypothesis #1e(part i): There is no significant increase in the proportion of ALL students scoring proficient on the end-of-kindergarten DRA relative to students from Cohorts 1 through 5.

A chi square test was used to test Hypothesis #1e (part i). As shown in Table 18, the proportion of all students scoring proficient on the end-of-kindergarten DRA increased significantly ($p = 0.000$) from Cohort 1 (75%) to Cohort 5 (98%). This upward trend provides evidence that MCSD's full-day kindergarten is raising achievement for all students in the area of early literacy skills.

Table 18

Proportion of Students Scoring Proficient on End-of-Kindergarten DRA Across Cohorts 1 to 5

Cohort	Proficient (n=789)		Not Yet Proficient (n=141)		Total (n=930)	
	n	%	n	%	n	%
Cohort 1	132	74.6%	45	25.4%	177	100%
Cohort 2	138	70.8%	57	29.2%	195	100%
Cohort 3	157	88.2%	21	11.8%	178	100%
Cohort 4	176	92.6%	14	7.4%	190	100%
Cohort 5	186	97.9%	4	2.1%	190	100%
Total	789	84.8%	141	15.2%	930	100%

Note: $X^2(4, N=930)=80.218, p=0.000$

Hypothesis #1e(part ii): There is no significant increase in the proportion of ALL students scoring proficient on the end-of-grade 1 DRA relative to students from Cohorts 1 through 4.

A chi square test was used to test Hypothesis #1e (part ii). As shown in Table 19, the proportion of all students scoring proficient on the end-of-grade 1 DRA increased steadily from 70.2% for Cohort 1 to 78.4% for Cohort 4. Nonetheless, this increase from year-to-year was not statistically significant ($p = 0.296$).

Accordingly, the researcher performed a chi square test to compare the proportion of all students from Cohort 1 scoring proficient on the end-of-grade 1 DRA with the proportion of all students from Cohort 4 scoring proficient on the end-of-grade 1 DRA. The results were not statistically significant ($p = 0.088$).

Table 19

Proportion of Students Scoring Proficient on End-of-Grade 1 DRA Across Cohorts 1 to 4

Cohort	Proficient (n=501)		Not Yet Proficient (n=164)		Total (n=665)	
	n	%	n	%	n	%
Cohort 1	113	70.2%	48	29.8%	161	100%
Cohort 2	131	74.9%	44	25.1%	175	100%
Cohort 3	123	77.8%	35	22.2%	158	100%
Cohort 4	134	78.4%	37	21.6%	171	100%
Total	501	75.3%	164	24.7%	665	100%

Note: $X^2(3, N=665)=3.699, p=0.296$

Hypothesis #1e(part iii): There is no significant increase in the proportion of ALL students scoring proficient on the end-of-second grade DRA relative to students from Cohorts 1 through 3.

A chi square test was used to test Hypothesis #1e (part iii). As shown in Table 20, the proportion of all students scoring proficient on the end-of-grade 2 DRA increased steadily from 74.6% for Cohort 1 to 82.5% for Cohort 3. Again, this increase from year-to-year was not statistically significant ($p = 0.258$).

Consequently, the researcher performed another chi square test to compare the proportion of all students from Cohort 1 scoring proficient on the end-of-grade 2 DRA with the proportion of all students from Cohort 3 scoring proficient on the end-of-grade 2 DRA. The results were not statistically significant ($p = 0.105$).

Table 20

Proportion of Students Scoring Proficient on End-of-Grade 2 DRA Across Cohorts 1 to 3

	Proficient (n=356)		Not Yet Proficient (n=95)		Total (n=451)	
	n	%	n	%	n	%
<u>Cohort</u>						
Cohort 1	106	74.6%	36	25.4%	142	100%
Cohort 2	132	79.5%	34	20.5%	166	100%
Cohort 3	118	82.5%	25	17.5%	143	100%
Total	356	78.9%	95	21.1%	451	100%

Note: $X^2(2, N=451)=2.707, p=0.258$

Hypothesis #1e(part iv): There is no significant increase in the proportion of ALL students scoring proficient on the end-of-third grade DRA relative to students from Cohorts 1 and 2.

A chi square test was used to test Hypothesis #1e (part iv). As shown in Table 21, there was no significant increase ($p = 0.245$) in the proportion of all students scoring proficient on the end-of-grade 3 DRA from Cohorts 1 and 2. However, the proportion of students proficient on the end-of-grade 3 DRA increased from 75.9% for Cohort 1 to 81.5% for Cohort 2.

Table 21

Proportion of Students Scoring Proficient on End-of-Grade 3 DRA Across Cohorts 1 and 2

	Proficient (n=229)		Not Yet Proficient (n=61)		Total (n=290)	
	n	%	n	%	n	%
<u>Cohort</u>						
Cohort 1	101	75.9%	32	24.1%	133	100%
Cohort 2	128	81.5%	29	18.5%	157	100%
Total	229	79.0%	61	21.0%	290	100%

Note: $X^2(1, N=290)=1.354, p=0.245$

While the increases in the proportion of ALL students scoring proficient on the end-of-year DRA were not statistically significant beyond kindergarten, the upward trend through the end of grade 3 may have practical significance for administrators within the Manheim Central School District. This upward trend will be revisited in Chapter 5.

The statistical hypotheses presented for Research Question #1 suggest the proportion of students scoring proficient on the DRA is significantly higher at the end of kindergarten for full-day kindergarten students. However, these statistically significant differences are not maintained through the end of grades 1, 2, and 3. These data will be revisited in Chapter 5.

Research Question #2

The second research question analyzes the extent that kindergarten program type, low income status, and gender impact DRA scores over time. The results of this question connect directly to MCSD's second strategic goal of implementing an appropriate curriculum and support system based on the diverse needs of all students. Based on the research presented in Chapter 2, it is expected that kindergarten program type, low income status, and gender may impact end-of-year DRA scores for kindergarten and, possibly, grade 1.

Research Question #2: To what extent, if any, did kindergarten program type, low income status, and gender impact end-of-year DRA reading scores, over time?

Hypothesis #2a: There is no significant interaction between end-of-kindergarten DRA scores and any combination of kindergarten program type, low income status, and/or gender for ALL kindergarten students from Cohorts 1 through 5.

A 2x2x2 ANOVA was used to test Hypothesis #2a. As shown in Table 22, the main effects of Program Type ($p = 0.000$) in the direction of full-day kindergarten, Gender ($p = 0.014$) in the direction of females, and Low Income ($p = 0.003$) in the direction of NON-low income students were all statistically significant while adjusting for the other variables. This suggests the predictor variables in isolation play a significant role in students' end-of-kindergarten DRA scores, but not when they are analyzed together for interactions. For example, the effect of kindergarten program type (full-day or half-day) on students' end-of-year DRA scores is not impacted by gender or low income status. This important finding related to interactions holds true in subsequent analyses for end-of-year DRA scores through grade 3 (see Table 22, 23, 24, and 25).

Table 22

2x2x2 ANOVA Comparing End of Kindergarten DRA with Kindergarten Program Type, Gender, and Low Income

Predictor Variables	Sum of Squares	DF	Mean Square	F-ratio	Sig.
Program Type	1464.48	1	1464.48	35.29	0.000
Gender	252.99	1	252.99	6.10	0.014
Low Income	362.48	1	362.48	8.74	0.003
Program Type AND Gender	50.15	1	50.15	1.21	0.272
Program Type AND Low Income	7.32	1	7.32	0.18	0.675
Low Income AND Gender	0.13	1	0.13	0.00	0.955
Residual	38299.11	923	41.49		
Total	42714.88	929			

Hypothesis #2b: There is no significant interaction between end-of-grade 1 DRA scores and any combination of kindergarten program type, low income status, and/or gender for ALL grade 1 students from Cohorts 1 through 4.

A 2x2x2 ANOVA was used to test Hypothesis #2b. As shown in Table 23, the main effects of Gender ($p = 0.022$) in the direction of females, and Low Income ($p = 0.000$) in the direction of NON-low income students were statistically significant while adjusting for the other variables. The main effect of Program Type ($p = 0.093$) was not statistically significant. This suggests the predictor variables Gender and Low Income play a significant role in students' end-of-grade 1 DRA scores, while the predictor variable Program Type does not play a statistically significant role in students' end-of-grade 1 DRA scores. Again, there were no significant interactions between any combinations of the predictor variables.

Table 23

2x2x2 ANOVA Comparing End of Grade 1 DRA with Program Type, Gender, and Low Income

Predictor Variables	Sum of Squares	DF	Mean Square	F-ratio	Sig.
Program Type	244.32	1	244.32	2.82	0.093
Gender	455.17	1	455.17	5.26	0.022
Low Income	1159.53	1	1159.53	13.40	0.000
Program Type AND Gender	133.40	1	133.40	1.54	0.215
Program Type AND Low Income	1.59	1	1.59	0.02	0.892
Low Income AND Gender	52.86	1	52.86	0.61	0.435
Residual	56958.04	658	86.56		
Total	59902.65	664			

Hypothesis #2c: There is no significant interaction between end-of-grade 2 DRA scores and any combination of kindergarten program type, low income status, and/or gender for ALL grade 2 students from Cohorts 1 through 3.

