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Comparison of The Academic Achievement of Primary School Students
in Multiage and Traditional Classrooms

A dissertation
presented to
the faculty of the Department of Educational Leadership
and Policy Analysis
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Doctor in Education

by
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December 2001

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Dr. Nancy Dishner
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Keywords: Multiage, Developmentally Appropriate, Primary Grade Multiage,
Kindergarten/First-Grade Multiage, Traditional Class

ABSTRACT

Comparison of the Academic Achievement of Primary School Students in Multiage and Traditional Classrooms

by

Mary Frances Harmon

The purpose of this study was to ascertain whether students in a kindergarten/first-grade multiage class achieve at a different level from students enrolled in a traditional kindergarten or first-grade class in a selected primary school in East Tennessee. The question of the interaction between gender and type of instruction was also analyzed.

The causal comparative quantitative research method was used to analyze data differentiating between students enrolled in multiage and traditional classes, retrospectively. A t-test was used to determine the level of performance the students demonstrated on the BRIGANCE K Screen at the beginning of the study. The number of mastered first-grade reading skills and mathematics skills, the score on the system-wide first-grade reading test and mathematics test, and gender interaction with type of instruction in each area were analyzed using ANCOVAs.

Statistically significant results ($p < .05$) showed that the multiage students performed at a higher level on the BRIGANCE 1 Screen (ANCOVA). In 1998, the combined males scored significantly higher than the combined females. In 1999, multiage males had significantly higher means than traditional males. ANCOVA results showed statistically significant difference in the number of mastered reading skills of the multiage students in 1998 as well as with the combination of all three years. The multiage mean was the higher of the two groups all three years. For the number of mastered mathematics skills, ANCOVA results showed a statistically significant difference in 1999 with the multiage scores higher than the traditional group. ANCOVA results showed no significant difference between the groups on the standardized reading and mathematics tests analyzed.

Findings indicate that kindergarten students may benefit from kindergarten classes in a multiage setting, and that first-grade students may benefit from multiage settings in mastering skills in reading and mathematics but that benefit is not necessarily demonstrated by standardized test scores.

DEDICATION

This work is dedicated to my husband, Marvin, who encouraged me to expand my horizons and be all that I can be, and to my children, Brad, Michael, and Melissa. Thank you for your love, support, patience, and encouragement throughout my endeavors. You have kept me focused and on target. Also, to my parents, James and Veryl Turner, who instilled in me a strong work ethic and taught me the value of education. To my sister, Barbara Scott, who tirelessly gave of herself to help me in innumerable ways. And to Doodles who took me for a walk everyday. I love each of you.

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CHAPTER 1

INTRODUCTION TO THE STUDY

Just around the bend in the road, in the shadows of the giant oak tree, sits the old one-room schoolhouse. Even in its deteriorating state, you can close your eyes and visualize the schoolhouse as it was in its prime. Suddenly you hear the laughter of the children as they play in the schoolyard. You can feel the contentment in the atmosphere. The children are happy to be at school. The schoolhouse serves the community's most important resource, the children. The students feel safe and secure at school. The teacher is a stable aspect in the lives of students because there is seldom a change in school staff. The teacher is not only there to educate the students but to nurture, challenge, and prepare them for the real world. With only one teacher for all 8 to 12 grades, the teacher is faced with the challenge of covering the curriculum of each grade, providing quality time for each subject and grade level, and maintaining an atmosphere conducive to education.

The multiage class is a concept implemented in some schools during the 1990s. This is a heterogeneous class that consists of at least two traditional grade levels with students usually covering three or more chronological age groups. This idea employs a developmentally appropriate curriculum that enhances the students' educational experience.

Parallels can be drawn between the old one-room schoolhouse and today's multiage classroom. In both settings, the range of the ages of the students covers more than two years, and the students have the same teacher for more than one year or grade. Another similarity is the challenge of covering more than one curriculum per school year. In both situations, the teacher must provide the appropriate time for instruction and practice of all subjects for all grade levels. Like the old one-room schoolhouse, today's multiage classroom can provide students with a nurturing atmosphere necessary for a positive educational experience.

Statement of the Problem

Throughout history, teachers have viewed meeting the needs of individual students as the primary purpose of their profession. Now many students bring unusual problems from home that are unique to today's society. These problems and experiences put many students at a clear disadvantage in school. Today's society faces crises that have never before been experienced. As many as seven million children are "latch-key kids" who face an empty home after leaving school (Child Care, 1998). Others come from dysfunctional families, broken homes, extended families, foster care, or single-parent families. Increased diversity, mobility, and population has contributed to the need for school reforms to meet the needs of diverse social and economic groups (Gaustad, 1992a). The school now bears the burden of providing a positive school experience in spite of these problems.

To strengthen students' school experiences, numerous schools are implementing programs that are based on student developmental and ability levels. One such program is the multiage classroom. According to Miller (1994), "numerous research reports emphasizing whole language, cooperative learning, heterogeneous grouping, and developmentally appropriate practice, . . . have implications for multiage learning environments" (p. 1). Kentucky, Oregon, Mississippi, Louisiana, and Florida have passed legislation mandating the reformation of current education practices. Multiage programs have been implemented in each of these states. Other states such as Alaska, California, Texas, Pennsylvania, New York, Georgia, and Tennessee have appointed task forces to study the multiage concept (Stone, 1995, 1996).

Some schools offer both traditional age-graded classes and multiage classes. In these situations, questions often arise concerning the academic achievement of both types of approaches. This study will seek to address such questions in the context of a primary school setting in which achievement levels (in reading and mathematics) of students in a traditional age-graded setting will be compared with achievement levels of students in a multiage setting.

The purpose of this study was to ascertain whether students in a kindergarten/first-grade multiage class achieve at a different level from students enrolled in a traditional kindergarten or first-grade class in a primary school in East Tennessee. The results will be used to determine whether there is a difference in the relationship between class type and academic achievement. Results will also be used to determine whether there is a difference in the academic achievement of females and of males within the two groups and between the two groups.

Research Questions

To determine if class type, multiage or traditional, affects student academic achievement in kindergarten and/or first grade, the following research questions were posed:

1. What level of performance did the students demonstrate on the BRIGANCE K Screen and were there initial differences between the multiage and traditional groups on this test?
2. Is there a difference in the BRIGANCE 1 Screen scores of kindergarten students participating in a multiage program and of students participating in a traditional age-graded kindergarten program while controlling for kindergarten readiness?
3. Is there a difference in the number of reading and math skills mastered by first-grade students participating in a multiage program and of students participating in a traditional age-graded first-grade program while controlling for kindergarten readiness?
4. Are there academic achievement differences between boys and girls within the multiage classroom and the traditional age-graded classroom and is there an interaction between gender and type of instruction?

Background

The American educator John Dewey held the philosophy that education should be child centered (Pulliam, 1987) and focused on learning by doing and learning by being active, not

passive (Hovda, Kyle, & McIntyre, 1996). He became skeptical of the rote learning systems used in American schools (Webb, Metha, & Jordan, 1996). Dewey had a vision of change for the educational system of the United States.

The successful launch of Sputnik in 1957 and the concern for equality of opportunity in the 1960s (Pulliam, 1987) had the educational authorities of the day questioning many of the approaches being practiced in the public schools. They suggested that there were alternative methods that would better meet the challenge of fulfilling the needs of the students. According to Pulliam, individual contracting, flexible scheduling, team teaching, and open classrooms were some of the different concepts implemented throughout the United States. Another alternative was a multiage program based on the theory of continuous educational progress by the individual pupil. These nongraded schools for primary age students established in the late 1950s and early 1960s are considered the forerunner of the modern day nongraded school (Goodlad & Anderson, 1963).

Now that the 21st Century has arrived, the question continues: How can the educational system best meet its obligations to a diverse student population? According to research, there is a movement that suggests that the multiage concept can contribute to fulfilling these obligations (Anderson & Pavan, 1993).

Significance of the Study

This study provides data comparing the academic success of students in a multiage primary grade program with similar students enrolled in traditional classrooms. Insights from this study may influence the examination of traditional roles of school personnel and of the chronological age-graded concept. It may further influence inquiry into alternative educational strategies.

The school's responsibilities changed dramatically during the later part of the 20th Century. According to a survey by the National Association of Elementary School Principals

(1990), not only must schools be responsible for the academic aspect of children's education but must also provide a curriculum that enhances social and emotional growth. The traditional age-graded curriculum focuses mainly on academics, but today's schools must meet the ever-changing needs of a diverse population. It is the school's responsibility to educate the whole child. Academics is still a major focus of the educational system; but social, emotional, and physical growth should also be included in the child-centered curriculum (Stone, 1996, 1998). It is up to the school to implement alternative educational programs that will educate the whole child and meet the needs of the 21st Century student.

This study will contribute to the field by providing data to indicate whether or not, given the delimitations of the study, there is a measurable or significant difference in the achievement of primary students in traditional age-graded classes and those of students in multiage programs.

Definitions

Continued educational progress is the process of each individual student moving from easier to more difficult material at his or her own pace (Gaustad, 1992a).

Developmentally appropriate refers to the practice or skill appropriate for the individual child based on his or her individual rate and pattern of growth, learning style, personality, and family background (Gaustad, 1996).

External attribution gives credit for the occurrence to an outside force or claims that some outside influence caused the occurrence.

Internal attribution assigns the cause of the action to circumstances within the person, or the person is accountable for the action.

Multiage indicates, in the context of this study, the practice of teaching children of different ages in the same classroom. The multiage class includes two grade levels and three or more chronological ages.

Limitations and Delimitations

This study was limited by the use of scores of the BRIGANCE K and 1 Screens. As such, interpreter reliability may be questionable as not all BRIGANCE K and 1 Screens were administered by the same person.

This study was delimited to students who completed both kindergarten and first grade in the multiage classes or both kindergarten and first grade in the traditional age-graded classes in the same primary school. The multiage kindergarten class attended school for the full school day of seven hours, while the traditional kindergarten class attended school for four and one half hours. Students were enrolled in the multiage kindergarten by parent request. Parent requests were also honored in the selection of traditional kindergarten and first-grade classes. Both multiage and traditional classes included a cross section of ability and socioeconomic groups. The results are generalizable only to the population used in this study and findings may or may not be applicable to schools in other geographical regions. Additionally, this study may be limited by the amount of time the two kindergarten groups attended school. This factor could possibly sway the outcome of the study as well as overshadow the effects of the multiage and traditional format.

Overview of the Study

Chapter 1 includes the introduction, the statement of the problem, the research questions, the background, significance of the study, the definitions, and the limitations and delimitations of the study.

Chapter 2 contains a review of the literature pertaining to the history of the multiage classroom, philosophies supporting the multiage classroom, varying definitions of multiage classrooms, current uses of the multiage concept, and previous research on the multiage classroom. The research design and method used in the study are detailed in Chapter 3. Chapter

4 contains the analysis of the data, and Chapter 5 contains the summary, conclusions, and the recommendations for further research.

CHAPTER 2

REVIEW OF LITERATURE

As the school age population becomes more diverse, educators are searching for the best approaches to use in meeting the needs of their students. Among many alternatives, the multiage classroom is becoming increasingly attractive. The concept is intricately entwined with several learning theories developed by well-known psychologists and educators. This chapter reviews those theories, the history of the multiage classroom, various definitions and approaches to the multiage classroom, and recent research on the multiage concept.

