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ABSTRACT

Research on the social and cognitive effects of grouping children in mixed-age versus same-age classrooms is gaining interest among practitioners and researchers. This investigation used a teacher rating scale to assess children's prosocial, aggressive, and friendship behaviors in mixed- and same-age classrooms. Confounding variables such as the child's age and sex, the teacher's educational level, and classroom practices, were statistically controlled. Participating were 649 students from 29 classrooms in 2 suburban Chicago schools and 2 inner city Milwaukee schools. The mixed-age condition was comprised of 177 males and 135 females, and the same-age classes had 152 males and 173 females. A pretest of teacher ratings of kindergarten children who were later assigned to either a mixed- or same-age first grade classroom showed no preexisting behavioral differences. Posttest findings suggested a significant positive effect on children's prosocial behavior as a result of participation in a mixed-age classroom context. Fewer children appeared to experience social isolation in mixed-age classrooms than in same-age classrooms. Aggressive and negative behaviors were significantly less likely to be noted by teachers in mixed-age than in same-age classrooms. Follow-up ratings of third graders, all of whom were by then enrolled in same-age classrooms, indicated that children who had participated in same-age classrooms were significantly more likely to be rated by their current teachers as aggressive or disruptive. (Contains 76 references.) (KB)

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**CHILDREN'S SOCIAL BEHAVIOR IN RELATIONSHIP TO PARTICIPATION IN MIXED-AGE OR SAME-AGE CLASSROOMS**

*Presented at the 1997 Biennial Meeting of the Society for Research in Child Development (SRCD) April 3-6, 1997 Washington, DC*

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## Abstract

*Research on the social and cognitive effects of grouping children in mixed-age (where there is an age span of at least two years among children) versus same-age classrooms is gaining increasing interest among practitioners and researchers. The present investigation uses a teacher rating scale, based on research into the correlates of children's social skillfulness and acceptance by other children, to assess children's social behavior in mixed- and same-age classrooms*

*Confounding variables such as the child's age and sex, the teacher's educational level, and classroom practices were statistically controlled. Further, a pretest of teacher ratings of kindergarten children who were later assigned to either a mixed- or same-age first grade classroom showed no preexisting behavioral differences.*

*Findings suggest a significant positive effect on children's prosocial behavior as a result of participation in a mixed-age classroom context. In addition, fewer children appeared to experience social isolation in mixed-age classrooms than in same-age classrooms. Aggressive and negative behaviors were significantly less likely to be noted by teachers in mixed-age than in same-age classrooms.*

*Follow-up ratings taken of third grade children (all of whom were by then enrolled in same-age classrooms) indicated that children who had participated in same-age classrooms were significantly more likely to be rated as aggressive or disruptive by their current teachers.*

### **CHILDREN'S SOCIAL BEHAVIOR IN RELATIONSHIP TO PARTICIPATION IN MIXED-AGE OR SAME-AGE CLASSROOMS**

A growing body of research explores the influence of educational contexts on individual, community, and societal aspects of children's development. While interest has focused on the impact of the classroom environment on children's attitude toward school, cognitive growth, and academic development, less direct attention has been given to the effects of classroom context on social development during the elementary years.

The United States has become increasingly concerned about the effectiveness of its primary and secondary educational system (Kagan, 1990). During roughly the same time period, related social trends include growing numbers of women entering the work force, decreasing nuclear and extended family size, and increased family mobility (Coleman, 1987). Such changes have contributed to a reduction in children's informal access to children of differing ages than in times past. In contrast to a historical pattern of children developing within an age-varied social system, many children today spend a majority of their time in an age segregated milieu (Bronfenbrenner, 1970; Katz, Evangelou & Hartman, 1990; McClellan, 1994). The results of this pattern of segregation are thought to contribute to a declining social support system and compromised development of children's social skills. Coleman suggests the need for a significant institutional and societal response to support functions traditionally filled by the family such as the development of feelings of belongingness and community, emotional and social bonding, and nurturance.

Increasingly, the school has been viewed as one of the most effective and efficient contexts to address not only children's academic needs, but also their affective and social needs before these needs reach crisis proportions (Bronfenbrenner, 1970; Coleman, 1987; Parker & Asher, 1987). One educational approach that researchers have explored for encouraging the development of social skills is mixed-age education, where children of at least a two year age span are grouped in a single classroom and are encouraged to share experiences involving intellectual, academic, and social skills (Goodlad & Anderson, 1987; Katz et al, 1990; McClellan, 1994). Consistency over time in relationships among teachers, children and parents is viewed as one of the most significant strengths of the mixed-age approach because it encourages greater depth in children's social, academic, and intellectual

development. The concept of the classroom as a "family" is encouraged, leading to expansion of the roles of nurturing and commitment on the part of both students and teacher (Feng, 1994; Hallion, 1994; Marshak, 1994).