A 2x2x2 ANOVA was used to test Hypothesis #2c. As shown in Table 24, the main effects of Gender ($p = 0.045$) in the direction of females, and Low Income ($p = 0.002$) in the direction of NON-low income students were statistically significant while adjusting for the other variables. The main effect of Program Type ($p = 0.592$) was not statistically significant. This suggests the predictor variables Gender and Low Income play a significant role in students' end-of-grade 2 DRA scores. The predictor variable Program Type does not play a statistically significant role in students' end-of-grade 2 DRA scores. Again, there were no significant interactions between any combinations of the predictor variables.

Table 24

2x2x2 ANOVA Comparing End of Grade 2 DRA with Program Type, Gender, and Low Income

Predictor Variables	Sum of Squares	DF	Mean Square	F-ratio	Sig.
Program Type	16.87	1	16.87	0.29	0.592
Gender	237.13	1	237.13	4.05	0.045
Low Income	595.61	1	595.61	10.17	0.002
Program Type AND Gender	54.57	1	54.57	0.93	0.335
Program Type AND Low Income	10.70	1	10.70	0.18	0.669
Low Income AND Gender	4.73	1	4.73	0.08	0.776
Residual	26012.34	444	58.59		
Total	27225.37	450			

Hypothesis #2d: There is no significant interaction between end-of-grade 3 DRA scores and any combination of kindergarten program type, low income status, and/or gender for ALL grade 3 students in Cohorts 1 and 2.

A 2x2x2 ANOVA was used to test Hypothesis #2d. As shown in Table 25, the main effects of Program Type ($p = 0.950$), Gender ($p = 0.630$), and Low Income ($p = 0.550$) were not statistically significant while adjusting for the other variables, suggesting these do not play statistically significant roles in students' end-of-grade 3 DRA scores. Once more, there were no significant interactions between any combinations of the predictor variables.

Table 25

2x2x2 ANOVA Comparing End of Grade 3 DRA with Program Type, Gender, and Low Income

Predictor Variables	Sum of Squares	DF	Mean Square	F-ratio	Sig.
Program Type	0.08	1	0.08	0.00	0.950
Gender	4.94	1	4.94	0.23	0.630
Low Income	7.60	1	7.60	0.36	0.550
Program Type AND Gender	0.35	1	0.35	0.02	0.898
Program Type AND Low Income	1.98	1	1.98	0.09	0.760
Low Income AND Gender	5.91	1	5.91	0.28	0.598
Residual	6008.08	283	21.23		
Total	6042.88	289			

Kindergarten program type, in support of full-day kindergarten, played a statistically significant role in students' end-of-year DRA scores at the end of kindergarten. These data reinforce the statistics presented for Research Question #1.

Furthermore, females and non-low income students scored significantly higher than their male and low-income counterparts on the end-of-year DRA at the end of kindergarten, grade 1, and grade 2. However, these differences disappeared by the end of grade 3.

Research Question #3

Manheim Central School District chose to use the DRA assessment tool to analyze the reading growth of students through the end of grade 3. Teachers use the results of the DRA to guide instruction for their students. In grades 3 through 8 and 11, Pennsylvania requires all students to take the Pennsylvania System of School Assessment (PSSA) exam. Accordingly, this research question was used to determine the extent to which the DRA assessment tool was a valid choice for MCSD relative to students grade 3 PSSA reading scores.

Research Question #3: To what extent, if any, do end-of-grade 3 DRA reading scores correlate to grade 3 Pennsylvania System of School Assessment (PSSA) reading scores?

This correlation includes all students for which the researcher had end-of-grade 3 DRA scores and the students corresponding third grade PSSA reading scores for students from Cohorts 1 and 2. Consequently, the number of students for this question varies from the number of grade 3 students reported in Table 10, above, because of students moving into MCSD after kindergarten. A Pearson correlation coefficient was calculated for end-of-grade 3 DRA scores and the students corresponding third grade PSSA reading

scores for students from Cohorts 1 and 2. The resulting Pearson correlation coefficients are shown in Table 26.

Table 26

Pearson Correlation Coefficients (r) for Grade 3 PSSA Reading Scores and End-of-Grade 3 DRA Scores for Cohorts 1 and 2

	n	r	p -value
<u>Cohort</u>			
Cohort 1	175	0.572	0.000
Cohort 2	199	0.723	0.000

As shown in Table 26, there is a moderate positive correlation between PSSA reading scores and the end-of-grade 3 DRA scores for Cohort 1, while there is a strong positive correlation between PSSA reading scores and the end-of-grade 3 DRA scores for Cohort 2. Both correlations were significant at the 0.001 level.

Research Question #4

Full-day kindergarten is the foundation of MCSD's early literacy initiatives implemented to support the district's educational goals. Moreover, full-day kindergarten was the most expensive initiative. Therefore, this research question was designed to analyze and compare associated costs of both full-day and half-day kindergarten relative to the number of students who scored proficient on the DRA over time.

Research Question #4: Is MCSD's full-day kindergarten program a cost-effective alternative to a half-day kindergarten program?

To answer this question a cost-effective analysis was utilized. The measure of effectiveness selected was the total number of students scoring proficient on the end-of-year DRA. The cost of each program was based on actual salary amounts for each kindergarten teacher, half- or full-day, for the five years of the study. Additionally, benefits were assigned to each teacher based on the average percentage of salary for the district for each year. Table 27 summarizes the total cost of full-day and half-day kindergarten in MCSD throughout the five years of the study. For example, in the 2001/2002 school year, full-day kindergarten cost the school district a total of \$258,467 for the equivalent of 4 full-time teachers, including benefits, while half-day kindergarten cost the school district a total of \$171,803 for the equivalent of 3 full-time teachers.

Table 27

Total Cost of Full-Day and Half-Day Kindergarten for Cohorts 1 through 5

2000/01			2001/02			2002/03			2003/04			2004/05		
Staff	FTE	Salary	Staff	FTE	Salary	Staff	FTE	Salary	Staff	FTE	Salary	Staff	FTE	Salary
Full-Day														
			2	1.00	\$41,349	2	1.00	\$43,922	1	1.00	\$53,835	1	1.00	\$55,793
						4	1.00	\$57,898	2	1.00	\$45,835	2	1.00	\$47,577
			5	1.00	\$58,911	5	1.00	\$60,978	4	1.00	\$59,993	4	1.00	\$62,764
									5	1.00	\$63,121	5	1.00	\$65,966
									11	1.00	\$56,919	11	1.00	\$59,336
12	1.00	\$54,165	12	1.00	\$55,872	12	1.00	\$57,898	12	1.00	\$59,993	12	1.00	\$62,764
						13	1.00	\$38,392	13	1.00	\$40,212			
			10	1.00	\$58,595	10	1.00	\$61,645				6	1.00	\$60,831
									7	1.00	\$58,659	7	1.00	\$60,831
									3	1.00	\$52,008	3	1.00	\$55,793
									9	1.00	\$37,279			
												8	1.00	\$36,422
Total	1.00	\$54,165	4.00	\$214,727	6.00	\$320,733	10.00	\$527,854	10.00	\$527,854	10.00	\$568,077		
Benefits	19.52%	\$10,573	20.37%	\$43,740	22.25%	\$71,363	26.25%	\$138,562	29.04%	\$164,970				
TOTAL		\$64,738		\$258,467		\$392,096		\$666,416		\$666,416		\$733,047		
Half-Day														
1	0.50	\$24,058	1	0.50	\$24,905	1	0.50	\$25,898						
2	0.50	\$19,881												
4	1.00	\$54,165	4	1.00	\$55,872									
5	1.00	\$57,179												
11	0.50	\$25,570	11	0.50	\$26,418	11	0.50	\$27,422						
13	1.00	\$34,597	13	1.00	\$35,534									
						6	1.00	\$56,372						
Total	4.50	\$215,450	3.00	\$142,729	2.00	\$109,692	0.00	\$0	0.00	\$0	0.00	\$0		
Benefits	19.52%	\$42,056	20.37%	\$29,074	22.25%	\$24,406	26.25%	\$0	29.04%	\$0				
TOTAL		\$257,506		\$171,803		\$134,098		\$0		\$0		\$0		
Full-Day Plus Half-Day														
Total	5.50	\$269,615	7.00	\$357,456	8.00	\$430,425	10.00	\$527,854	10.00	\$527,854	10.00	\$568,077		
Benefits	19.52%	\$52,629	20.37%	\$72,814	22.25%	\$95,770	26.25%	\$138,562	29.04%	\$164,970				
TOTAL		\$322,244		\$430,270		\$526,195		\$666,416		\$666,416		\$733,047		

Using the cost data from Table 27, CERs (cost-effectiveness ratio) were calculated to compare half-day and full-day program results. The CERs represent the total dollars spent per proficient student. For example, the end-of-kindergarten CER for half-day students from Cohort 1 was \$2239, while the corresponding CER for full-day kindergarten students was \$3808. Here is how both numbers were calculated:

Half-Day Kindergarten CER:

$$CER = \frac{\text{Total Cost Half - Day}}{\text{No. Students Proficient}} = \frac{\$257,506}{115} = \$2239 \quad \text{translation} \longrightarrow \frac{\$2239 \text{ spent}}{1 \text{ proficient student}}$$

Full-Day Kindergarten CER:

$$CER = \frac{\text{Total Cost Full - Day}}{\text{No. Students Proficient}} = \frac{\$64,738}{17} = \$3808 \quad \text{translation} \quad \longrightarrow \quad \frac{\$3808 \text{ spent}}{1 \text{ proficient student}}$$

The ratio calculations were

1. By individual cohort to compare each year in which there were both half-day and full-day programs in operation. Ratios were calculated not only for the end of kindergarten, but for all grade years experienced by each cohort to examine the maintenance of effect over time, if any. Using the total number of students scoring proficient on the end-of-year DRA as the measure of effectiveness, the following CERs were calculated for both half-day and full-day kindergarten programs from

- a. Cohort 1:

- i. For end-of-kindergarten DRA scores, the CER for half-day students is \$2239 while the CER for full-day students is \$3808.
- ii. For end-of-grade 1 DRA scores, the CER for half-day students is \$2407 while the CER for full-day students is \$10790.
- iii. For end-of-grade 2 DRA scores, the CER for half-day students is \$2575 while the CER for full-day students is \$10790.
- iv. For end-of-grade 3 DRA scores, the CER for half-day students is \$2769 while the CER for full-day students is \$8092.

- b. Cohort 2:

- i. For end-of-kindergarten DRA scores, the CER for half-day students is \$2564 while the CER for full-day students is \$3640.

- ii. For end-of-grade 1 DRA scores, the CER for half-day students is \$2353 while the CER for full-day students is \$4456.
 - iii. For end-of-grade 2 DRA scores, the CER for half-day students is \$2203 while the CER for full-day students is \$4786.
 - iv. For end-of-grade 3 DRA scores, the CER for half-day students is \$2231 while the CER for full-day students is \$5068.
- c. Cohort 3:
- i. For end-of-kindergarten DRA scores, the CER for half-day students is \$2853 while the CER for full-day students is \$3565.
 - ii. For end-of-grade 1 DRA scores, the CER for half-day students is \$3831 while the CER for full-day students is \$4456.
 - iii. For end-of-grade 2 DRA scores, the CER for half-day students is \$3831 while the CER for full-day students is \$4724.

Table 28 provides a summary of the effectiveness measures, while Table 29 summarizes costs related to part 1 of Research Question #4. The data from Tables 28 and 29 were combined to calculate the CERs reflected in Table 30.

Table 30

Half-Day and Full-Day CERs for Cohorts 1 through 5

	Kindergarten			Grade 1			Grade 2			Grade 3		
	n	Prof	CER	n	Prof	CER	n	Prof	CER	n	Prof	CER
<u>Cohort 1</u>												
Half-Day	159	115	\$2,239	144	107	\$2,407	125	100	\$2,575	118	93	\$2,769
Full-Day	18	17	\$3,808	17	6	\$10,790	17	6	\$10,790	15	8	\$8,092
Total	177	132	\$2,441	161	113	\$2,852	142	106	\$3,040	133	101	\$3,191
<u>Cohort 2</u>												
Half-Day	116	67	\$2,564	108	73	\$2,353	102	78	\$2,203	96	77	\$2,231
Full-Day	79	71	\$3,640	67	58	\$4,456	64	54	\$4,786	61	51	\$5,068
Total	195	138	\$3,118	175	131	\$3,285	166	132	\$3,260	157	128	\$3,361
<u>Cohort 3</u>												
Half-Day	59	47	\$2,853	45	35	\$3,831	43	35	\$3,831			
Full-Day	119	110	\$3,565	113	88	\$4,456	100	83	\$4,724			
Total	178	157	\$3,352	158	123	\$4,278	143	118	\$4,459			
<u>Cohort 4</u>												
Full-Day	190	176	\$3,786	171	134	\$4,973						
<u>Cohort 5</u>												
Full-Day	190	186	\$3,941									

As shown in Table 30, MCSD's half-day kindergarten is more cost-effective than full-day kindergarten for Cohorts 1 to 3 for all end-of-year DRA scores. The differences, however, in the full-day and half-day CERs steadily decrease when analyzing them vertically from Cohort 1 to Cohort 3. For example, using the kindergarten data from Cohort 1 MCSD spent \$1,569 more dollars per proficient student in full-day kindergarten, but in Cohort 3 MCSD only spent \$712 more dollars per proficient student in full-day kindergarten. This same pattern continues through grade 3 when comparing CERs vertically from Cohort 1 to Cohort 3. However, when analyzing CERs horizontally as the cohorts progressed from kindergarten through grade 3, half-day kindergarten became increasingly more cost-effective.

The ratio calculations were

2. By combined cohorts to compare the results for all students in half-day and full-day programs at the end of each grade. The number of cohorts that had completed each grade diminished in the later years of the study. Ratios were calculated not only for the end of kindergarten, but for all grade years experienced by each cohort to examine the maintenance of effect over time, if any. Using the total number of students scoring proficient on the end-of-year DRA as the measure of effectiveness, the following CERs were calculated for both half-day and full-day kindergarten programs from
 - a. Cohorts 1 through 4 combined:
 - i. For end-of-kindergarten DRA scores, the CER for half-day students is \$2460 while the CER for full-day students is \$3694.
 - ii. For end-of-grade 1 DRA scores, the CER for half-day students is \$2620 while the CER for full-day students is \$4831.
 - b. Cohorts 1 through 3 combined:
 - i. For end-of-grade 2 DRA scores, the CER for half-day students is \$2645 while the CER for full-day students is \$5002.
 - c. Cohorts 1 and 2 combined:
 - i. For end-of-grade 3 DRA scores, the CER for half-day students is \$2525 while the CER for full-day students is \$5478.

Table 31 provides a summary of the effectiveness measures, while Table 32 summarizes costs related to part 2 of Research Question #4. The data from Tables 31 and 32 were combined to calculate the CERs reflected in Table 33.

Table 31

Half-Day and Full-Day Effectiveness Measures for Combined Cohorts

Combined Cohorts: 1 to 4		1 to 4			1 to 3			1 & 2				
Kindergarten (n=740)		Grade 1 (n=665)			Grade 2 (n=451)			Grade 3 (n=290)				
	n	Prof	% Prof	n	Prof	% Prof	n	Prof	% Prof	n	Prof	% Prof
Half-Day	334	229	68.6%	297	215	72.4%	270	213	78.9%	214	170	79.4%
Full-Day	406	374	92.1%	368	286	77.7%	181	143	79.0%	76	59	77.6%
Total	740	603	81.5%	665	501	75.3%	451	356	78.9%	290	229	79.0%

Table 32

Half-Day and Full-Day Costs for Combined Cohorts

Combined Cohort 1 to 4		1 to 4			1 to 3			1 & 2				
Kindergarten (n=740)		Grade 1 (n=665)			Grade 2 (n=451)			Grade 3 (n=290)				
	n	Prof	Cost	n	Prof	Cost	n	Prof	Cost	n	Prof	Cost
Half-Day	334	229	\$563,407	297	215	\$563,407	270	213	\$563,407	214	170	\$429,309
Full-Day	406	374	\$1,381,717	368	286	\$1,381,717	181	143	\$715,301	76	59	\$323,205
Total	740	603	\$1,945,124	665	501	\$1,945,124	451	356	\$1,278,708	290	229	\$752,514

Table 33

Half-Day and Full-Day CERs for Combined Cohorts

Combined Cohort 1 to 4		1 to 4			1 to 3			1 & 2				
Kindergarten (n=740)		Grade 1 (n=665)			Grade 2 (n=451)			Grade 3 (n=290)				
	n	Prof	CER	n	Prof	CER	n	Prof	CER	n	Prof	CER
Half-Day	334	229	\$2,460	297	215	\$2,620	270	213	\$2,645	214	170	\$2,525
Full-Day	406	374	\$3,694	368	286	\$4,831	181	143	\$5,002	76	59	\$5,478
Total	740	603	\$3,226	665	501	\$3,882	451	356	\$3,592	290	229	\$3,286

As shown in Table 33, MCSD's half-day kindergarten is more cost-effective than full-day kindergarten for combined cohorts for all end-of-year DRA scores. The difference in the percentage of proficient students coming from half-day and full-day kindergarten programs decreased as students progressed from kindergarten to grade 3 (see Table 31). Accordingly, the differences in CERs for students coming from half-day

and full-day kindergarten programs increased as students progressed from kindergarten to grade 3 (see Table 33). This indicates that over time half-day kindergarten becomes increasingly more cost-effective.