Learning Theories that Support Multiage Education

Piaget's (1977) Cognitive Development Theory provides the basis for what most educators consider developmentally appropriate practice. Primary age children develop physically and intellectually at varying rates; therefore, they progress at different rates (Gaustad, 1992a). Piaget and Inhelder (1969) held that children of primary school age need opportunities to interact with peers and their environment to enhance learning:

Contact with persons thus becomes more and more important, heralding a transition from contagion to communication. Even before the formation of a self complementary to and interacting with others we witness the elaboration of a whole system of exchanges through imitation and the reading of gestural signs. From this time on, the child begins to react to persons in a more and more specific manner because they behave differently from things and because they behave according to schemes which bear some relation to the schemes of the child's own action. Sooner or later there is established a kind of causality whose source is others, . . .(p. 24)

According to Piaget (1973), peer interactions, a crucial part of a child's development, result in cognitive conflict. These exchanges or conflicts force children to consider the points of view of others and experience interactions with other children at various developmental levels (Stone, 1996). Further, these children need to experience activities using concrete manipulatives in settings that foster peer interaction (Gaustad, 1992a). "The multiage classroom is designed to provide students with opportunities to interact, as their interests dictate, with both the physical and the social environments" (Bacharach, Hasslen, & Anderson, 1995, p. 9).

Erikson (1950) also reported that students' social surroundings, relationships, and conflicts play a major role in whether they experience success. According to Erikson, a multiage setting enhances self-directed learning and students' feelings of success.

Piaget's (1977) ideas concerning cognitive development in children are similar to ideas contained in the theories of Bruner (1960, 1973) and Vygotsky (1978b). They support the idea that the cognitive development of young children results from a continual effort to adapt to the environment (Bacharach et al., 1995). The variety of developmental levels that are found in the multiage classroom enhances a child's opportunity to experience cognitive growth (Stone, 1996).

Bruner and Haste (1987) based Constructivist Theory on the precept that learning is an active process. This allows the learner to construct new ideas and concepts based on his or her current and past knowledge. Bruner (1966) concluded that the school curriculum should be discovery oriented and presented in a spiral manner allowing the student to build on what he or she already knows. Bruner (1971) said,

Discovery teaching generally involves not so much the process of leading students to discover what is 'out there,' but rather, their discovering what is in their own heads. It involves encouraging them to say, Let me stop and think about that; Let me have some vicarious trial-and-error. There is a vast amount more in most heads than we are usually aware of, . . . you have got to convince students (or exemplify for them, which is a much

better way of putting it) of the fact that there are implicit models in their heads which are useful. (p. 72)

The student is then able to obtain and handle new information and is challenged to expand his or her knowledge. According to Bruner (1966), the teacher should engage the students in active discussions and be the translator of information to the students' current level of understanding. Students in multiage settings obtain knowledge through investigation as well as in-depth discussion involving adults and other students.

Vygotsky's (1962) Sociocultural Theory of Psychological Development is grounded in the idea of the importance of language and social interaction for cognitive growth. He suggested that while children are learning they experience two levels of development, doing by themselves and doing with guidance. Vygotsky (1978b) posited that the zone of proximal development is found between these two levels. He described the zone as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978a, p. 86). In this zone, children who obtain assistance extend their learning further than what they are able to do alone (Dever, Zila, & Manzano, 1994). Vygotsky (1978a) further promoted the concept that learning awakens internal developmental processes that are able to operate only when the child is interacting with people in his or her surroundings and in collaboration with other children. The multiage concept advocates that all students be actively involved in explorations of a variety of concepts with peers and adults.

In the Social Cognitive Learning Theory, Bandura (1977) stressed the significance of observing and modeling the behaviors, attitudes, and emotional reactions of others. According to Bandura, the majority of human behavior is learned from examples. This allows people to watch what they should do before they try for themselves (Kearsley, 1999). Bandura, Erikson, and Vygotsky stressed the importance of young children having the opportunity to watch and mimic more mature people (Dever et al., 1994). Examples of more complex behaviors are more readily

learned by observations than by other means. According to this theory, social learning is a result of growth, which is dependent on the child's experiences and level of intellectual progress. A multiage class provides children with vast opportunities to emulate other children at various levels of development (Bacharach et al., 1995).

Attribution Theory, developed by Weiner (1974, 1975) deals with student motivation. According to this theory there are two types of attribution or explanation: external and internal. External attribution places the cause of the action on outside forces, while internal attribution places the cause within the person. Thus, the person is responsible for the action (Booth-Butterfield, 1996). This theory shows that behaviors can be changed depending upon the explanations students use. With external attributions, the student's behavior is unlikely to change, but with internal attributions the student takes responsibility for the behavior (Weiner, 1974, 1975). Multiage educators guide their students toward internal attribution in order for them to take the responsibility for learning. Exploring ideas of interest is promoted so that students learn because they want to learn (Yates, 1999).

Bronfenbrenner's (1990) Ecological Theory maintained that all aspects of a child's environment are interwoven. Bronfenbrenner stated that the child must routinely have shared interaction with numerous caring adults over an extended amount of time. The child's emotional, physical, intellectual, and social needs are unique, as are his or her abilities, interests, values, and beliefs. The child's development is a result of all the interactions and connections of home, school, community, and broader society (Bronfenbrenner, 1989). "Multiage classrooms, because of their diverse makeup reflect the reality of the world" (Bacharach et al., 1995, p. 11) thus providing a connection between the community, home, and school.

John Dewey was instrumental in founding the movement called Pragmatism or Experimentalism (Pulliam, 1987). He had a vision of a child-centered school (Dewey, 1966) where the whole child would be educated. His goal was to make the child a lifelong learner (Hovda et al., 1996). According to Dewey (1981/1990), "Real life will simply be an

enlargement, an expansion, of that in which he is already trained” (p. 241). Dewey (1966) also spoke out for the concept that the individual differences of the child be supported and not minimized by the school. The idea of the grade-based school was in conflict with Dewey’s philosophies (Goodlad & Anderson, 1963; Miller, 1967). Dewey maintained that education should be active not passive (Hovda et al., 1996) and geared to the actual needs of the student (Pulliam, 1987). Further, Dewey maintained that skills necessary for dealing with other people and problem solving should be major components of the curriculum (Goodlad & Anderson, 1963). Dewey’s ideas of a child-centered school where problem solving is stressed and students take active roles in their learning plays a major part in the multiage classroom. The multiage concept incorporates the premise that every child is unique and that the child’s education is based on his or her individual needs.

In the demanding complex world of technology, mobility, diversity, and population growth (Bacharach et al., 1995), the multiage classroom offers the individual student continuity and stability in an ever-changing world. The multiage concept affords students the opportunity to develop social skills, add to their knowledge, and function in a social setting by sharing and working collaboratively (Bacharach et al.; Dever et al., 1994). The concept is based on research dealing with child development that indicates each child grows at his or her own rate cognitively, physically, socially, and emotionally (Regional Laboratory, 1994). A child-centered curriculum that builds on the student’s earlier knowledge is incorporated into the multiage concept (Bacharach et al.). In the multiage classroom, younger students have the opportunity to watch and mimic older classmates (Dever et al.). According to Bronfenbrenner (1989), the real world is reflected in a multiage classroom. Therefore, the multiage student becomes more proficient in his or her relationships at all levels of society (Bacharach et al.). While this is the case with most multiage settings, these concepts also permeate the environment of many traditional age-graded classrooms. There are numerous traditional teachers who are skilled in providing their students with these same advantages.

The multiage concept is rooted in the history of American education, but this method is not prevalent in today's educational system (Webb, 1992). The vast majority of schools in the United States use the age-graded traditional classroom (Bacharach et al., 1995). Even before education began in America, children were taught in settings of mixed ages. Throughout history the notion of one teacher teaching more than one age group was common.

The History of the Multiage Concept

The multiage concept has actually been used for hundreds of years. In the early Jewish schools, boys ages 6 through 13 were taught in the synagogues. Greeks held that boys ages 7 through 18 should be trained together for mental as well as physical fitness (Moen, 1999). The medieval trade guilds trained apprentices of different ages together. These apprentices lived with their master until it was determined that they were prepared to live and work on their own. One of the responsibilities of the monasteries during the 1500s was to teach. Usually children from the ages of 6 to 16 were educated at the same time (Moen). These earliest instances of cross-age teaching laid the foundation for the European educational patterns.

During the 17th Century, the earliest American schools were multiage schools. All children of the village ages 6 to 16 were taught together (Moen, 1999). These colonial schools resembled the schools of Europe. The colonial period was a transitional time in American history. Education in America began to change from the European style of education and became more appropriate for life in the new environment (Pulliam, 1987).

The 1700s saw more changes in the American educational system. The subjects taught more closely met the needs of everyday life, and vernacular English, not Latin, became the language of educated people (Webb et al., 1996). Even with these changes, during the 18th Century the concept of teaching all ages of children together still remained the method used in the schools.

During the early 19th Century, Joseph Lancaster implemented the monitorial system in England. In this system, superior students (monitors) learned lessons from the adult teacher in charge and in turn taught the lessons to younger, less experienced students. The monitorial system was considered to be economical and efficient for educating large numbers of children. In 1806, a monitorial school was established in New York City. Initially this system was considered a blessing because it made education available to a vast number of poor children, but it was later criticized because it offered only the most basic education (Webb et al., 1996).

In the early 1800s, most schools in America remained the one-room schools having one teacher working with 10 to 30 students ages 6 to 14. Even though this is the multiage concept, it had little to do with the philosophy of multiage. It was a “direct result of geographic and economic factors” (Bacharach et al., 1995, p. 5). The one-room school was the logical answer to providing education to isolated pioneer families. This made it possible to serve students within walking distance of their homes. In numerous cases, the teacher of the 19th Century was ill prepared for the demanding responsibilities associated with the one-room school (Pflam, 1990) and was not able to prepare the students for life outside of the schoolroom. The one-room school as well as the monitorial system were seen as failing to produce skilled workers during a time when jobs were scarce and the industrial revolution was changing the needs of society (Anderson, 1992).

The mid-1800s saw a need for an effective economical education system that could handle much larger numbers of students, resulting in the revolutionary idea of mass public education (Gaustad, 1992a). Horace Mann, Secretary of the Board of Education of Massachusetts, introduced the graded school concept. He maintained the Prussian theory that emphasized uniformity grade by grade for the proper classification of scholars is the first component of educational excellence (Bacharach et al., 1995; Hallion, 1994). Another contributing factor to the establishment of grade-based schools was the introduction of graded textbooks. First produced was a set of arithmetic books, followed by the McGuffey Eclectic

Readers. Other textbooks were published covering various subject areas. Textbooks became the expected norm of the grade levels. Mandated standardized age entry into school and sequential grade levels and curriculum were the final steps toward grade-based schools. Graded schools were readily welcomed because of the administrative practicality, especially in large cities where the school age population was growing. Still, the one-room schools were maintained in the rural areas because of smaller populations (Bacharach et al.). Soon after the graded approach was introduced in the larger cities, some educators questioned its applicability. Different plans were implemented as alternatives to the graded approach. The St. Louis plan, developed around 1868 by W. T. Harris, was one of frequent promotions and reclassifications. This plan reduced the rigid grade lines by moving pupils whose progress was markedly different from the other students (Goodlad & Anderson, 1963). Other respected educators, such as Francis W. Parker, Charles W. Eliot, and William R. Harper, attacked the grade level organization of textbooks and the neglect of personal and social needs of the students (Anderson, 1992; Goodlad & Anderson).

By the beginning of the 20th Century, the age-graded schools had been the accepted mode of education for more than 50 years. With the Depression, the World Wars, and the community's desire to preserve community schools (Pratt, 1986), one-room schools could still be found in rural areas where the smaller populations would not support the age-graded school (Bacharach et al., 1995). By the 1930s, the nongraded movement had begun to emerge (Beggs & Buffie, 1967). In the early 1930s, John Dewey began voicing his opposition to the graded concept. He held that children learned best in child-centered mixed age groups (Moen, 1999). John Dewey was instrumental in establishing the Laboratory School at the University of Chicago that challenged the established practices of the time. The Laboratory School removed arbitrary classifications and encouraged daily experiences in and out of the classroom (Goodlad & Anderson, 1963).