The potential social implications of the mixed-age concept of education are strongly supported by Parker and Asher's (1987) review of the literature demonstrating the importance of peers in children's social development, and by Maccoby's (1992) study of reciprocity theory which demonstrates the positive effect on child behavior of sustained close relationships between children and caregivers. Furthermore, research that has followed children over a fifteen year period (Schweinhart, Weikart, & Larner, 1986) suggests that high quality early childhood programs that foster children's social development in low income communities contribute to a reduction in remedial education, depression, unemployment, illegitimate pregnancies and criminal behavior as children grow into adulthood.

The adequate implementation of a mixed-age approach to education extends beyond simply mixing children of different ages together. A positive working model of a mixed-age classroom allows for the development of social skills as the teacher encourages cross-age interactions through peer tutoring and shared discovery. Social competence develops for older children out of their role as teachers and nurturers, and for younger children out of their opportunity to observe and model the behavior of their older classmates (Katz, et al., 1990; Ridgway & Lawton, 1965).

In the following we will look briefly at a) the history of graded and mixed-age education, b) the importance of children's social development to their overall development including cognitive development, c) particular domains of social functioning including prosocial, friendship, and aggressive behavior in relationship to participation in mixed-age or same-age groups, d) the potential mixed-age grouping may hold for educational reform and, e) some of the issues and questions surrounding the validity of past research on mixed-age grouping.

## Review of the Literature

### A History And Contemporary Definition of Mixed-Age Education

Mixed-age education has its roots in the one room school house of the nineteenth century (Goodlad & Anderson, 1987; Katz et al., 1990; Theilheimer, 1993). Like today's mixed-age classrooms, younger children were often tutored by older children. The classroom functioned much like a family in that close relationships developed and children were both protected and nurtured. Classmates worked together with a blend between cooperation and competition, and students experienced a degree of flexibility in learning progression (Leight & Rinehart, 1992).

The establishment of graded education, where children of the same age were grouped homogeneously by classrooms, developed simultaneously with America's industrial revolution during the middle to end of the nineteenth century (Konner, 1975). Horace Mann, secretary of the Massachusetts Board of Education, introduced the concept following a trip to Prussia where he saw such a system in operation (Hallion, 1994). Using the organizational structure of the factory as a model, children were grouped by age to make the delivery of information cost- and time-efficient. To heighten the schools' efficiency, children were tracked and labeled by finer and finer delineations of ability. The development of graded textbooks also contributed to the institution of graded education.

Although there was an early cry from a variety of disciplines around the turn of the century regarding the ineffectiveness of the stereotyped pattern of the graded school in dealing with the needs of the individual as a learner, return to the concept of mixed-age grouping of children for educational purposes did not receive much notice until the 1959 publication of Goodlad and Anderson's, The Nongraded Elementary School, (Gaustad, 1992; Katz et al., 1990). The intent of this model was to move education beyond the lock-step standardized curriculum methods previously employed by shifting the goal of instructional planning from the needs of the group to the needs of the individual child.

Stimulated by the outcomes of non-graded instruction as reported by Goodlad and Anderson, and in response to the political and social climate of the time which emphasized individuality as opposed to conformity and homogeneity, the decades of the 1960's and 1970's experienced an open education movement which embraced modern principles of non-graded education (Devaney, 1974; Goodlad & Anderson, 1987). Many classrooms were modeled after the design of the British Infant Schools. However, this first wave of experimentation with mixed-age education lacked the support and understanding of both school administration and parents of students involved in the effort. Furthermore, early efforts at implementation lacked a consistent definition of a mixed-age model, and were, therefore, hampered by inadequate curriculum and staff development (Gaustad, 1992; Hallion, 1994).