The ratio calculations were

3. By beginning and ending cohorts to examine the last year of the mostly half-day approach with the latest fully operational year of the full-day kindergarten program. The half-day associated costs for Cohort 1 were recalculated in 2004/05 dollars; the same year as the costs for Cohort 5. This enabled the researcher to compare CERs based on a consistent salary schedule as well as an equal percent increase for benefits. Using the total number of students scoring proficient on the end-of-kindergarten DRA as the measure of effectiveness, the following CERs were calculated.
 - a. Cohort 1 versus Cohort 5:
 - ii. The CER for the total number of half-day kindergarten students from Cohort 1 scoring proficient on the end-of-kindergarten DRA is \$2830.
 - iii. The CER for the total number of full-day kindergarten students from Cohort 5 scoring proficient on the end-of-kindergarten DRA is \$3941.

Table 34 provides a summary of the effectiveness measures, while Table 35 summarizes costs related to part 3 of Research Question #4. The data from Tables 34 and 35 were combined to calculate the CERs reflected in Table 36.

Table 34

Half-Day Effectiveness Measures from Cohort 1 versus Full-Day Effectiveness Measures from Cohort 5

	Kindergarten		
	n	Prof	% Prof
<u>Cohort 1</u>			
Half-Day	159	115	72.3%
<u>Cohort 5</u>			
Full-Day	190	186	97.9%

Table 35

Half-Day Costs from Cohort 1 versus Full-Day Costs from Cohort 5 (in 2004/05 dollars)

	Kindergarten		
	n	Prof	Cost
<u>Cohort 1</u>			
Half-Day	159	115	\$325,419
<u>Cohort 5</u>			
Full-Day	190	186	\$733,057

Table 36

Half-Day CER from Cohort 1 versus Full-Day CER from Cohort 5

	Kindergarten		
	n	Prof	CER
<u>Cohort 1</u>			
Half-Day	159	115	\$2,830
<u>Cohort 5</u>			
Full-Day	190	186	\$3,941

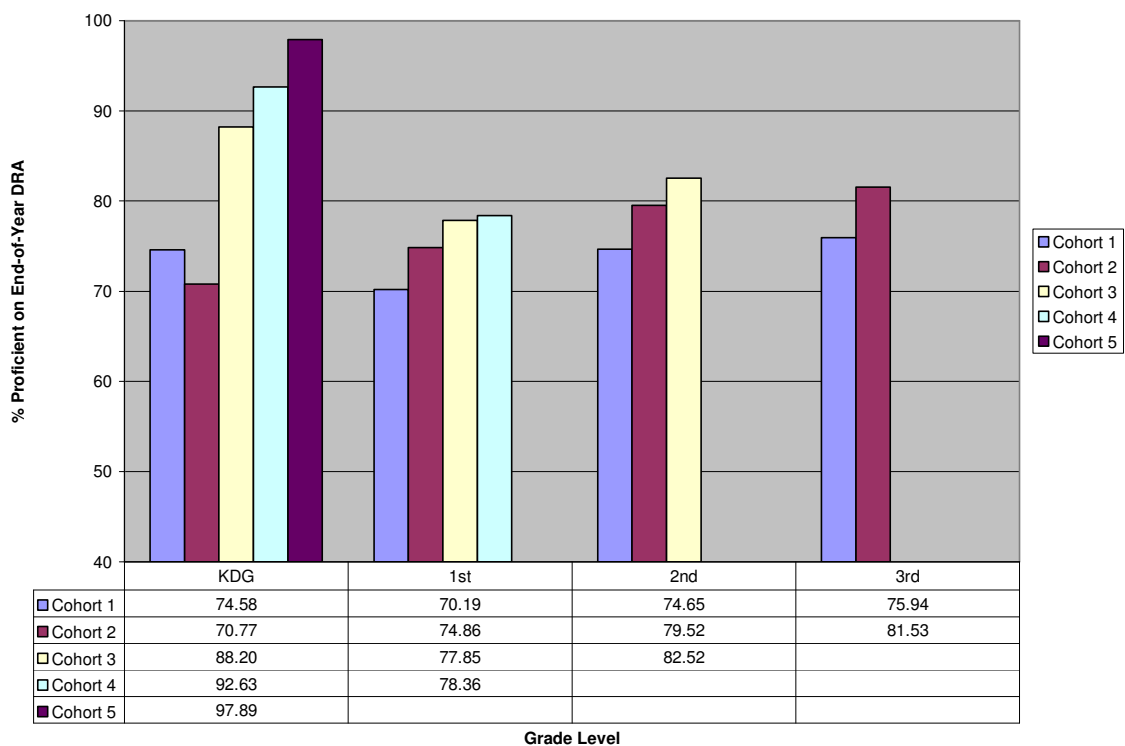
As shown in Table 36, MCSD's half-day kindergarten from Cohort 1 is more cost-effective than full-day kindergarten from Cohort 5 for end-of-kindergarten DRA scores.

Conclusion

The results of the statistical analyses conducted for Research Question #1 suggest the proportion of students from full-day kindergarten scoring proficient on the end-of-kindergarten DRA was significantly higher than their half-day kindergarten counterparts. Although, there were no significant differences when analyzing hypotheses tests as these same students progressed through grades 1, 2, and 3, Figure 3 shows that there is a clear upward trend from Cohort 1 through Cohort 5 in the proportion of all students scoring proficient on the end-of-year DRA.

Figure 3

Proportion of All Students Scoring Proficient on End-of-Year DRA from Cohort 1 to Cohort 5



While the percents from tallies presented in the analyses of Research Question #1 suggest full-day kindergarten is supporting MCSD's goal of raising achievement for all students from kindergarten through grade 3, the corresponding hypotheses tests suggest this goal is met at the end of kindergarten and grade 1, but not for grades 2 and 3. Further evidence needs to be analyzed as students from Cohorts 3, 4, and 5 continue to advance through the end of grade 3.

The results of the statistical analyses conducted for Research Question #2 suggest kindergarten program type plays a statistically significant role on end-of-kindergarten

DRA scores at the alpha level of 0.05 while adjusting for gender and low income status. However, this difference has disappeared by the end of grade 1.

Furthermore, gender and low income status play statistically significant roles on end-of-year DRA scores through the end of grade 2 while adjusting for the other variables. Females were more likely to score higher than their male counterparts, while students from non-low income homes were more likely to score higher than students from low income homes through the end of grade 2 regardless of their attendance in a half- or full-day kindergarten program. However, these differences disappeared by the end of grade 3.

The results of the statistical analyses conducted for Research Question #3 imply the DRA was a strong choice as an assessment tool connecting achievement results from MCSD's early literacy program to the reading portion of the PSSA. The strong positive correlations between the end-of-grade 3 DRA scores and PSSA reading scores may allow the district to use DRA scores from grades kindergarten through grade 2 as predictors of success on the third-grade PSSA.

The results of Research Question #4 suggest that MCSD's half-day kindergarten program is more cost-effective than their full-day kindergarten based on every comparative CER calculated. However, as MCSD increased their full-day kindergarten offerings throughout the first three years of this study, the difference between half-day kindergarten and full-day kindergarten CERs steadily improved, suggesting that MCSD's full-day kindergarten program became more efficient over time. When analyzing CERs as the cohorts progressed from kindergarten through grade 3, half-day kindergarten became increasingly more cost-effective. These results will be discussed in more detail

in Chapter 5. More specifically, the CERs will be discussed within the context of the upward trend in the proportion of students scoring proficient on the end-of-year DRA as well as the upward trend in the percentage of low income students entering kindergarten.

Chapter 5

DISCUSSION, CONCLUSIONS, AND FUTURE POSSIBILITIES

Discussion of Findings

During the late 1990s, Manheim Central, a small rural school district in south central Pennsylvania, was experiencing significant declining enrollment. In a typical public school district, this scenario would have automatically led to furloughing teachers with the hopes of signifying a fiscally responsible use of public school dollars. However, Manheim Central School District is anything but typical. Rather than cutting spending, the Board of School Directors of MCSD viewed the declining enrollment as an opportunity to reallocate significant monies towards early literacy initiatives aimed at the district goal of raising achievement levels for ALL students. This view became the foundation of the district's strategic educational goals adopted by MCSD in 1996. These initiatives included: (a) Reading Recovery (Clay, 1993); (b) a comprehensive review of the language arts curriculum; (c) Kid Writing (McCloy, 2002) in kindergarten, grade 1, and grade 2; and (d) full-day kindergarten.

The cornerstone of MCSD's early literacy initiatives, and certainly the most expensive, was the implementation of a pilot section of full-day kindergarten. After the initial success of the full-day kindergarten pilot section, MCSD moved forward with a plan to gradually increase the number of sections of full-day kindergarten over the next

three years until full-day kindergarten was available to all of the district's incoming kindergarten students.