Other isolated plans for nongraded type schools began to come forth. In 1934, the Flexible School Plan was developed in Western Springs, Illinois. It abolished the grade labels

for first, second, and third grades (Beggs & Buffie, 1967; Miller, 1967). The junior primary unit of Richmond, Virginia, began in 1936. In this concept, the junior primary unit (Miller) replaced kindergarten and first grade. The Continuous Progress Plan, begun in 1939, was a primary grade organization used in Athens, Georgia (Beggs & Buffie). In 1942, the Milwaukee School System initiated a nongraded plan that eventually spread to all but two Milwaukee elementary schools (Miller).

After World War II the student population began to expand. With this expansion there came a resurgence of interest in Dewey's vision to educate the whole child. The climate was right to effect change in schools (Anderson, 1993). Then with the successful launch of Sputnik in 1957, the United States became concerned with increasing science and mathematics knowledge. The federal government took an intense interest in the curriculum of elementary and high school education (Webb et al., 1996).

The federal government became even more involved in the activities of schools with the emergence of the civil rights movement. In 1954, the "separate but equal" case of Plessy v. Ferguson (1896) was overturned in Brown v. Board of Education of Topeka (1954). With the Brown case, an end to legalized segregation was ordered. Brown marked the beginning of the civil rights revolution. With the Civil Rights Act of 1964, the Higher Education Act of 1965, and the Elementary and Secondary Education Act of 1965, academic reforms not only for minorities but also for the disadvantaged were enacted. "The general principles of the civil rights movement were later applied to advancing the rights of women, racial and ethnic groups, the aged, and the handicapped" (Webb et al., 1996, p. 162).

Still, from the late 1950s through the early 1970s, there was renewed interest in the nongraded concept (Anderson, 1993). The forerunners of the modern-day nongraded schools were established during this time (Goodlad & Anderson, 1963). During the sixties and into the early seventies, experimental open education programs such as Individually Guided Education (IGE) were tried (Bacharach et al., 1995; Gaustad, 1992b). Many of the innovative programs

were viewed as unstructured and ineffective. As a result, in the early 1970s there was a return to traditional graded methods. An out right back to the basics movement was prominent during the 1980s. With this, only a small number of classrooms and schools continued with the nongraded approach (Stone, 1996).

Again in the 1990s, school reform was at the forefront of educational concerns. With the increasing mobility, diversity, and population of our nation, especially its school age population, schools were reevaluated and reforms were designed to help meet the needs of the diverse social and economic groups (Gaustad, 1992a). Kentucky, Florida, Louisiana, Oregon, and Mississippi passed legislation mandating educational changes. In each of these states, multiage or nongraded programs were implemented. Alaska, California, Georgia, New York, Pennsylvania, Tennessee, and Texas have commissioned councils to study multiage education and recommend appropriate changes for primary grades (Stone, 1995, 1996).

As the drive for excellence in education enters the 21st Century, the entire nation is involved in reexamining the schools and their practices. Educational reformers are searching for ways to answer the unmet needs of large segments of society (Anderson & Pavan, 1993). According to Anderson and Pavan, the time is ripe for questioning the rigid lockstep of graded practice. It is time to explore alternative approaches such as the nongraded multiage classroom, its various meanings, and especially its numerous applications for today's students.

Various Definitions and Applications of the Multiage Classroom

Over the years, different names have been attached to the multiage grouping concept: mixed age, nongraded, ungraded, multigrade, split-grade, and combination (Regional Laboratory, 1994), heterogeneous grouping, vertical grouping, family grouping, and primary school ungraded, or nongraded classes (Katz, Evangelou, & Hartman, 1990). Usually a multigrade, split-grade, or combination of grades include children from more than one grade level who continue to be identified by grade levels and participate in a grade-based curriculum.

Typically, these classes are formed because of increased or decreased school population, administrative needs, or financial needs of the school, while multiage classes are created based on the idea that students benefit from interacting with others who are developmentally at different stages (Regional Laboratory). Multiage terms can mean different things to different people as indicated by the following definitions.

Katz and colleagues (1990) maintained that mixed-age grouping is like family grouping because the children are not all the same age. This promotes social, emotional, and intellectual development of the students. There are no age-graded expectations in the curriculum.

According to Gaustad (1992b), nongraded or multiage education is “the practice of teaching children of different ages and ability levels together, without dividing them into groups labeled by grade designations” (p. 1). In 1996, Gaustad amended this definition to include varying grades in the same classroom with the aim of improving learning for all students. The same teacher, or team of teachers, remain with the students for more than one year. Gaustad added in 1997 that emotional maturity should also be considered as part of the definition.

Hallion's (1994) definition of a multiage classroom included at least two traditional grades with a thematic, integrated curriculum. The individual student functions on his or her developmental level making continuous progress. Cooperative learning, peer tutoring, hands on activities, better classroom discipline, heterogeneous as well as ability groups, and ongoing authentic assessment are all characteristics of this multiage classroom. Hallion stressed that the whole child is considered and nurtured.

In 1994, the Regional Laboratory for Educational Improvement of the Northeast and Islands in Andover, Maryland published an Occasional Paper discussing the multiage concept. The paper depicted the multiage concept as students and their learning being the central focus of the school organization. There are different aged students in the same classroom. These students remain together, with the same teacher or teachers for more than one year.

Bacharach and colleagues (1995) described multiage grouping as a randomly selected class of students more than one year apart in age. These students are grouped in combinations that will be most beneficial to their educational stimulation and success. The rationale for multiage grouping is based on meeting students' individual needs.

In Creating the MultiAge Classroom, Stone (1996) explained in detail the multiage classroom:

The multiage class is *not* a combination class where a teacher instructs two or three grade levels in their designated curricula. Ages and grades do not divide this community of learners within the classroom. Rather, in the multiage community, every child in the 'family' can become a successful learner *on his own continuum of growth*. The multiage classroom supports this individual growth through a *process* approach to learning that is child centered rather than curriculum centered. The mixed-age environment requires teachers to facilitate the learning of each child rather than to instruct the class as a whole based on predetermined grade-level skills and content. As a result, the multiage classroom can turn the process of education into a wonderful and successful adventure in learning for both teachers and children. (p. vii)

Grant and Richardson (1996) defined multiage continuous progress classroom as "the practice of blending two or more grades, four or more chronological ages and staying with the same teacher for more than one year. Multiage practices foster developmentally appropriate instruction and provide a more challenging educational experience" (p. 271).

Copeland (1998) stated that the multiage classroom is much more than just a method for grouping students. It is a philosophy that supports each student's continuous progress.

Montes (1996) held that a multiage group contains children of varying ages who remain together with the same teacher for several years. This allows the social, behavioral, cognitive, and emotional aspects of each student to be enhanced. The curriculum is student centered.

In the various definitions of the multiage classroom, there are commonalities. Mixed-age grouping consists of educating children of different ages, more than one year apart, and at least two traditional grade levels. There is a wide range of ability levels within one class. One or more teachers work with the class and usually for more than one year. One of the main objectives of this type of program is to teach the child and not just the curriculum. In other words, a child-centered integrated curriculum is used with continuous progress and developmentally appropriate programs that educate the whole child.

Research has been conducted to identify the positive and negative aspects of multiage classes. The results of various research projects deal not only with the cognitive aspect of the multiage class, but also with the affective domain.

Research on the Multiage Concept

The research reports on the impact of multiage instruction have generally fallen into one of two categories: (a) the impact on academic achievement and (b) the impact on the affective domain. In addition, research on gender differences seen in multiage settings has also been explored.

Academic Achievement

Way (1979) conducted a study in a public school setting examining the effects of multiage grouping on achievement. She found that there was no significant difference between students in the traditional and multiage classrooms in academic achievement.

The District of Columbia Public Schools (1981) published the findings of its research dealing with how multiage grouping effectively met the needs of all students. Standardized achievement tests were used to measure increase or decrease of the multiage students' reading and mathematics scores. The results showed an increase in the percentile ranks in reading or mathematics, or both, in first through fourth grades, but not in fifth and sixth grades. The study

was replicated in three additional schools. It was then determined that the multiage class did have a positive effect on the achievement of students in the District of Columbia.

Additional research on the multiage concept was investigated during the 1990s. Katz and colleagues' (1990) research determined the following reasons for using the multiage concept:

1. The concept relaxed age-graded expectations of the curriculum,
2. Students remained with the same teacher for at least two years, and
3. Students gained self-confidence as learners.

It was determined that these students did as well or better academically than students in traditional classes.

Gutierrez and Slavin (1992) used the results from multiple choice standardized tests of basic skills as a basis for comparison. The different programs used in this study fell into four categories: (a) Joplin-like, in which students are grouped across age lines for one subject; (b) a comprehensive program, which incorporates cross-age grouping in several subjects; (c) individualized instruction with little teacher-directed instruction; and (d) those that were unspecified as to type of program. Gutierrez and Slavin concluded that the effects of nongraded programs depend on the different kinds of programs implemented. For example, “cross-grade grouping that made extensive use of individualized instruction provided no benefits to students. Cross-grade grouping for a single subject yielded modest positive effects; cross-grade grouping for multiple subjects also yielded modest positive effects” (Guskey & Lindle, 1997, p. 7). According to Gutierrez and Slavin, direct instruction done in small groups by the teacher provided these positive effects.

Anderson and Pavan (1993) reviewed 64 research studies on multiage classes. They determined that in most cases students in nongraded, multiage schools do as well or better academically than students in traditional age-graded classes. Further conclusions revealed that nongraded programs benefit all students academically, especially boys, lower functioning students, African Americans, students more likely to drop out of school, and impoverished

students. Studies showed higher achievement was attained in nongraded schools and fewer pupils were retained (Anderson & Pavan; Gorrell, 1998; Guskey & Lindle, 1997).

Veenman (1995) also based his findings on the results of standardized multiple-choice tests of basic skills. Veenman found no evidence that student learning is either inhibited or enhanced by multiage classes (Guskey & Lindle, 1997).

Mason and Burns (1996) did a critique of Veenman's earlier work. They not only analyzed Veenman's data but also analyzed additional studies. Again, the results of standardized multiple-choice tests of basic skills were used. According to Mason and Burns, Veenman's review was more objective than previous reviews, but Veenman ignored selection bias favoring the multigrade classes and lower quality instruction. These studies found that multigrade classes did have small negative effects on achievement (Guskey & Lindle, 1997; Mason & Burns).

Veenman (1996) answered Mason and Burns by saying that educators "should not base policy decisions on research findings alone . . . [but] should take into account not only the findings of research but also the significance of these findings for their own schools" (p. 337).

Mason and Good (1996) conducted a study of mathematics instruction comparing multigrade and single-grade classes with traditional whole-class teaching and single-grade classes with two ability groups in each class. They found that instruction, organization, content, and materials used in multigrade classes were very different from that used in both types of single-grade classes. Mason and Good also found less "peer cooperation, innovative curriculum, individualized instruction, and integrated or continuous progress curriculum" (Guskey & Lindle, 1997, p. 8) in the multigrade classes. Finally, Guskey's and Lindle's study revealed that "curriculum in single-grade classes was more meaningfully presented, more challenging cognitively, more oriented toward conceptual understanding, and more often employing cooperative groups for collaborative problem solving" (p. 8).

In Miller's (1995) summary of research on multiage grouping practices, he found that the traditional age-grade classes yielded no benefits over multiage classes, but there are significant

gains in student achievement when cross-age peer tutoring is implemented. Miller said, “As our society has changed, so must our schools. The grading of schools, which was intended to serve children, may now be restricting their educational opportunities” (p. 31).

Gaustad (1996, 1997) explained that research indicates that grouping children of different ages, abilities, and maturity levels promotes cognitive growth. Students are encouraged to learn not only from the teacher but also from each other. Teachers use developmentally appropriate instructional practices and focus on the individual needs of students. Meeting the needs of all students makes the multiage concept particularly effective for primary grades.

Different research studies share the following common themes:

1. Studies show no significant difference between students in traditional and multiage classes on academic achievement. In most cases, students in multiage classes scored as well as or better than students in traditional classes. While some researchers claim that neither type of class is more beneficial than the other, some researchers claim that multiage classes promote cognitive growth.
2. Studies show that positive results toward multiage classes far outweigh the negative research outcomes.

Affective Outcomes

According to Way’s (1979) study examining the effects of multiage classes on self-concept, there is a significant difference between the students in multiage classes and those in traditional age-graded classes in the affective domain in the areas of happiness and satisfaction. The multiage students scored significantly higher in these two categories. The multiage students also had a higher mean score than the traditional students on total self-concept, but the difference was not statistically significant.

Katz and colleagues (1990) determined that a multiage class resembled the real-life setting of family, thus provided good socialization. The mixed age classes provided

opportunities for leadership to emerge, and students gained self-confidence as learners. Their research also determined that multiage students had increased self-esteem and better attitudes toward school.

Gutierrez and Slavin (1992) found that multiage classes had positive effects on the mental health and school attitudes for all students, especially those identified as at risk and those of lower socioeconomic groups. This research was supported by Anderson and Pavan's (1993) findings. They reported that in the majority of cases, students in multiage classes do as well as or better emotionally than those in traditional classes. Behavior problems were not as prevalent in the multiage classes, and all students benefit socially, especially males, African-Americans, underachievers, students at risk, and impoverished students. These groups showed better attitudes toward school and learning; in addition, they showed a better attitude toward themselves.

Veenman (1995) found that in "areas such as attitudes toward school, self-concept, personal adjustment, and social adjustment, students are sometimes better off in multigrade classes" (p. 367). Even though Mason and Burns (1996) disagreed with several of Veenman's findings, they did agree that multigrade classes had a slightly positive effect for affective outcomes.

In Miller's (1995) summary of different studies concerning multiage practices, he found that multiage classes benefit students in the affective domain. Further, there is more harmony between students and easier acceptance of others in multiage classes. The high-need populations appear to benefit the most. Gaustad (1996, 1997) reported that cross-age grouping promotes social growth and lessens antisocial behavior.

These studies support the premise that there is a significant benefit in the affective domain for students enrolled in a multiage class. Students experience increased self-esteem, better attitudes toward school, less discipline and antisocial problems, and are better adjusted socially and emotionally.

Gender Differences

In 1972 a comparison study of multiage and traditional classes was done by Canadian educator, Ramayya. Ramayya (1972) stated in his findings that a multiage setting was more beneficial to boys in reading achievement. There was no statistically significant difference between the girls in both groups in either reading or mathematics achievement. Both sexes of the multiage group showed greater levels of self-esteem than those of the traditional group. The females in the multiage class had higher mean scores in all academic areas, but this was not statistically significant.

As early as 1973, Pavan was exploring the impact of multiage classes. She summarized 16 studies that compared multiage classes to traditional classes. With her research she found that underachievers, boys, and Blacks benefit from multiage environments. In 1993, Pavan was joined by Anderson in replicating her previous study. They confirmed that in a multiage environment “boys, Blacks, underachievers, and students of lower socioeconomic status were more likely to perform better and to feel more positive toward themselves and their schools” (Anderson & Pavan, 1993, p. 53).

Thelin (1981) reported that girls in the multiage classes did better on examinations than boys with the same being true for the traditional classes. He discovered that the multiage students were more actively involved in whatever was going on in the classroom and had a more positive attitude toward school than the traditional students. He also found that boys had no preference to which type of class they attended.

Smith (1993) explored students’ attitudes toward multiage classes, specifically looking at gender differences. She found no significant differences in the attitudes of boys and girls toward multiage classes. She did find that the younger students in each class had a more positive attitude toward being enrolled in a multiage class than the older students. However, the difference in this attitude was minimal.

Tanner and Decotis (1994) did a comparison study of academic achievement and attitude toward school between multiage students and students from traditional settings. They found that there were no statistically significant differences in traditional and multiage kindergarten scores on the Georgia Kindergarten Assessment Program (GKAP). Also, no significant differences between boys and girls were found on the GKAP. Multiage students had higher mean scores in the areas of listening skills, writing, mathematics problem solving, and citizenship. On the Student Survey of Attitudes, there was no significant difference between class types, but girls had significantly higher scores than boys in their attitudes toward reading and language arts, mathematics, and social studies.

In a study of children in multiage classrooms, Ricard, Miller, and Heffer (1995) found a slightly significant gender difference on reading achievement scores indicating that first and second grade boys had lower mean scores and kindergarten boys earned higher mean scores. On the measurement of social behavior, no significant difference in gender was found. Overall, “standardized scores for reading, mathematics, and spelling achievement as well as nonverbal reasoning ability were appropriate relative to age-based norms and did not significantly differ for boys or girls” (p. 265).

No conclusive evidence has been drawn concerning the impact that a multiage setting has on either gender. There were different findings pertaining to academic achievement and attitudes toward school of both genders. There was an indication that multiage students have higher self-esteem when dealing with school issues and have a better attitude toward school.

Several research studies discussed parental concerns and involvement. Proponents of the multiage concept emphasized the importance of parental involvement in successful multiage programs.

Parents and the Multiage Class

Parents are becoming more verbal about the quality of their children's education (Miller, 1994). As stakeholders in the educational process, parents have the right to be informed and participate in their children's education. Numerous opportunities are available to parents of all students, such as volunteering in their child's class, accompanying the class on field trips, participating in fundraising strategies, working on school committees, staying in touch with the teacher(s), and working with the parent-teacher organization. Many parents are not able to participate in all school functions because of other obligations, such as work schedules and family responsibilities. Some parents feel intimidated by school and school personnel. Other parents have no desire to be involved in any activity related to school. It is the responsibility of the school to attempt to communicate with all parents. Keeping the lines of communication open benefits individual students and promotes collaboration for school improvement (Anderson & Pavan, 1993). Multiage classes emphasize the developmental process of children. Thus, they offer the perfect opportunity for parents to be active partners in their child's education.

Parents are sometimes concerned about specific aspects related to their child's education and the multiage class. Concerns include:

1. Older children being challenged academically (Magee, 1995; Woelfel, 1992).
2. Older children benefiting as much as the younger children (Mattern & Yates, 1995).
3. Use of appropriate instructional grade level and appropriate curriculum material (Woelfel, 1992).
4. Older children receiving less attention than younger children (Schrier & Mercado, 1994).
5. Younger children interfering in older children's activities (Schrier & Mercado, 1994).
6. Older children frightening or intimidating the younger, smaller children (Schrier & Mercado, 1994; Woelfel, 1992).
7. Younger children not being able to keep up with older children (Schrier & Mercado, 1994).

8. Children feeling frustrated by attempting to do more advanced activities and failing (Schrier & Mercado, 1994).
9. Children feeling overshadowed by older children and not expressing themselves fully (Schrier & Mercado, 1994).

Teachers and parents of multiage students can easily answer questions of concern. The majority of parents recognize socialization as a major accomplishment in the multiage classroom. Children have the opportunity to become friends with different aged children, participate in activities with children of all ages, begin to understand social age structure, interact with children with different personalities, and play with other children. Further, older children apply problem-solving skills, nurture younger children, help younger children with hard assignments, and become better acquainted with how young children behave (Schrier & Mercado, 1994). “Parents liked the positive academic modeling that occurred between their child and children of different ages in the classroom” (Tanner & Decotis, 1994, p. 45).

Research indicated that parent support positively affects student learning (Gaustad, 1997). By inviting parental involvement, parents are quicker to identify the benefits of the multiage classroom (Stone, 1996) and are more willing to be active participants. At home, parents can reinforce what their children are working on in their classrooms and can even become directly involved in classroom activities (American Association of School Administrators, 1992) by volunteering as part-time teaching assistants and by sharing their own special skills (District of Columbia Public Schools, 1981). For any multiage class to be successful, there must be parental support. Parental involvement is an integral part of the true multiage concept.

Summary

In meeting the challenges of education in the 21st Century, we should look at history and determine whether the traditional age-graded approach remains educationally sound for all

students. Educators must “deal with the fact that individuals are different and different treatments are needed to maximize each individual’s potential” (Anderson & Pavan, 1993, p. 47).

The learning theories described in this chapter are considered the basis of the multiage concept. The multiage classroom is grounded in the history of American education as described in this chapter. Various meanings and applications of today’s multiage class are discussed. Pertinent research on the multiage concept has been explored and explained. Parents’ concerns and views on benefits of the multiage class are noted. The academic achievement of multiage and traditional kindergarten and first-grade students will be further examined by the researcher.

CHAPTER 3

METHODOLOGY

The purpose of this study was to determine whether there was a difference in the academic achievement of kindergarten and first-grade students enrolled in a multiage program and those enrolled in a traditional educational program in a primary school located in East Tennessee. Data collected through student academic achievement records allowed the researcher to investigate the possible effects of multiage instruction as an alternative educational program.

Chapter 3 describes the research design, population, and sample and selection procedures. The instrumentation, data collection planning, and data analysis planning are also explained.

Research Design

A retrospective causal-comparative design was used to gather, analyze, and interpret existing student data. The data used in this study are routinely gathered by the school system and were made available for analysis. The data were gathered from student academic achievement records that contain test score information and information about the type of program students have been in (multiage or traditional). The analysis of data allowed the researcher to infer whether a cause and effect relationship exists between academic achievement and the type of program the students are enrolled in.

Population

The participants were selected from one primary school in East Tennessee. The school, one of 20 in the county's public school system, was located in a small East Tennessee city with a population of approximately 10,000. The school served not only the city but also children who resided in the surrounding area. There were approximately 730 kindergarten, first-grade, and

second-grade students enrolled in the primary school. Both multiage and traditional educational programs were available for kindergarten and first-grade students.

With 240 kindergarten students and 250 first-grade students in 2000-2001, there were 12 kindergarten classes and 13 first-grade classes. Two of those classes formed the two multiage kindergarten/first-grade cohort groups. The initial multiage class was implemented four years ago with a second class established one year later.

The traditional kindergarten classes in this primary school were self-contained single-grade classes consisting of approximately 20 children whose fifth birthday was on or before September 30 of their kindergarten year. Children in the traditional kindergarten classes attended school from 8:00 am until 12:30 pm daily. The majority of the kindergarten students left school at 12:30 to go home or go to a care provider. Those who remained at school had no academics but did have a snack, a story time or activity, and one hour of rest time. These students left school at 2:30 pm with all first- and second-graders. One teacher was assigned to each class with a teaching assistant assigned for three and one half hours each day. Each classroom had tables and chairs where the children could sit and work. There was a central area where all students could gather to sit on the floor. This area was used for class instruction, story time, and other activities. Various play and learn centers were scattered through out the rooms. Each classroom teacher was responsible for planning appropriate activities for his or her individual class.

The traditional first-grade classes were self-contained single-grade classes of approximately 20 children who had completed kindergarten. These heterogeneously grouped students attended school for the full school day. They were divided into different reading groups according to ability levels. In some cases, math groups were also created in the same manner. One teacher and one full-time teaching assistant were assigned to each first-grade class. Each teacher was responsible for the lesson plans and activities for his or her class. If the teacher

desired, thematic units, individual projects, group projects, and cooperative learning activities could be used.