The purpose of this study was to determine the efficacy of Manheim Central School District's full-day kindergarten program as compared to its half-day kindergarten program relative to students' reading levels through the end of grade 3. More specifically, this study analyzed the relationships among Developmental Reading Assessment (DRA) scores, half-day kindergarten, and full-day kindergarten. The analysis included associated costs, including teacher salary and benefits, to determine the extent to which Manheim Central's full-day kindergarten program is supporting the district's mission and first two educational goals: (1) Raise student achievement for all students, and (2) Implement an appropriate curriculum and support system based on the diverse needs of all students. The analyses conducted by the researcher revealed strong results connecting the DRA to the PSSA; linking full-day kindergarten to increased achievement for ALL students; comparing results for students from diverse backgrounds; and exploring the costs related to increased achievement.

Developmental Reading Assessment and PSSA Correlations

While this research study was designed to evaluate the efficacy of Manheim Central School District's full-day kindergarten program, one of the most important findings may be its contribution to the body of research on the DRA (see, for example, Williams, 1999; Weber, 2000). When MCSD adopted the DRA as an integral part of its early literacy assessment plan, it had no way of knowing that this assessment would be a

predictor of performance on the reading portion of the state mandated PSSA (Pennsylvania System of State Assessment) third-grade test. Indeed, this study produced a significant positive correlation between students' grade 3 PSSA reading scores and their corresponding end-of-grade 3 DRA scores for students from Cohort 1 and Cohort 2 (see Table 26). This important finding suggests the DRA was a strong choice as an assessment tool connecting achievement results from MCSD's early literacy program to the reading portion of the PSSA. To further validate this discovery, similar correlations should be conducted as students from Cohorts 3 through 5 progress all the way through grade 3 and take the PSSA reading exam.

The Pennsylvania Department of Education now requires all students in grades 3 through 8 and 11 to take the PSSA exams in reading and mathematics. Additionally, Manheim Central School District requires students to demonstrate proficiency on the PSSA in grade 11 to earn an MCSD high school diploma, thus, placing an increased level of accountability on this high stakes exam. The strong correlation between the DRA and PSSA found in this study will allow MCSD to design intervention programs for struggling students while they are still in the primary grades. This finding has significance because the researcher is not aware of any other studies connecting the DRA to the PSSA. While this strong, positive correlation between DRA scores and PSSA scores for third graders is good news for the district, the heart of this work focused upon the success of full-day kindergarten.

Raising Achievement Levels of All Students

When all kindergarten students from Cohorts 1 through 4 were combined, 92% of full-day kindergarten students were proficient on the end-of-kindergarten DRA, while only 69% of half-day kindergarten students were proficient (see Table 14). This difference in percentage was statistically significant and coincides with recent studies conducted by Cryan, Sheehan, Wiechel, and Bandy-Hedden (1992); Hough and Bryde (1996); Morrow et al. (1999); and Walston and West (2004), which found full-day kindergarten students to have increased achievement over their half-day kindergarten counterparts.

When this same group of students from MCSD's Cohorts 1 through 4 completed grade 1, 78% of those students coming from full-day kindergarten were proficient on the end-of-grade 1 DRA, compared to 72% of those students coming from half-day kindergarten (see Table 19). However, these differences were not sustained through the end of grades 2 and 3. This phenomenon supports the concerns raised by Karweit (1992) who, because of the lack of true experimental studies comparing full-day and half-day kindergarten, found little evidence supporting full-day kindergarten beyond grade 1. Importantly, this study did not use a true experimental design, which is necessary to determine causal relationships (Fraenkel & Wallen, 2000).

Although students in half-day kindergarten caught up to their full-day kindergarten counterparts on DRA test scores by the end of grade 3, the descriptive data presented in Figure 3 suggests they caught up to them at much higher standards and levels on the DRA. This finding suggests that Manheim Central School District's

implementation of full-day kindergarten has succeeded in “raising the bar” during these early years of literacy development.

Additionally, the percentage of all students scoring proficient on the end-of-kindergarten DRA increased significantly from Cohorts 1 through 5 (see Table 18). While not statistically significant beyond kindergarten, the fact that a steady increase in the percentage of all students scoring proficient on the end-of-year DRA for all grade levels from kindergarten through grade 3 can be seen throughout MCSD’s gradual implementation of full-day kindergarten (see Figure 3) may have practical significance for the district. Throughout the five-year period of this study, the number of students from kindergarten through grade 3 reading on grade level climbed as the number of full-day kindergarten sections increased.

Consequently, full-day kindergarten at MCSD seems to have contributed greatly toward the district goal of raising student achievement for ALL students. Further analysis of Cohorts 3 through 5 is necessary to determine if this upward trend continues as these students advance through grade 3. While full-day kindergarten appears to have contributed to raising the bar for all students, some may argue that these increased expectations could place at-risk students at a disadvantage.

Meeting Students’ Diverse Needs

According to the data, full-day kindergarten at MCSD has also supported the district’s second strategic goal: Implement an appropriate curriculum and support system based on the diverse needs of all students. As an elementary principal in the Manheim

Central School District, the researcher has experienced first hand the many positive effects of full-day kindergarten beyond DRA reading scores. The related staff development offered to primary teachers throughout MCSD's implementation of full-day kindergarten has worked to promote NAEYC's (1996) recommendations of implementing early childhood programs rich in developmentally appropriate practices related to curriculum, instruction, and assessment. As a result, this administrator and others within the district now routinely see primary teachers and reading specialists at MCSD who are working with students coming from both full- and half-day kindergarten programs using scaffolding strategies to instruct children within their zone of proximal development.

Reflecting practices supported in research studies conducted by Cryan et al. (1992); Elicker and Mathur (1997); Hough and Bryde (1996); Morrow et al. (1999); and Walston and West (2004), students attending MCSD's full-day kindergarten program have spent more time in (a) quality small group activities, (b) active free play promoting child-initiated social interactions, and (c) one-on-one work with the classroom teacher than was apparent at the start of this initiative. From the researcher's administrative perspective, these developmentally appropriate practices, which have become an integral part of MCSD's full-day kindergarten program, seem to have had a measurable effect on students' acquisition of early literacy skills, as suggested by their gains in DRA reading scores.

MCSD's second district goal not only addresses the implementation of an appropriate curriculum, but more importantly, speaks to the diverse needs of all students. During the five-year implementation period of full-day kindergarten, MCSD experienced

a steady upward trend in the percentage of low income students entering the district (see Figure 2). The academic achievement gap between low income and non-low income families is well known, resulting in federal and state initiatives aimed at decreasing this gap (U. S. Department of Education, n.d.). Administrators within the district recognize that an increasingly needy and at-risk population generally results in lower performance on standardized test scores caused by students who tend to be more challenging to teach, lack motivation, and may lack parental support in the home; consequently, students from low income families are more likely to be unsuccessful in school (Kaufman & Bradbury, 1992).

On several occasions during the time frame of this study, the administrative team met to discuss many issues surrounding the increased number of disadvantaged students being served within the district's kindergarten programs. These issues included an increased number of students entering kindergarten (a) with minimal or no understanding of numbers and letters, (b) with no pre-kindergarten experiences, (c) lacking self-control within a structured group setting, and (d) exhibiting extremely aggressive behaviors towards other students and adults. Remarkably, however, during the five-year period of this study Manheim Central School District experienced a positive correlation between the percentage of low income students being served and the percentage of students scoring proficient on the DRA (see Tables 11 & 18). This counterintuitive finding offers evidence that MCSD's full-day kindergarten program is playing a pivotal role in meeting the diverse needs of its students.

The Price of Success

Increases in DRA reading scores for all students from kindergarten through grade 3 is a laudable achievement for any district. Unfortunately, in the real world cautious board members representing thrifty constituents must approve school district budgets, which, at times, include tax increases. Before tax increases are approved, however, the local school board may go through the painstaking process of examining expensive programs to determine if they are reaching their educational goals and objectives. When considering the budget implications of Manheim Central School District's full-day kindergarten program, the CERs produced from this study may be used by board members and administrators to compare full-day and half-day kindergarten programs. The CERs, or cost-effectiveness ratios, represent the total dollars spent per proficient student.

The CERs calculated for Research Question #4 suggest that MCSD's half-day kindergarten program was more cost-effective annually than its current full-day kindergarten program. However, as MCSD increased its full-day kindergarten offerings throughout the first three years of this study the annual full-day kindergarten CERs gradually decreased while the corresponding half-day kindergarten CERs increased (see Table 30). Consequently, the differences between half-day and full-day CERs steadily decreased. This suggests that the number of full-day kindergarten students proficient on the DRA increased more rapidly than the corresponding increase in costs necessary to offer additional full-day kindergarten sections. In other words, the CERs from Table 30

provide evidence that MCSD's full-day kindergarten program became more efficient over time relative to CERs during the kindergarten year.

While making policy decisions regarding their full-day kindergarten program, these findings suggest that the Manheim Central School District Board of School Directors, along with the central office administration, might best consider the CERs from the "you get what you pay for" perspective. That is, while all of the CERs are better for half-day kindergarten, the district realized a steadily increasing percentage of proficient students on the end-of-year DRA, while simultaneously experiencing a corresponding increase in low income students. In other words, the district will need to decide if the increase in end-of-year DRA proficiency levels is worth the extra monies dedicated to its full-day kindergarten program.

Limitations of the Study

While full-day kindergarten was the cornerstone of Manheim Central School District's plan to support its goal of raising achievement levels for all students, several other early literacy initiatives must also be considered when analyzing end-of-year DRA scores and CERs. Among these are a comprehensive review of the language arts curriculum, Kid Writing in kindergarten through grade 2, and Reading Recovery in grade 1.

During the period of this study, MCSD had several programs designed to close the achievement gap by supporting primary students who were at risk of falling behind in the acquisition of early literacy skills. First, MCSD's Title I reading program utilized all

six of the district's reading specialists to provide intensive reading support in all first and second grade classrooms. Second, summer school was offered to academically at-risk students. The researcher did not collect data to determine if either of these programs, during the five years of this study, served a higher percentage of students coming from half-day kindergarten classrooms. If so, it would be plausible to infer that the Title I reading program and/or summer school may have played a "catch up" role for half-day kindergarten students in subsequent years.

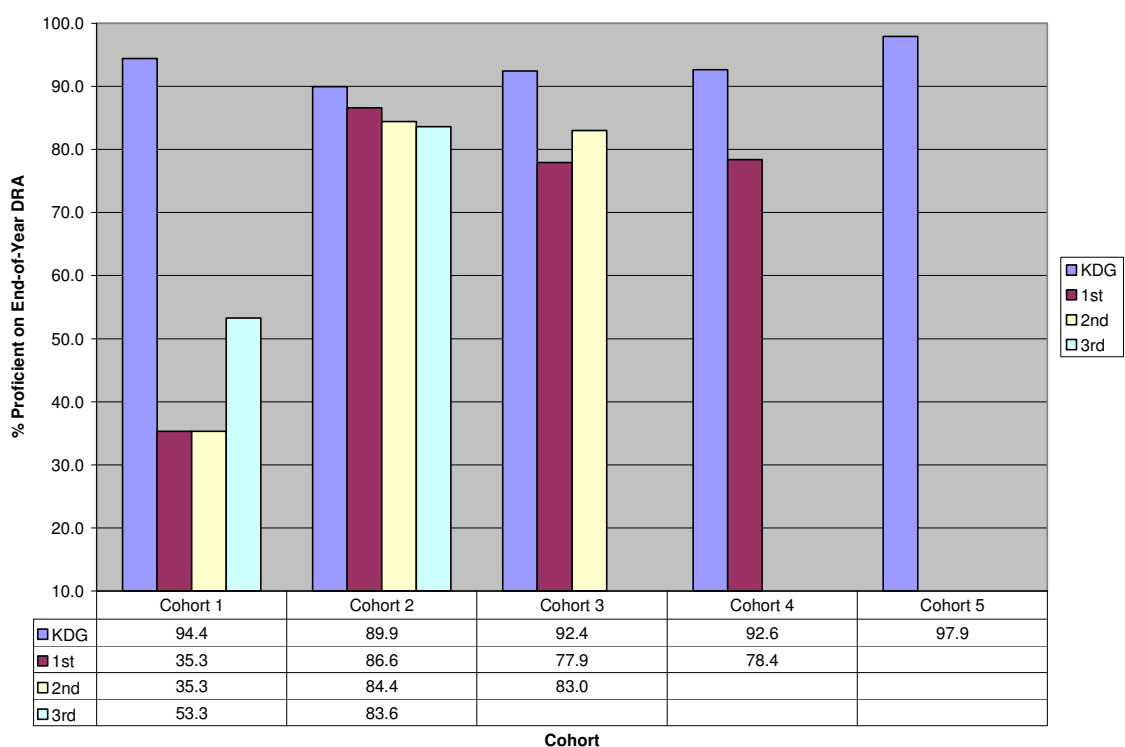
During the full-day kindergarten program design phase, MCSD did not establish a system for collecting data relative to: (a) incoming students' prekindergarten experiences -the district began collecting this information during the 03-04 school year; (b) parent satisfaction over time; (c) teacher feedback regarding social and behavioral differences observed for their kindergarten students over time; (d) summer school attendance; or (e) participation in the Title I reading program. Consequently, this study analyzed only DRA reading data and associated program costs. From a comprehensive program evaluation perspective, decisions regarding the future of a program should include systematic data collection and analysis representing all of the information outlined above.

Finally, a closer look at the eighteen students in the initial full-day kindergarten section from Cohort 1 (see Figure 4) reveals a dramatic decrease from the percentage of students proficient at the end of kindergarten (94%) to the percentage proficient at the end of grade 3 (53%). This anomaly suggests that there may have been curricular issues as these students progressed through subsequent years and were combined with students coming from half-day kindergarten when assigned to sections for grades 1, 2, and 3. There very well may have been a "wash out" effect for this group of students. There was

no way for the researcher to determine if the mixing of full-day kindergarten students with half-day kindergarten students slowed the progress and early reading gains made in the earliest full-day kindergarten classrooms

Figure 4

Proportion of Full-Day Kindergarten Students Scoring Proficient on End-of-Year DRA from Cohort 1 to Cohort 5



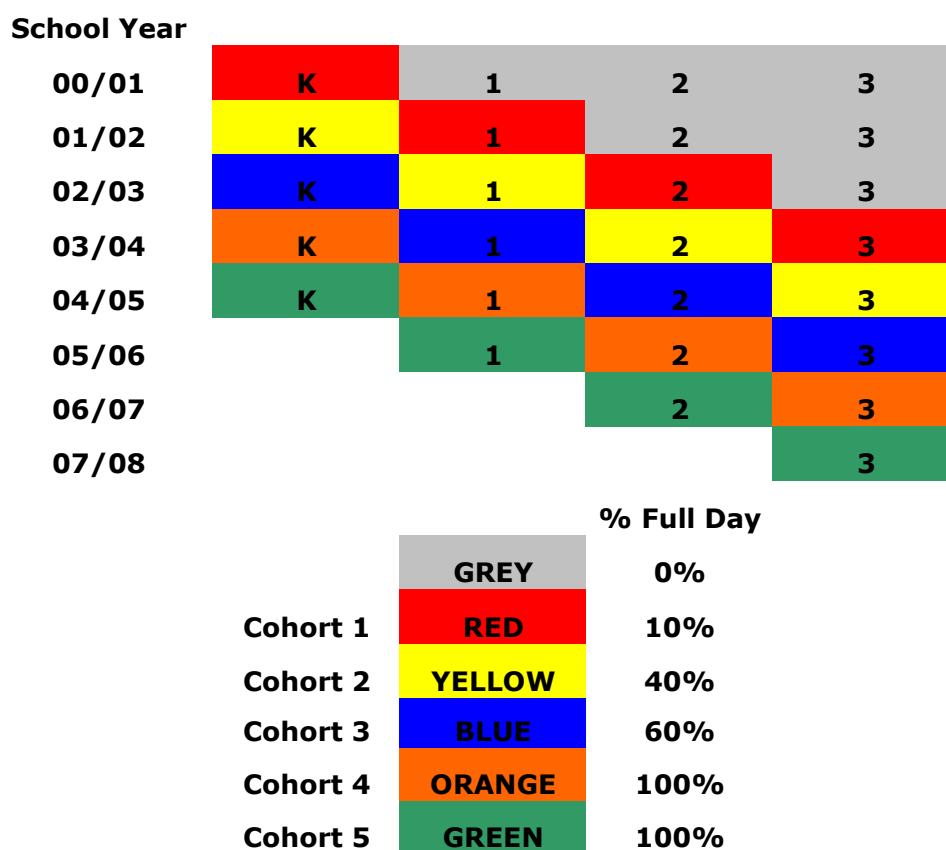
To better understand the impact of these limitations, the researcher recommends that MCSD continue conducting similar data analyses as the students from Cohorts 3, 4, and 5 advance through grade 3. As shown in Figure 6, this will simply include the collection of DRA reading data through the end of the 2007/2008 school year.

Furthermore, MCSD should continue to analyze Pearson correlations with grade 3 PSSA

reading scores and end-of-grade 3 DRA scores. Additionally, the district may find it helpful to run correlations between grade 3 PSSA reading scores and beginning-of-grade 3 DRA scores. If a positive correlation is found, this would allow the district to plan interventions throughout the third grade school year for low performing students prior to them taking the PSSA exam.

Figure 5

Cohorts 3, 4, and 5 Extended Through the End of Grade 3



Future Possibilities

As states continue to provide funding for full-day kindergarten programs, it is imperative for researchers within these states to analyze the efficacy of the full-day kindergarten programs over time. Future research in this area can focus on many different aspects of the implementation of full-day kindergarten within a specific district, such as: Did the district implement an appropriate and comprehensive plan for evaluating the efficacy of the program with regards to the districts mission and goals? How well did the district provide in-service training in developmentally appropriate practices to the full-day kindergarten teachers? Was the curriculum in subsequent grade levels adjusted to meet the needs of the students coming from full-day kindergarten? Is there a component within the evaluation to determine parent and teacher satisfaction?