In both traditional kindergarten and first-grade classes, some planning was done jointly by all teachers. For example, a grade-wide program or activity and some field trips were planned by all teachers, or they could select a committee from their grade to do this planning. The teachers then met for finalizing the implementation of such plans.

The two multiage groups each consisted of approximately 20 kindergarten students and 20 first-grade students. The kindergarten students' birthdays were on or before September 30 of their kindergarten year while the students who were considered first graders had all completed the kindergarten curriculum. These classes were heterogeneously grouped with one teacher assigned per grade level. A full-time teaching assistant was assigned to the first-grade class while a teaching assistant was assigned the kindergarten class for one half of the school day. Prior to students being assigned to a multiage class, the parents agreed to a two-year placement of their child in the multiage group.

The two teachers, in a team-teaching approach, shared the responsibility for all of the students. The planning, creating, scheduling, grading, conferencing, and teaching were joint efforts of both teachers. These teachers employed a variety of strategies, such as individual assignments, cooperative small group and large group activities, partnerships of two students, and peer tutoring to involve the students in learning. Teachers from both cohort groups worked together to coordinate the curriculum, thematic units, lesson plans, field trips, programs, and other activities.

Each multiage cohort unit was actually two classrooms with a connecting door. Both classrooms were equipped with tables and chairs for the children to sit at and work. The children moved between the two adjoining rooms for different activities. There were different 'center areas' in each room. One of the two rooms had a common gathering area for the entire cohort group. This area was used for large group instruction and story time, as well as special activities.

The kindergarten students were called ‘new friends’ while the first-grade students were called ‘old friends.’ Each old friend was given a new friend to mentor. It was the responsibility of the old friend to guide the new friend in learning the classroom procedures, rules, and rituals. They became partners in numerous activities and projects.

Sample and Selection Procedures

The matching sampling technique was selected by this researcher because of the existence of a two-year (K/1) multiage program and a traditional program. The 1997, 1998, and 1999 cohort groups of the multiage classes were included in this study. These years indicate the students’ year in kindergarten. For this study, the sample included all students participating for both school years in the kindergarten and first-grade multiage program. The multiage students were paired with students participating for both school years in the traditional kindergarten and first-grade program. The 109 pairs of students were included in the study. Each pair was enrolled in kindergarten during the same year. Students were paired by gender and BRIGANCE K Screen scores. BRIGANCE K Screen scores were within two points (plus or minus) of each other. Students of various economic, social, and ability groups are enrolled in both academic programs. Following is a description of each phase of the data collection process.

Phases of Data Collection

Phase 1: BRIGANCE K Screen – all students (multiage and traditional) are administered this Screen during May prior to their entering kindergarten or in the fall prior to September 15.

Phase 2: BRIGANCE 1 Screen – all kindergarten students (multiage and traditional) are administered this Screen during May of their kindergarten year to determine progress.

Phase 3: Mastered First-Grade Reading Skills

Phase 4: Mastered First-Grade Mathematics Skills

Methods for Objective 3 and 4 – throughout their first-grade year, students are continually assessed following the School Board’s adopted guidelines for reading and

mathematics. Each reading skill and each mathematics skill is marked as mastered or not mastered on each student's reading skills card and mathematics skills card.

Phase 5: First-Grade Reading test score

Phase 6: First-Grade Mathematics test score

Methods for Objective 5 and 6 – in May of 2001, the system-wide test was initially administered to all first-grade students. This test was divided into two sections, reading and mathematics. A score was given for each section.

Multiage students in Cohort 1, 2, and 3 were matched with students in the traditional program on BRIGANCE K Screen scores and gender. The purpose of this matching process was to insure that the two groups would initially be equivalent on these two variables. Each pair of students attended kindergarten during the same school year. All students involved in this study were administered the BRIGANCE K and 1 Screens as well as tested for reading and mathematics skills according to the School Board's adopted guidelines. Only the students of Cohort 3 and their matched traditional students were involved in the initial System-wide First-Grade Test. During the three school years included in the study, four students left the multiage program. One student moved to a private school, while the other three transferred to different school systems because of parental employment changes. These students were not included in the study.

Table 1 provides a timeline of when each phase was initiated with the kindergarten and first-grade students. It is represented by cohort.

Table 1

Testing Timeline

Cohort 1:	Kindergarten (1997-1998)	First Grade (1998-1999)
<u>BRIGANCE K Screen</u>	Multiage Traditional	
<u>BRIGANCE 1 Screen</u>	Multiage Traditional	
Reading Skills Mastered		Multiage Traditional
Math Skills Mastered		Multiage Traditional
Cohort 2:	Kindergarten (1998-1999)	First Grade (1999-2000)
<u>BRIGANCE K Screen</u>	Multiage Traditional	
<u>BRIGANCE 1 Screen</u>	Multiage Traditional	
Reading Skills Mastered		Multiage Traditional
Math Skills Mastered		Multiage Traditional
Cohort 3:	Kindergarten (1999-2000)	First Grade (2000-2001)
<u>BRIGANCE K Screen</u>	Multiage Traditional	
<u>BRIGANCE 1 Screen</u>	Multiage Traditional	
Reading Skills Mastered		Multiage Traditional
Math Skills Mastered		Multiage Traditional
System-wide Reading Test		Multiage Traditional
System-wide Math Test		Multiage Traditional

Instrumentation

BRIGANCE Screens

In the spring of each year, the BRIGANCE K Screen (Glascoe, 1997) is administered to children who will be entering kindergarten the following school year. The screening process is used to determine each child's readiness for attending school. At the end of the kindergarten year, the BRIGANCE 1 Screen (Glascoe) is administered to kindergarten students to determine students' progress and to assess students' readiness for first grade.

The BRIGANCE K and 1 Screens (Glascoe, 1997) include a wide range of tasks measuring fine-motor and gross-motor skills, expressive and receptive language, and cognitive and academic skills in reading and reading readiness, math and math readiness, and handwriting skills. The BRIGANCE Screens are criterion-referenced as well as norm-referenced tests that provide information about the child's mastery of critical readiness skills as well as how the child's performance compares to other children's performance.

Glascoe's 1997 study provided evidence that the BRIGANCE Screens have a high degree of internal consistency (.81 - .99), excellent test-retest reliability (<3 months 86%, >3 months 82%), and outstanding inter-rater reliability (97%). The BRIGANCE Screens have excellent concurrent validity and have a high correlation to diagnostic measures of intelligence, academics, development, and/or teacher/examiner ratings. Glascoe (1997) also documented substantial content and predictive validity.

Reading Program Guidelines

The Board of Education of the school system has adopted specific guidelines and expectations for comprehensive reading and mathematics programs to ensure uniformity throughout the school system. Educators agreed that the percentage of skills mastered would be used for determining student placement. Seventy percent of the academic skills should be mastered in order for students to successfully move to the next level.

The reading program correlated the Basic Skills First Program (BSF) with the World of Reading Program (Baumann et al., 1989) for implementation of reading instruction for grades kindergarten through eight. The correlation of Clap Your Hands and Levels 2-5 of the World of Reading Program matches the appropriate BSF skills curriculum for first-grade students. Further, the Board of Education adopted the following specific steps for implementation of instruction:

1. The teacher must follow the sequential order of the World of Reading Program.
2. Skills practice work from the World of Reading Program is to be implemented as deemed appropriate by the teacher.
3. Correlations between BSF and World of Reading Program should be referred to as teachers determine the skills and objectives to focus on within the limits of instruction. Teacher lesson plans should reflect an incorporation of BSF-R skills.
4. The BSF Reading objectives comprise the minimal framework around classroom instruction. However, this does not limit the reading program to teaching only BSF skills. It is the expectation that the basal reading program will be taught comprehensively and not implemented in a segmented fashion. Integrated units developed for Grades 1-4 may be used as supplemental enrichment to the basal program.
5. BSF Reading skills that are not covered adequately through World of Reading Program should be taught using additional supplementary resources.

The Board of Education provided an explanation of available curriculum materials to be used in the teaching of the adopted system reading program:

1. The World of Reading Program basal textbook will be the primary instructional tool.
2. Teachers will be provided a set of two levels of revised BSF reading teacher guides issued in notebook form to include: (a) one set on grade level, and (b) one set designed for the grade level below.

3. A locally produced set of resource books is available in each school to supplement the reading program in grades 1-8. Integrated units have been developed for grades 1-4 and are available for all teachers. Portions of the units can be copied for individual use as needed by the teacher.
4. Correlations for World of Reading Program and BSF will be available for all teachers.

The Board of Education also adopted specific steps for testing reading skills and for the recordkeeping of student achievement results:

1. Teachers will use a locally produced testing packet that includes World of Reading Program tests and other identified resources that assess comprehension and vocabulary skills in Levels 2-14.
2. World of Reading Program unit tests will be administered comprehensively to students in Levels 2-14.
3. Testing will occur at the completion of each unit. Grades 7 and 8 will give BSF tests during the 4th six weeks-grading period.
4. Teachers will use test results along with professional judgment to determine student progress and the need for reteaching, acceleration, enrichment, and/or extension.
5. Tests will be hand-scored by the classroom teacher. Progress must be documented on the individual student record sheets.
6. Tests must be kept in the student's individual reading folder during the school year. All tests may be discarded at the end of the year at the discretion of the building principal.
7. Student Record Sheets must be kept and continuously updated. Records are to be stored in the student's manila reading file folder during the year so that they are readily accessible to the teacher, principal, and supervisor. However, the student individual record sheets must be placed in the student's official cumulative folder at the end of the year or upon his or her transfer to another school. The reading file folder must be passed on to the next teacher for continued use.

Mathematics Program Guidelines

The Board of Education adopted the State of Tennessee's K-8 Mathematics Framework as the curriculum guide to be used in mathematics instruction within the school system.

Harcourt Brace's Mathematics Plus (Burton et al., 1992) is the adopted textbook series for Grades K-6. Both the state curriculum guide and Harcourt Brace materials incorporate the National Council of Teachers of Mathematics standards, which emphasize the use of manipulative materials and other technology for problem-solving. The Harcourt Brace series will be used for mathematics instruction in all classrooms in Grades K-6. At the request of the classroom teacher, the building level principal or the instructional supervisor may evaluate special conditions or needs which could warrant a program change for individual students.

The Board of Education adopted guidelines to determine student placement. For students currently enrolled in the school system, classroom teachers would use the results from the previous year's Math Skills Checklist. Students entering the school system for the first time will be administered the Harcourt Brace Mathematics tests by the classroom teachers for placement purposes within the first two weeks of the date of enrollment.

The first inventory test administered should match the grade level assignment of the student. The classroom teacher then follows these implemented guidelines: (a) tests are included in the HB Teacher Resource Package; (b) failure to master 70% of the skills on the test will result in the student being given a lower level test; (c) during the year, the tests are to remain in the student math folder; and (d) inventory tests are not timed.

The Board of Education adopted three basic implementation strategies that should be remembered by the teacher for organization of his or her instruction:

1. Adherence to the system guidelines for time-on-task and the adopted text as specified per grade level is required.
2. Teachers are to follow the Board adopted teaching sequence, keeping the following points in mind: (a) Some skills need to be taught as an interrelated cluster, and (b)

practice and review must be a continuous process integrated throughout the teaching sequence.

3. The techniques used in mathematics instruction must be directly linked to the implementation of the adopted curriculum and must be reflective of the standards of the NCTM, with an emphasis on the manipulative materials and the incorporation of technology, where available.

These adopted regulations and procedures for the school system's reading and mathematics programs were followed by the teachers involved in this study.