While these components of a solid evaluation plan are important, the development of early literacy skills will continue to be paramount in any full-day kindergarten program. Future research should focus on the extent to which full-day kindergarten impacts the reading levels of students through grade 3. To avoid some of the limitations this researcher encountered, during the research design phase a group of students should be set up to attend a developmentally appropriate full-day kindergarten and then this same group of students should loop to grades 1, 2, and 3.

Another area to consider for further research is the extent to which full-day kindergarten impacts students socially and behaviorally. Did students entering full-day kindergarten have any prekindergarten experiences? How well do the students adjust to the institution of schooling? Does full-day kindergarten limit the daily transitions in and

out of daycare? Do developmentally appropriate play activities help foster social and behavioral growth in full-day kindergarten students?

Finally, further research should be considered in the area of teacher performance. Is student achievement impacted by a teacher's years of experience in full-day kindergarten? Does a teacher's highest level of education positively affect student reading scores? Is there a correlation between student achievement and the amount of professional development opportunities full-day kindergarten teachers have had in developmentally appropriate practices?

Conclusion

Manheim Central School District's implementation of full-day kindergarten truly was unique. Over a three year period, the district had a steady increase from one pilot section of full-day kindergarten to a fully operational program consisting of ten sections serving the entire district population of kindergarten students. Full-day kindergarten was the cornerstone of many early literacy initiatives put into practice during the same time period, including comprehensive literacy training for all primary teachers, intensive Title I reading support from all of the district's reading specialists, and summer school for struggling readers.

While the hypotheses tested in this research study did not reveal statistical significance through grade 3, the descriptive data analyses provide clear evidence of an upward trend in the proportion of students scoring proficient on the end-of-year DRA, through grade 3 suggesting practical significance from school board or administrative

perspective. This upward trend becomes even more powerful when analyzed and considered within the context of a simultaneous upward trend in the number of low income students entering their kindergarten program. Over the next several years, Manheim Central School District will be able to determine if this upward trend continues as the students in the latter cohorts progress through grade 3. If so, the new data may very well increase the statistical significance of the earlier data analyses.

The strength of the correlation between grade 3 DRA scores and students' corresponding PSSA reading scores is noteworthy. If data in subsequent years continue to show strong correlations between these two assessment measures, MCSD may be able to utilize the DRA as a predictor of student performance on the reading portion of the PSSA. This important finding may have significance across the state as all districts in Pennsylvania are subjected to the pressures of accountability related to the PSSA.

This research study provides the policy makers within the Manheim Central School District with a wealth of reading proficiency data over time as well as cost-effectiveness data related to their full-day kindergarten program. These data may be utilized to assist the Board of School Directors and central office administrators in the decision making process regarding the future of full-day kindergarten at Manheim Central School District. Based on the data analyzed and presented for this research study, Manheim Central School District is making substantial progress towards its district goals of raising student achievement for all students and implementing an appropriate curriculum and support system based on the diverse needs of all students through its full-day kindergarten initiative.

Beyond the Numbers

This research was conducted using data from the Manheim Central School District. As an elementary principal in the district, I have a wealth of anecdotal evidence that supports the success of the district's full day kindergarten initiative but was not included as a part of the study. While the findings of this study support the decision to begin full day programming in the district, many other factors of great importance also support this programming decision.

This study measures the success of the full day program along one construct only: academic achievement as measured by DRA scores. Yet many other variables can be used to measure the importance of the program, such as sociological issues (e.g., children in childcare beginning at six weeks of age), developmental issues (Vygotsky's zone of proximal development), pedagogical changes (e.g., Kid Writing curriculum), and parent-teacher satisfaction with the program. In this case, it is my sense that almost 100% of the parents and teachers are supportive of full day kindergarten, though for very different reasons. This section addresses some of the anecdotal evidence of program success that leads this researcher to embrace full-day kindergarten as one of the single most influential factors in our steadily improving academic performance.

Kid Writing, as expressed to the researcher by an experienced kindergarten teacher, is "the single most powerful strategy for developing early literacy skills that I have used in my 30 plus years as a kindergarten teacher." Full-day kindergarten provides teachers with up to 60 minutes of daily instructional time to be used for Kid Writing! As

this researcher has witnessed, the growth in this area is truly remarkable when comparing students' Kid Writing journal entries in the fall to their journal entries in May.

Second, the passion expressed by the many experienced kindergarten teachers within the district supporting their full-day kindergarten program is exceptional. While not conducted, the researcher believes a survey of kindergarten teachers within the district would claim tremendous growth increases, both socially and behaviorally, among the students in full-day kindergarten. This, in conjunction with the reading data presented in the study, would provide important evidence reflecting first-grade preparedness.

Third, while MCSD was transitioning from half-day kindergarten to full-day kindergarten, the elementary administration sponsored a Parent Information Night prior to kindergarten registration to educate parents on the full-day kindergarten program. During these annual programs, a large number of parents from diverse backgrounds spoke passionately about the many positive outcomes full-day kindergarten had for their children. Some parents compared their oldest child's growth, who incidentally attended half-day kindergarten, with the tremendous growth experienced by a younger child who attended full-day kindergarten. Other parents spoke about their comfort in knowing that, while they were working a full-time job during the day, their child was not transitioning from school to childcare several times throughout the day. The researcher believes such testimonials, along with the positive "word-of-mouth" advertisement throughout the community, help to explain the relatively low number of families within the district who requested half-day kindergarten during these transition years.

Finally, it must be acknowledged this researcher wholeheartedly supports Manheim Central School District's full-day kindergarten program from a parent's perspective. As a parent of three young children, my two oldest children attended full-day kindergarten and my youngest child will be entering kindergarten during the 08-09 school year. In addition to increased levels on the DRA, my children exited full-day kindergarten with a desire and passion to read and write.

Most full-day kindergarten teachers within the district point out that, since the implementation of full-day kindergarten, MORE students CHOOSE to read and write during free choice time. Teaching reading and writing is the single most important curricular area in all primary grades. If a qualitative study were to be conducted on Manheim Central School District's full-day kindergarten program, this researcher/administrator/parent believes the results would significantly enhance the powerful quantitative results found in this study.

References

- Almasi, J. F., Culver, J., & Montgomery, S. (n.d.). *An evaluation of the impact of the Kentucky reading project on teacher and student growth 2004-05*. Retrieved March 12, 2006, from <http://www.kentuckyliteracy.org/2004-2005/Doc4-Almasi.doc>
- Ashdown, J., & Hummel-Rossi, B. (2002). What is cost-effectiveness analysis? *Journal of Reading Recovery*, Fall, 44-46.
- Blanck, G. (1990). Vygotsky: The man and his cause. In L. C. Moll (Ed.), *Vygotsky and education: Instructional implications and applications of sociohistorical psychology* (pp. 31-58). Cambridge, United Kingdom: Cambridge University Press.
- Beaver, J. (1997). *Developmental reading assessment resource guide*. Parsippany, NJ: Celebration Press.
- Berenson, M. L., & Levine, D. M. (1999). *Basic business statistics: Concepts and applications (7th ed.)*. Upper Saddle River, NJ: Prentice Hall, Inc.
- Clark, P. (2001). *Recent research on all-day kindergarten*. *ERIC Digest*. ERIC Clearinghouse on Elementary and Early Childhood Education. (ERIC Document Reproduction Service No. ED 453 982)
- Clay, M. M. (1993). *Reading Recovery: A guidebook for teachers in training*. Portsmouth, NH: Heinemann.
- Cryan, J. R., Sheehan, R., Wiechel, J., & Bandy-Hedden, I. G. (1992). Success outcomes of full-day kindergarten: More positive behavior and increased achievement in the years after. *Early Childhood Research Quarterly*, 7, 187-203.
- Denton, D. (1999). *Reading reform in the SREB states: Early assessment*. Southern Region Education Board. Retrieved March 12, 2006, from <http://www.sreb.org/programs/srr/pubs/readreform/Reading%20Reform.pdf>
- Donaldson, S. I., & Christie, C. A. (in press). Emerging career opportunities in the transdiscipline of evaluation science. In S. I. Donaldson, D. E. Berger, & K. Pezdek (Eds.), *Applied psychology: New frontiers and rewarding careers* (pp. 243-259). Mahwah, NJ: Lawrence Erlbaum Associates.
- Dwyer, M. C., Chait, R., & McKee, P. (2000). *Building strong foundations for early learning: The U.S. Department of Education's guide to high-quality childhood*

education programs. U.S. Department of Education. Washington, DC: U.S. Government Printing Office. Retrieved November 1, 2005, from www.ed.gov/offices/OUS/PES/whatsnew.html