Data Collection Planning

A letter requesting permission for this specific school to participate in the study was mailed to the Director of Schools for the school system that was involved (see Appendix A). Upon receipt of approval by the Director of Schools, a letter was sent to the principal of the participating school explaining the intent of the study and requesting input and assistance (see Appendix B). The request outlined the steps followed in gathering data concerning individual students.

Data Analysis Planning

The causal comparative research method was used to analyze performance differences between students enrolled in multiage and traditional classes. Data were analyzed using the Statistical Program for the Social Sciences (SPSS, 1998).

The following null hypotheses were proposed for this study.

Ho1: There is no significant difference in the BRIGANCE K Screen scores of students in the multiage program and those in the traditional program.

Ho2: There is no significant difference in the BRIGANCE 1 Screen scores of students in a multiage program and of students in a traditional program at the end of their kindergarten year when controlling for BRIGANCE K Screen scores.

Ho3a: There is no significant difference between the number of reading skills mastered by students in a multiage program and by students in a traditional program at the end of their first-grade year when controlling for BRIGANCE K Screen scores.

Ho3b: There is no significant difference between the number of mathematics skills mastered by students in a multiage program and by students in a traditional program at the end of their first-grade year when controlling for BRIGANCE K Screen scores.

Ho3c: There is no significant difference in the System-wide First-Grade Reading Test scores of students in a multiage program and of students in a traditional program at the end of their first-grade year when controlling for BRIGANCE K Screen scores.

Ho3d: There is no significant difference in the System-wide First-Grade Mathematics Test scores of students in the multiage program and students in the traditional program at the end of their first-grade year when controlling for BRIGANCE K Screen scores.

Ho4a: There is no significant difference on the BRIGANCE 1 Screen scores by gender while controlling for the BRIGANCE K Screen.

Ho4b: There is no significant difference on the BRIGANCE 1 Screen scores by gender x type of instruction while controlling for the BRIGANCE K Screen.

Ho4c: There is no significant difference in the number of reading skills mastered by gender while controlling for the BRIGANCE K Screen.

Ho4d: There is no significant difference in the number of reading skills mastered by gender x type of instruction while controlling for the BRIGANCE K Screen.

Ho4e: There is no significant difference in the number of math skills mastered by gender while controlling for the BRIGANCE K Screen.

Ho4f: There is no significant difference in the number of math skills mastered by gender x type of instruction while controlling for the BRIGANCE K Screen.

Ho4g: There is no significant difference in the System-wide First-Grade Reading Test scores by gender while controlling for the BRIGANCE K Screen.

Ho4h: There is no significant difference in the System-wide First-Grade Math Test scores by gender while controlling for the BRIGANCE K Screen.

A t-test for two independent groups was used to determine whether or not there was a difference between the BRIGANCE K Screen mean scores of the multiage and traditional groups. This was done four times: first, combined for the entire population of the study; then, for each of the three different cohort groups divided by year.

At the end of the kindergarten year, the BRIGANCE 1 Screen was administered to both multiage and traditional kindergarten students. To determine whether or not there is a difference between the means of the BRIGANCE 1 Screen scores, an Analysis of Covariance (ANCOVA) was used. This ANCOVA controlled for the BRIGANCE K Screen scores.

At the end of the first-grade year, the number of reading skills mastered and the number of mathematics skills mastered were tabulated for each pair of matched students. To determine whether or not there was a difference between the number of reading and mathematics skills mastered, an ANCOVA was employed for each of the two subject areas. The process involved comparing the two groups (multiage vs. traditional) on their first-grade outcome while adjusting the first-grade scores for any kindergarten differences that might have been found.

Finally, to determine whether or not there was any difference between class type (multiage vs. traditional) and academic achievement of females and of males, a Two-Way Analysis of Covariance was used. This method compared the two groups (multiage vs. traditional) and the two gender groups (male vs. female) on their first-grade outcome while controlling for the BRIGANCE K Screen scores.

Summary

The methodology and procedures used in this study have been presented in Chapter 3. The research design, causal-comparative, was presented and explained. The population, sample, and selection procedures were described. The BRIGANCE K and 1 Screens were described along with their reliability, concurrent validity, content and predictive validity, and correlation to diagnostic measures. The School Board's adopted guidelines for the reading and mathematics programs were explained. The data collection planning and data analysis planning were presented. The results of this collection and analysis are presented in Chapter 4.

CHAPTER 4

RESULTS

In this chapter, the research questions presented in Chapter 1 and the hypotheses presented in Chapter 3 are addressed. The purpose of this study was to ascertain whether students in a kindergarten/first-grade multiage class achieve at a different level than students enrolled in a traditional kindergarten or first-grade class in a primary school in East Tennessee. The comparison was made by using the BRIGANCE 1 Screen, the number of mastered reading skills, the number of mastered mathematics skills, the reading score from the System-wide First-Grade Test, and the mathematics score from the System-wide First-Grade Test. In addition, analyses were performed to determine whether there was an interaction between instruction type and gender.

Four research questions formed the basis of this study with 14 null hypotheses being tested. Research question number one was used to demonstrate that initially the students being compared began at the same level of achievement.

Research Question #1

What level of performance did the students demonstrate on the BRIGANCE K Screen and were there initial differences between the multiage and traditional groups on this test?

Research Question #1 addressed the similarity of the BRIGANCE K Screen scores with which the students were matched at the beginning of the study. The multiage kindergarten students were matched with a traditional kindergarten student having a similar (plus or minus 2 points) BRIGANCE K Screen score. The following hypothesis was associated with this research question.

Ho1: There is no significant difference in the BRIGANCE K Screen scores of students in the multiage program and those in the traditional program.

As shown in Table 2, initially there were no significant differences between the means of the two groups. The means for both multiage and traditional groups were only marginally different in all cases. The null hypothesis was retained. At the beginning of their kindergarten year, both groups had equal levels of performance, indicating that the matching process did result in groups with similar entry scores.

Table 2
t-test Comparison of Means by Type of Classroom

Year in K	Type	n	M	SD	t	p
Combined Years	Multiage	109	89.97	11.95	.02	.98
	Traditional	109	90.00	11.67	.02	.98
1997	Multiage	32	85.84	13.58	.07	.95
	Traditional	32	86.08	13.53	.07	.95
1998	Multiage	41	91.66	11.99	.12	.91
	Traditional	41	91.35	11.49	.12	.91
1999	Multiage	36	91.71	9.52	.11	.92
	Traditional	36	91.94	9.33	.11	.92

Research Question #2

Is there a difference in the BRIGANCE 1 Screen scores of kindergarten students participating in a multiage program and of students participating in a traditional age-graded kindergarten program while controlling for kindergarten readiness?

Research Question #2 addressed the BRIGANCE 1 Screen scores of the students at the end of their kindergarten year. This screen is used to determine progress during the kindergarten year as well as readiness for first grade. The hypothesis associated with this research question was:

Ho2: There is no significant difference in the BRIGANCE 1 Screen scores of students in a multiage program and of students in a traditional program at the end of their kindergarten year when controlling for BRIGANCE K Screen scores. The results of this analysis are shown in Table 3.

Table 3

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of BRIGANCE 1 Screen, by Class

Year in K	Type	n	Adjusted <u>M</u>	<u>F</u>	<u>p</u>
Combined Years	Multiage	109	96.43	6.73	.01*
	Traditional	109	94.75		
1997	Multiage	32	94.21	1.87	.18
	Traditional	32	92.19		
1998	Multiage	41	97.07	4.68	.03*
	Traditional	41	95.05		
1999	Multiage	36	97.66	.98	.33
	Traditional	36	96.67		

*p<.05

As shown in Table 3, for the combined groups there was a statistically significant difference between the means. Since the number of students in this group was larger, there was a smaller standard of error, thus making the statistical test more powerful and more likely to reach statistical significance. The multiage group showed a higher mean (M = 96.43) than the traditional group (M =94.75) indicating that they performed better on the BRIGANCE 1 Screen.

In 1997 and 1999, the difference between the two means was not statistically significant. In both cases, there were smaller numbers of students and the standard error was smaller. In 1998, however, the difference between the means of the two groups was statistically significant. Since two of the tests were statistically significant, the null hypothesis was rejected. Students in the multiage setting had higher scores on the BRIGANCE 1 Screen than those in the traditional program. Across all years, the BRIGANCE 1 Screen mean for the multiage groups was higher than the traditional groups, although in only two comparisons were the results statistically significant.

Research Question #3

Is there a difference in the number of reading and math skills mastered by first-grade students participating in a multiage program and of students participating in a traditional age-graded first-grade program while controlling for kindergarten readiness?

Research Question #3 addressed the academic achievement of first-grade students measured in reading and mathematics. This achievement was measured by tallying the total number of reading skills mastered and the total number of mathematics skills mastered by the individual students. In addition, this question addressed the reading and mathematics scores of the System-wide First-Grade Test that was administered to the 1999 group. The hypotheses associated with this research question were:

Ho3a: There is no significant difference between the number of reading skills mastered by students in a multiage program and by students in a traditional program at the end of their first-grade year when controlling for BRIGANCE K Screen scores. This analysis is presented in Table 4.

Table 4

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of Number of Reading Skills Mastered, by Class

Year in K	Type	n	Adjusted <u>M</u>	<u>F</u>	<u>p</u>
Combined Years	Multiage	108	38.00	11.04	.00*
	Traditional	108	34.35		
1997	Multiage	32	36.46	1.68	.20
	Traditional	32	33.58		
1998	Multiage	41	40.75	25.97	.00*
	Traditional	41	34.74		
1999	Multiage	35	36.20	.49	.49
	Traditional	35	34.57		

* $p < .05$

As shown in Table 4, the difference between the means was statistically significant for the combined sample. In 1997 and 1999, there were smaller numbers of students, and the differences between the two group means were not statistically significant. In 1998, the difference between the means was statistically significant (multiage $\bar{M} = 40.75$; traditional $\bar{M} = 34.74$). There were a slightly larger number of students in 1998. In all three years, the mean for the multiage group was higher, indicating a better performance by those in multiage classes. Because two of the tests were statistically significant, the null hypothesis was rejected. Students in the multiage setting mastered a higher number of reading skills.

Differences in the number of mathematics skills mastered were also assessed. The associated hypothesis was:

Ho3b: There is no significant difference between the number of mathematics skills mastered by students in a multiage program and by students in a traditional program at the end of their first-grade year when controlling for BRIGANCE K Screen scores. The results of this analysis are shown in Table 5.

Table 5

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of Number of Mathematics Skills Mastered, by Class

Year in K	Type	<u>n</u>	Adjusted <u>M</u>	<u>F</u>	<u>p</u>
Combined Years	Multiage	108	80.79	2.27	.13
	Traditional	108	77.92		
1997	Multiage	32	60.58	.24	.63
	Traditional	32	59.48		
1998	Multiage	41	88.67	.10	.76
	Traditional	41	88.96		
1999	Multiage	35	90.05	14.41	.00*
	Traditional	35	81.84		

*p<.05

After controlling for the BRIGANCE K Screen, the combined years analysis indicated there was no significant difference between the means of the two groups as shown in Table 5. In 1997 and 1998, the difference between the two group means was not statistically significant. In 1999, the multiage mean (M = 90.05) was much higher than the traditional mean (M = 81.84), and there was a statistically significant difference that year. Because one of the tests was statistically significant, the overall hypothesis was rejected. Students in the multiage program did master a higher number of mathematics skills.