- Elicker, J., & Mathur, S. (1997). What do they do all day? Comprehensive evaluation of a full-day kindergarten. *Early Childhood Research Quarterly*, 12, 459-480.
- Fraenkel, J. R., & Wallen, N. E. (2000). *How to design and evaluate research in education (4th ed.)*. Boston, MA: The McGraw-Hill Companies, Inc.
- Fromberg, D. P. (1992). Implementing the full-day kindergarten. *Principal*, 71(5), 26-28.
- Fusaro, J. (1997). The effect of full-day kindergarten on student achievement: A meta-analysis. *Child Study Journal*, 27(4), 269-277.
- Gilliam, W., & Leiter, V. (2003). Evaluating early childhood programs: Improving quality and informing policy. *Zero to Three*, 23(6), 6-13.
- Gullo, D. F. (1990). The changing family context: Implications for the development of all-day kindergartens. *Young Children*, 45(4), 35-39.
- Gullo, D. F. (2000). The long term educational effects of half-day vs. full-day kindergarten. *Early Child Development and Care*, 160, 17-24.
- Gust, C. (2000, April). *Request to conduct a pilot program for full day kindergarten 2000-2001*. Paper presented at the meeting of the Manheim Central School District Board of School Directors, Manheim, PA.
- Hildebrand, C. (1997). Effects of all-day and half-day kindergarten programming on reading, writing, math and classroom social behaviors. *National FORUM Journals*. Retrieved December 23, 2004, from <http://www.nationalforum.com/Miscellaneous/Archives.htm>
- Humphrey, J. W. (1980). *A study of the effectiveness of full day kindergarten*. (ERIC Document Reproduction Service No. ED 190 224)
- Hough, D., & Bryde, S. (1996). *The effects of full-day kindergarten on student achievement and affect*. Paper presented at the Annual Meeting of the American Educational Research Association. New York, NY. April 8-12, 1996. (ERIC Document Reproduction Service No. ED 395 691)
- Karweit, N. (1992). The kindergarten experience. *Educational Leadership*, 49(6), 82-86.

- Kaufman, P., & Bradbury, D. (1992). *Characteristics of at-risk students in NELS:88*. Washington, DC: U.S. Department of Education, NCES. Retrieved June 18, 2006, from <http://nces.ed.gov/pubs92/92042.pdf>
- Koopmans, M. (1991). *A study of the longitudinal effects of all-day kindergarten attendance on achievement*. (ERIC Document Reproduction Service No. ED 336 494)
- LeCompte, M. (1994). *Sensible matchmaking: Qualitative research design and the program evaluation standards*. Retrieved November 20, 2005, from <http://search.epnet.com.ezaccess.libraries.psu.edu/login.aspx?direct=true&db=tfh&an=9612092183>
- Levin, H. M., & McEwan, P. J. (2001). *Cost-effectiveness analysis: Methods and applications (2nd ed.)*. Thousand Oaks, CA: Sage Publications, Inc.
- Levin, H. M., & McEwan, P. J. (2002). *Cost-effectiveness and educational policy: American Education Finance Association, 2002 Yearbook*. Larchmont, NY: Eye on Education, Inc.
- Leong, D., Bodrova, E., Hensen, R., & Henninger, M. (1999). *Scaffolding early literacy through play: How to strengthen play, increase oral language, encourage more symbolic thinking, and support the development of concepts of print and writing*. Paper presented at the NAEYC Annual Conference, New Orleans, LA. Retrieved October 23, 2005, from http://www.mcrel.org/pdf/earlychildhoodeducation/4006tg_scaffolding_literacy_through_play.pdf
- Manheim Central School District. (2005). Homepage <http://www.manheimcentral.org>
- Martinez, S., & Snider, L. (2001). *Summary of research full-day kindergarten*. Kansas State Department of Education. Retrieved December 23, 2004, from http://www.ksde.org/pre/full_day_kindergarten.html
- McCloy, M. E. (2002). *Strategies for successful child-centered writing (Kid Writing)*. Retrieved January 22, 2005, from http://www.kidwriting.com/files/research_on_kid_writing.doc
- McKenzie, J., & Goldman, R. (2005). *The student guide to minitab: Release 14*. Upper Saddle River, NJ: Pearson Education, Inc.
- Morrow, L., Strickland, D., & Woo, D. (1999). *Literacy instruction in half-and whole-day kindergarten: Research to practice*. Newark, DE: International Reading Association.

- National Association for the Education of Young Children. (1996). *A position statement of the NAEYC. Developmentally appropriate practice in early childhood programs serving children from birth through age 8*. Retrieved December 4, 2005, from <http://www.naeyc.org/about/positions/pdf/psdap98.pdf>
- National Association for the Education of Young Children & National Association of Early Childhood Specialists in State Departments of Education (2003). *Joint position statement by the NAEYC and NAECS/SDE. Early childhood curriculum, assessment, and program evaluation: Building an effective, accountable system in programs for children birth through age 8*. Retrieved December 4, 2005, from <http://www.naeyc.org/about/positions/pdf/CAPEexpand.pdf>
- Nelson, R. F. (2000). Which is the best kindergarten? *Principal*, 79(5), 38-41.
- Nieman, R. H., & Gastright, J. F. (1981a). *The long-term effects of ESEA Title I preschool and all day kindergarten: An eight year follow-up study*. (ERIC Document Reproduction Service No. ED 198 949)
- Norusis, M. (n.d.). *SPSS 6.1: Guide to data analysis*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Pearson Learning Group. (n.d.). *DRA K-8 technical manual: Developmental Reading Assessment (DRA)*. Retrieved October 23, 2005, from http://www.pearsonlearning.com/correlation/rsp/DRA_Technical_Manual.pdf
- Pennsylvania Department of Education. (n.d.). *Accountability Block Grant guidelines and information*. Retrieved December 13, 2005, from http://www.pde.state.pa.us/svcs_students/lib/svcs_students/ABGGuidelines2005-06.pdf
- Plucker, J. A., Eaton, J. J., Rapp, K. E., Lim, W., Nowak, J., Hansen, J. A., et al. (2004). *The effects of full day versus half day kindergarten: Review and analysis of national and Indiana data*. Center for Evaluation and Education Policy. Retrieved January 17, 2005, from <http://www.doe.state.in.us/primetime/pdf/fulldaykreport.pdf>
- Rosenthal, E., & Rathbun, A. (2005). *Statistics in brief: Regional differences in kindergartners' early education experiences*. (NCES 2005-099). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office. Retrieved October 23, 2005, from <http://nces.ed.gov/pubs2005/2005099.pdf>
- Rothenberg, D. (1984). *Full-day or half-day kindergarten?* ERIC Digest Urbana, IL: ERIC Clearinghouse on Elementary and Early Childhood Education. (ERIC Document Reproduction Service No. ED 256 474)

- Rothenberg, D. (1995). *Full-day kindergarten programs*. ERIC Digest Champaign, IL: ERIC Clearinghouse on Elementary and Early Childhood Education. (ERIC Document Reproduction Service No. ED 382 410)
- Shadish W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin Company.
- Tomlinson, C. A. (2000). *Differentiation of instruction in the elementary grades*. ERIC Digest. ERIC Clearinghouse on Elementary and Early Childhood Education. (ERIC Document Reproduction Service No. ED 443 572)
- U. S. Department of Education. (n.d.). *The No Child Left Behind Act of 2001*. Retrieved December 13, 2005, from <http://www.whitehouse.gov/news/reports/no-child-left-behind.html#3>
- Walston, J. T., & West, J. (2004). *Full-day and half-day kindergarten in the United States: Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99* (NCES 2004-078). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
- Wang, Y. L. & Johnstone, W. G. (1999). Evaluation of a full-day kindergarten program. *ERS Spectrum*, 17(2), 27-32.
- Weber, W. A. (2000). *Developmental Reading Assessment and Evaluación del desarrollo de la lectura: A validation Study*. Retrieved January 2, 2006, from http://www.pearsonlearning.com/correlation/rsp/ResearchPaper_DRA.pdf
- Wells, G. (1994). The complementary contributions of Halliday and Vygotsky to a language-based theory of learning. *Linguistics and Education*, 6, 41-90.
- Williams, E. J. (1999). *Developmental Reading Assessment: Reliability Study*. Unpublished manuscript. Retrieved January 2, 2006, from <http://www.pearsonlearning.com/correlation/rsp/DRA.doc>

VITA

R. Thomas Stone

R. Thomas Stone was born in Goshen, Indiana on March 28, 1971, to Tom and Judy Heminger. He graduated from Manheim Central High School in Manheim, Pennsylvania in 1989. In 1993, he graduated from Lebanon Valley College in Lebanon, Pennsylvania with a Bachelor of Science degree in Mathematics along with Pennsylvania's certification to teach mathematics.

Following graduation from Lebanon Valley, Mr. Stone began his high school teaching career in the Eastern Lebanon County (ELCO) School District. Over his nine-year employment there, he primarily taught junior and senior level honors and advanced placement courses while serving on the Student Support Team.

While at ELCO, Mr. Stone completed his Master in Education degree in Teaching and Curriculum, in addition to earning Pennsylvania's principal certification, from the Pennsylvania State University. Mr. Stone began his administrative career as an assistant principal at ELCO Middle School for three years where he began his doctoral studies at Penn State, followed by a half year as an assistant principal at ELCO High School.

Mr. Stone recently completed his fourth year as an elementary principal within the Manheim Central School District.