Table 6 is a description of the comparison of the group means on the System-wide First-Grade Reading Test. This test was given for the first time in the spring of 2001 to the 1999 cohort groups; therefore, there is only one year for analysis. The associated hypothesis was:

Ho3c: There is no significant difference in the System-wide First-Grade Reading Test scores of students in a multiage program and of students in a traditional program at the end of their first-grade year when controlling for BRIGANCE K Screen scores. The results of this analysis are shown in Table 6.



Table 6
Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of System-wide First-Grade Reading Test Scores for 1999 Cohort

Year in K	Type	<u>n</u>	Adjusted <u>M</u>	<u>F</u>	<u>p</u>
1999	Multiage	27	39.28	2.80	.10
	Traditional	27	42.20		

Table 6 shows, there was no statistically significant difference between the means of the two groups. Therefore, the null hypothesis was retained. There was no significant difference between the two groups on the System-wide First-Grade Reading Test.

Table 7 describes the comparison of the group means of the System-wide First-Grade Mathematics Test that was given for the first time in the Spring of 2001. The associated hypothesis was:

Ho3d: There is no significant difference in the System-wide First-Grade Mathematics Test scores of students in the multiage program and students in the traditional program at the end of their first-grade year when controlling for BRIGANCE K Screen scores. The results of this analysis are shown in Table 7.

Table 7

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of System-wide First-Grade Mathematics Test Scores for 1999 Cohort

Year in K	Type	<u>n</u>	Adjusted <u>M</u>	<u>F</u>	<u>p</u>
1999	Multiage	28	40.51	.78	.38
	Traditional	28	41.35		

Table 7 indicates there was no statistically significant difference between the means of the two types of classes. The null hypothesis was retained. There was no significant difference between the two groups on the System-wide First-Grade Mathematics Test.

Research Question #4

Are there academic achievement differences between boys and girls within the multiage classroom and the traditional age-graded classroom and is there an interaction between gender and type of instruction?

Research Question #4 addressed the issue of academic achievement differences between boys and girls in both types of classes, traditional age-graded and multiage. Additionally, the question addressed the issue of possible interactions between gender and the type of instruction. A two-way Analysis of Covariance was used to determine whether a difference exists in the BRIGANCE 1 Screen scores, the total number of reading skills mastered, the total number of mathematics skills mastered, and the reading and mathematics scores from the System-wide

First-Grade Tests. The two-way Analysis of Covariance was also used to test the interaction between gender and type of instruction. The two hypotheses relating to differences on the BRIGANCE 1 Screen follow:

Ho4a: There is no significant difference on the BRIGANCE 1 Screen scores by gender while controlling for the BRIGANCE K Screen.

Ho4b: There is no significant difference on the BRIGANCE 1 Screen scores by gender x type of instruction while controlling for the BRIGANCE K Screen.

Table 8

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of BIGANCE 1 Screen, by Class and Gender

Year in K	Type	Gender	Adjusted M	Gender		Group x Gender	
				F	p	F	p
Combined	Combined	Male	96.31	3.75	.05	.06	.81
		Female	95.04				
	Multiage	Male	97.06				
		Female	95.95				
	Traditional	Male	95.55				
		Female	94.13				
1997	Combined	Male	94.15	1.31	.26	2.38	.13
		Female	92.47				
	Multiage	Male	93.89				
		Female	94.47				
	Traditional	Male	94.42				
		Female	90.47				
1998	Combined	Male	97.21	4.93	.03*	.47	.50
		Female	95.16				
	Multiage	Male	97.87				
		Female	96.44				

Table 8 Continued

Year in K	Type	Gender	Adjusted <u>M</u>	<u>Gender</u>		<u>Group x Gender</u>	
				<u>F</u>	<u>p</u>	<u>F</u>	<u>p</u>
1998	Traditional	Male	96.56				
		Female	93.88				
1999	Combined	Male	97.07	.03	.87	5.17	.03*
		Female	97.24				
	Multiage	Male	98.88				
		Female	96.79				
	Traditional	Male	95.27				
		Female	97.68				

*p<.05

As indicated by Table 8, overall gender had no significant interaction in either type of class. In 1997, there were no statistically significant differences between males and females. In 1998, there was a statistically significant difference between the combined male and female groups with the male population having a significantly higher mean than the females. In 1999, there was no statistically significant difference between the means of males and females; however, there was a significant gender x group interaction ($F=5.17, p=.03$). As a result, simple main effects were assessed by looking at gender effects within each type of classroom and classroom type effects within each gender group, while controlling for BRIGANCE K Screen. The results of the simple main effects test using ANCOVA indicated that the only significant simple main effect occurred within the male students, where the multiage group scores were significantly higher than the traditional group ($F=4.74, p=.04$). In 1999, males in the multiage group scored higher than males in the traditional group. Therefore, both hypotheses were rejected.

The following null hypotheses address differences in the number of reading skills mastered:

Ho4c: There is no significant difference in the number of reading skills mastered by gender while controlling for the BRIGANCE K Screen.

Ho4d: There is no significant difference in the number of reading skills mastered by gender x type of instruction while controlling for the BRIGANCE K Screen.

Table 9

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of Number of Reading Skills Mastered, by Class and Gender

Year in K	Type	Gender	Adjusted <u>M</u>	Gender		Group x Gender	
				<u>F</u>	<u>p</u>	<u>F</u>	<u>p</u>
Combined Years	Combined	Male	35.60	.83	.36	.45	.50
		Female	36.61				
	Multiage	Male	37.84				
		Female	38.11				
	Traditional	Male	33.35				
		Female	35.11				
1997	Combined	Male	35.31	.05	.82	.03	.86
		Female	34.79				
	Multiage	Male	36.52				
		Female	36.41				
	Traditional	Male	34.10				
		Female	33.17				
1998	Combined	Male	37.10	.91	.34	.15	.70
		Female	38.25				
	Multiage	Male	39.85				
		Female	41.45				
	Traditional	Male	34.35				
		Female	35.04				
1999	Combined	Male	34.01	.87	.36	1.90	.17
		Female	36.35				
	Multiage	Male	36.74				
		Female	35.79				
	Traditional	Male	31.46				
		Female	36.91				

*p<.05

As shown in Table 9, there were no statistically significant differences between males and females. Neither were there significant interactions between gender and type of instruction for either group. Therefore, the hypotheses were retained.

The hypotheses associated with a comparison of the number of math skills follow:

Ho4e: There is no significant difference in the number of math skills mastered by gender while controlling for the BRIGANCE K Screen.

Ho4f: There is no significant difference in the number of math skills mastered by gender x type of instruction while controlling for the BRIGANCE K Screen.

These results are shown in Table 10.

Table 10

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of Number of Mathematics Skills Mastered, by Class and Gender

Year in K	Type	Gender	Adjusted <u>M</u>	Gender		Group x Gender	
				<u>F</u>	<u>p</u>	<u>F</u>	<u>p</u>
Combined Years	Combined	Male	79.76	.14	.71	.74	.39
		Female	79.05				
	Multiage	Male	82.14				
		Female	79.76				
	Traditional	Male	77.38				
		Female	78.33				
1997	Combined	Male	61.69	1.69	.20	1.79	.19
		Female	58.74				
	Multiage	Male	63.93				
		Female	57.98				
	Traditional	Male	59.44				
		Female	59.51				

Table 10 Continued

Year in K	Type	Gender	Adjusted <u>M</u>	Gender		Group x Gender	
				<u>F</u>	<u>p</u>	<u>F</u>	<u>p</u>
1998	Combined	Male	89.21	.54	.46	1.44	.23
		Female	88.51				
	Multiage	Male	88.43				
		Female	88.86				
	Traditional	Male	90.00				
		Female	88.15				
1999	Combined	Male	83.64	3.38	.07	3.10	.08
		Female	87.67				
	Multiage	Male	89.86				
		Female	90.18				
	Traditional	Male	77.41				
		Female	85.17				

*p<.05

As shown in Table 10, there were no statistically significant differences between males and females. Table 10 also shows that gender had no significant interaction in either type of class. Therefore, the hypotheses were retained.

The hypothesis associated with a comparison of the System-wide First-Grade Reading Test scores was:

Ho4g: There is no significant difference in the System-wide First-Grade Reading Test scores by gender while controlling for the BRIGANCE K Screen.

These results are shown in Table 11.

Table 11

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of System-wide First-Grade Reading Test, by Class and Gender for 1999 Cohort

Year in K	Type	Gender	Adjusted <u>M</u>	Gender		Group x Gender	
				<u>F</u>	<u>p</u>	<u>F</u>	<u>p</u>
1999	Combined	Male	40.32	.11	.74	.82	.37
		Female	40.95				
	Multiage	Male	39.33				
		Female	39.29				
	Traditional	Male	39.22				
		Female	43.59				

As shown in Table 11, there was no statistically significant difference found between gender and type of instruction. Nor were there significant differences found between males and females. Therefore, the hypothesis was retained.

The hypothesis associated with a comparison of the System-wide First-Grade Math test scores was:

Ho4h: There is no significant difference in the System-wide First-Grade Math Test scores by gender while controlling for the BRIGANCE K Screen.

These results are shown in Table 12.

Table 12

Analysis of Covariance (ANCOVA) Comparison of Adjusted Means of System-wide First-Grade Mathematics Test, by Class and Gender for 1999 Cohort

Year in K	Type	Gender	Adjusted <u>M</u>	Gender		Group x Gender	
				<u>F</u>	<u>p</u>	<u>F</u>	<u>p</u>
1999	Combined	Male	40.70	.13	.72	3.40	.07
		Female	41.06				
	Multiage	Male	40.90				
		Female	40.58				
	Traditional	Male	39.70				
		Female	42.63				

As shown in Table 12, there was no statistically significant difference between gender and type of instruction. The null hypothesis was retained. While the mean for the females appeared slightly higher than the males within the traditional classroom group, the results were not tested for significance because the gender x group interaction was not significant ($p=.07$).

Chapter 5 presents an analysis and interpretation of these findings. Conclusions and implications of the findings are also included, along with recommendations for further study.

CHAPTER 5
SUMMARY, FINDINGS, CONCLUSIONS, IMPLICATIONS, AND
RECOMMENDATIONS

Summary

The central goal of this study was to compare the academic achievement of students enrolled in a kindergarten/first-grade multiage class with that of students enrolled in traditional age-graded kindergarten and first-grade classes at a specific primary school in East Tennessee. The first multiage class in this school was begun in 1997 with a second beginning in 1998. The program was the first to be implemented in the school system. In the participating school system, the annual rate of transience was 23% with a slightly higher rate of 25% at the study school. Therefore, there were some students who moved into or out of all classes.

The parents of the multiage kindergarten students agreed to a two-year placement in the multiage program. Both types of classes included students with a wide variety of academic abilities and socioeconomic levels.

Students were assessed in the spring prior to their kindergarten year by using the BRIGANCE K Screen. In the fall, until September 15, students who were not tested in the previous spring were given the BRIGANCE K Screen. Any students who moved into the multiage groups after September 15 of their kindergarten year were not included in this study because they did not have a BRIGANCE K Screen score. The students matched with the multiage students were enrolled for both kindergarten and first grade in a traditional class in this school. They also must have been enrolled prior to September 15 of their kindergarten year to have a BRIGANCE K Screen score.

Kindergarten academic achievement was measured by using the BRIGANCE 1 Screen scores. This assessment was completed in the spring of the kindergarten year. First-grade

academic achievement was measured by tallying the total number of reading skills mastered and total number of mathematics skills mastered. Additionally, for the 1999 group, a System-wide First-Grade Test in reading and mathematics was used. The groups were also compared by gender using the BRIGANCE 1 Screen and both reading and mathematics.

The conclusions derived from the findings presented in Chapter 4 as well as recommendations for further research are presented in this chapter. This study was based on four research questions.

Findings

Research Question #1

What level of performance did the students demonstrate on the BRIGANCE K Screen and were there initial differences between the multiage and traditional groups on this test ?

Using gender and similar BRIGANCE K Screen scores, 109 multiage students were matched with 109 traditional age-graded students for this study. A t-test for two independent groups was used to determine that at the .05 level there were no significant differences between the means of the two groups. The probability for each year as well as the combined years was greater than .9. The greatest difference between the means of the two groups was found in 1998. As shown by the t-test for two independent groups, the two groups had equal levels of performance at the beginning of the study.

Research Question #2

Is there a difference between the BRIGANCE 1 Screen scores of kindergarten students participating in a multiage program and of students participating in a traditional age-graded kindergarten program, while controlling for kindergarten readiness?

To answer this research question, the BRIGANCE 1 Screen scores of the identified students were used. An Analysis of Covariance (ANCOVA) was used because it allowed control

for the initial kindergarten readiness. The ANCOVA indicated in 1997 and in 1999 that neither group scored significantly higher than the other; but in 1998 and combined years, the ANCOVA showed that the multiage students scored significantly higher than the traditional students. In all years as well as the combined years, the multiage means were higher. While only two of the differences were statistically significant, the overall pattern indicates that these students performed at a higher level than the students in the traditional classes.

Research Question #3

Is there a difference in the number of reading and math skills mastered by first-grade students participating in a multiage program and of students participating in a traditional age-graded first-grade program, while controlling for kindergarten readiness?

The academic achievement of the first-grade students involved in this study was measured by tallying the total number of reading skills mastered and the total number of mathematics skills mastered. Additionally, a System-wide First-Grade Test was administered to the 1999 cohort, and the results (reading score and mathematics score) were also used. An Analysis of Covariance (ANCOVA) was used to ascertain whether there were any significant differences between the achievement of the two groups. It also allowed for controlling for kindergarten readiness.

The ANCOVA showed that overall the number of reading skills mastered by the multiage students was statistically significantly higher than that of the traditional students. Even though the two means were within 3.7 points of each other, this is significant for the combined years population. In 1997 and 1999, the ANCOVA indicated no statistical difference; but in 1998, there was a 6 point difference between the means of the two groups with the multiage being higher. This difference was determined to be statistically significant. The multiage mean was higher in all three years of the study, giving basis to the argument that the multiage students performed at a higher level in reading. On the System-wide First-Grade Test for reading (given

to the 1999 cohort), the traditional students performed slightly higher than the multiage students; but the difference was not statistically significant.

To determine whether there is a statistical difference between the mathematics achievement of the two groups, an ANCOVA was again used. This analysis showed there was no difference between the multiage and traditional groups except in 1999. In 1999, however, the multiage mathematics scores were significantly higher than the traditional scores. On the System-wide First-Grade Test for mathematics (given to the 1999 cohort), the multiage students performed at a slightly lower level than the traditional students. This difference was not statistically significant.

Research Question #4

Are there academic achievement differences between boys and girls within the multiage classroom and the traditional age-graded classroom and is there an interaction between gender and type of instruction?

Again, an Analysis of Covariance (ANCOVA) was conducted to determine whether there was any difference between the academic achievement of boys and girls in both types of classes. This analysis was done for the BRIGANCE 1 Screen, the total number of reading skills mastered, the total number of mathematics skills mastered, and the reading and mathematics scores from the System-wide First-Grade Test.

For the BRIGANCE 1 Screen, a significant difference was found between the combined male and female groups in 1998, with boys scoring higher. In 1999 there was a statistically significant interaction in the group x gender. Because of this interaction, ANCOVA was used to assess simple main effects. The results indicated that the multiage male students scores were significantly higher than the traditional male students.

For the total number of mastered reading skills, there were no statistically significant differences between the means of the males and females. Neither was there an interaction

between gender and type of instruction. On the system-wide first-grade test (given to the 1999 cohort) no statistically significant difference between males and females or any interactions of gender x instruction type was found.

For the total number of mastered mathematics skills, no significant differences between the males and females or in the groups x gender were found. On the mathematics test of the System-wide First-Grade Test (given to the 1999 cohort) no statistically significant difference was found between the genders; nor was there an interaction between gender and type of instruction.

Conclusions

Now that we have entered the 21st Century, the demands on our educational system have increased. With the population growth, the increase in diversity, and the unique needs of today's school-age children, it is essential for educators to explore alternative avenues to ensure success for students. According to Gaustad (1992b), the time when the multiage approach is especially suitable is the primary years (1996) and benefits for students in the social, intellectual, and emotional areas are enhanced by multiage instruction. Because the age-graded approach has been in use for more than a century, many educators hold a firm belief in this established instructional method. Questions have arisen concerning the applicability of both the multiage and traditional methods of instruction. Research supporting both types of instruction is available. With the findings of this study, the following conclusions were offered.

It was evident that the two groups used for this study had similar entry scores. When comparing kindergarten progress and first-grade readiness, multiage kindergarten students had higher scores. This indicated that kindergarten students may benefit from attending a kindergarten/first-grade multiage program. These students were able to interact with more mature students, thus allowing additional opportunities for experience with higher level thinking activities to enhance learning. The multiage program was seen as providing an advantage over

the traditional classroom by allowing students to have earlier access to first-grade skills that were deemed academically appropriate by the classroom teacher. One cannot rule out that attending kindergarten for a full day could possibly have an impact on the multiage kindergarten students' academic achievements.

It was also apparent that multiage first-grade students were able to master a higher number of reading skills and mathematics skills than traditional first-grade students. This could have been in part because the multiage students were with the same teacher or team of teachers during their kindergarten year, thus, were exposed at a earlier age to more advanced concepts. It was also possible that these multiage students had an advantage over traditional students because of their continual interaction with older children. This allowed the younger students to see others at various developmental levels and to emulate appropriate behaviors. The older students also had the advantage of working with younger children. The older students in essence became the teacher or advisor. They gained greater self-confidence and self-esteem. This experience also allowed the older students to continually review their own previous learning, thereby maintaining proficiency in these skills.

When exploring the gender issue, male kindergarten students in general had higher BRIGANCE 1 Screen scores than females. Additionally, multiage males scored higher than traditional males at the end of the kindergarten year. These findings agreed with Anderson and Pavan (1993) who determined that this type of program was beneficial to boys. Ricard et al. (1995) also determined that multiage kindergarten boys earned higher mean scores than boys enrolled in a traditional kindergarten program. It has long been thought that some boys mature at slower rates than girls do. This could be a factor influencing the interaction between type of instruction and male multiage students. Also, this may indicate that kindergarten boys benefited more than girls from experiences with more mature students as well as from exposure to more advanced concepts at an earlier age. Additionally, the possibility that kindergarten boys benefited more than kindergarten girls from attending an all day program cannot be ruled out.

There was no indication that either multiage or traditional classes were more advantageous to males or females in the first grade. No statistically significant differences were found between male and female scores. Neither were differences found in type of instruction having effects upon achievement based on gender.

A multiage kindergarten/first-grade program may be the most appropriate placement for some students, while a traditional program may appropriately fit the needs of other students. Teachers of both types of instructional programs must be familiar with a wide scope of reliable methods that will enhance the development of skills necessary to have a successful educational experience.

Implications

Many well-known educators and psychologists support the multiage concept. According to these theories, children should be allowed many peer interactions in a setting that fosters active self-directed learning and experiences of success. This not only allows cognitive growth, but social and emotional maturing are enhanced.

As evidenced in this study, kindergarten students who attended a multiage program achieved at a higher level. It appears beneficial for kindergarten students to be involved in a multiage setting with first-grade students. Gutierrez and Slavin (1992) determined that cross-age and cross-grade grouping had some positive effects in achievement of students. It seemed that being allowed to attempt first-grade skills upon completion of the kindergarten mathematics and language arts curriculum as well as being exposed to other first-grade activities and lessons was a benefit for students.

Miller (1995) held that our educational institutions must be transformed in order to meet the needs of a constantly evolving society. With current research on learning styles, multiple intelligences, and brain-based learning, it is apparent that appropriate instructional approaches differ for individual students. No single method can successfully provide every child with

instruction that is most applicable for him or her. A variety of instructional strategies and approaches should be available in every school to allow all students access to the type of program which best suits their individual educational needs. Today's educators must be proficient in evaluating students' needs and placing them in the appropriate programs.

Recommendations

As a result of this study the following recommendations are offered:

1. Research should be conducted involving student attitudes toward class type, multiage and traditional, in order to determine whether a relationship exists between academic achievement and attitudes toward school.
2. Research should be conducted to compare the academic growth of multiage and traditional students as related their socioeconomic levels.
3. Further studies should be conducted in other schools that have incorporated both multiage and traditional approaches to determine which class type produces greater gains in academic achievement in reading and mathematics.
4. Research should be conducted to compare the achievement of second-grade students who were in a multiage class for kindergarten and first grade with that of students who were in traditional kindergarten and first grade.
5. Research should be conducted to study the views of parents of children enrolled in multiage classes compared with the views of parents of children enrolled in traditional classes.
6. Research should be conducted to determine the increase or decrease of progress of multiage student achievement in the areas of reading and mathematics compared to that of the traditional student.

7. To study the effects of the length of kindergarten school day on academic achievement, research should be conducted with kindergarten students attending a full-day program as compared to those attending a half-day program.

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APPENDICES

APPENDIX A

Letter to Director of Schools

Dear _____
(Director of Schools)

As a requirement for completing the Doctor of Education degree in the Educational Leadership and Policy Analysis Department at East Tennessee State University, I am planning a study of the comparison of academic achievement of students in multiage classrooms and in traditional age-graded classrooms. This letter is to request your permission for (participating school) to participate in this study.

For this study, students in the multiage class will be paired with students in a traditional age-graded class by gender and by BRIGANCE K Screen scores. These scores will be within (plus or minus) two points of each other. The BRIGANCE 1 Screen will be administered to these students and the scores will be statistically compared. These same two students will remain paired for the final statistical comparison of the number of reading and math skills mastered at the end of their first-grade year. Additionally, the academic achievement levels of females and males of both groups will be statistically compared.

As we work toward meeting the diverse needs of today's school-age population, we are facing challenges in education never before seen. Educators will be required to examine existing programs as well as implement innovative programs to ensure each student experiences success in school. This study will provide data comparing the academic success of students enrolled in two different types of programs. Insights from this study may influence the further examination of different programs available to help meet the obligations of the educational system to its students.

Please feel free to contact me at (phone number) if you have any questions.

Thank you,

M. Fran Harmon

APPENDIX B

Letter to Principal

Dear _____
(Principal)

As a requirement for completing the Doctor of Education degree in the Educational Leadership and Policy Analysis Department at East Tennessee State University, I am planning a study of the comparison of academic achievement of students in multiage classrooms and in traditional age-graded classrooms. This letter is to request your permission for your school, (participating school), to participate in this study.

For this study, students in the multiage class will be paired with students in a traditional age-graded class by gender and by BRIGANCE K Screen scores. These scores will be within (plus or minus) two points of each other. The BRIGANCE 1 Screen will be administered to these students and the scores will be statistically compared. These same two students will remain paired for the final statistical comparison of the number of reading and math skills mastered at the end of their first-grade year. Additionally, the academic achievement levels of females and males of both groups will be statistically compared.

As we work toward meeting the diverse needs of today's school-age population, we are facing challenges in education never before seen. Educators will be required to examine existing programs as well as implement innovative programs to ensure each student experiences success in school. This study will provide data comparing the academic success of students enrolled in two different types of programs. Insights from this study may influence the further examination of different programs available to help meet the obligations of the educational system to its students.

Please feel free to contact me at (phone number) if you have any questions.
Thank you,

M. Fran Harmon

VITA

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