The current classroom model for mixed-age education differs in definition from what was previously attempted in non-graded education. The mixed-age class is not a combination class where children of two grade levels are placed in one classroom but are treated as two distinct subgroups (Surbeck, 1992). Rather, the contemporary model promotes integration of instruction across grade levels, with students having the opportunity to choose their own level of study. Children are encouraged to participate in cross age interactions, taking on roles of leadership and peer tutoring. The teacher's role is to provide leadership, support, and scaffolding, rather than adopting a laissez-faire approach, as was often the case in non-graded classrooms of the '60's and '70's (Greenberg, 1992; Theilheimer, 1993). The teacher is actively involved in helping each student follow an individual study plan, minimizing the possibility of a student receiving inappropriate instruction due to lack of attention.

Recognizing the need for consistent implementation of the mixed-age classroom for the purpose of studying the effects of the model, Nye (Nye, Cain, Zaharias, Tollett, & Fulton, 1995) provides the following definition:

...the practice of grouping children of more than one age and ability level (usually three age levels) together with a goal of maximizing teaching practices involving interaction, experiential learning, and fluid, flexible small group participation among children so that they experience a continuous progression of learning (cognitive and social) in keeping with their individual rate of knowledge and skill acquisition within an environment which prohibits artificial and arbitrary points which benchmark failure such as retention during the primary years. (p. 3)

### **The Importance Social Development**

Significant results in both the academic and affective domains favoring mixed-age classes have been demonstrated by a number of researchers (Anderson & Pavan, 1993; Marshak, 1994; McClellan, 1991; Miller, 1991; Nye, 1995; Pratt, 1986). Particularly noteworthy is Anderson and Pavan's review of thirty seven studies which demonstrates improvement in test scores on standardized tests and improved attitudes toward school for students in mixed-age classes, and especially for "blacks, boys, under achievers and students of low socioeconomic status" (p. 50). Of approximately eighteen studies that looked specifically at low income populations and mixed-age grouping, mixed-age emerges as a structure that, overall, promotes higher achievement scores, stronger social development, better self-concepts, and more positive attitudes toward school (Anderson & Pavan, 1993). Results are more pronounced the longer the time period students are involved in mixed-age programs.

There is evidence that the growing child's social interaction is important in the development of his or her cognitive abilities (Tizard, 1986). Social cognition may lay the foundation for cognition in general within both the development of the individual person and the genetic heritage of the species (Chance & Mead, 1953; Humphrey, 1976; Jolly, 1966; Tizard, 1986). If this is the case, we might look at mixed-age groups as providing the child with a rich and complex social environment that contributes to both greater social facility, as well as to greater cognitive competence.

Palmer (1987) argues that the cognitive conflict necessary for optimal intellectual development can only occur within a community, so that those interacting will take the time to fully consider one another's position, as well as take the emotional risks necessary for the kind of deep engagement that leads to real intellectual work. Research on the greater teaching effectiveness of those older peers who are intimates of a younger child, such as older siblings (Azimtia & Hesser, 1993), reinforces the significance of Palmer's observations about the importance of community to intellectual development.

Social Behaviors of prominent interest to researchers (Parker & Asher, 1987) include prosocial behavior, friendship patterns, and aggressive behavior. In the following sections we will discuss the role that each of these behavioral sub-sets plays in children's development. We will also discuss research exploring the relationship of mixed- and same-age grouping and prosocial, friendship, and aggressive behaviors.

### **Prosocial Behavior**

Prosocial behaviors include helping, sharing, cooperating, and caring for or taking responsibility for another (Radke-Yarrow, Zahn-Waxler, & Chapman, 1983). The capacity for prosocial behavior has been shown to increase with age in cultures where children are given opportunities and expected to help in the care of younger children (Whiting & Whiting, 1975). The provision of opportunity for prosocial action makes mixed-age groups highly pertinent. While it is not suggested that same-age mates do not behave prosocially toward one another, there is some evidence that younger children are more likely to elicit prosocial behavior from children than are same-agemates. The physical appearance or "babyiness" of young children may make them more likely to evoke care giving behaviors from children older than themselves. Furthermore, children are more likely to direct their assistance seeking or dependent behavior toward older rather than same-age or younger peers (Whiting & Whiting). These two conditions may make it likely that prosocial behavior will emerge more frequently in mixed-age classrooms than in same-age classrooms. Finally, because of the classroom structure, teachers in mixed-age classes are more likely to ask children to help one another than teachers in same-age classrooms.

Knight and Kagan (1977) found that children's behaviors increased in rivalry and decreased in altruism and cooperation as they progressed through graded elementary school in the United States. A review of published research by Radke-Yarrow, Zahn-Waxler, and Chapman (1983) found that only about half of the studies on altruism show predicted increase in altruism with age. One possible explanation for these unexpected decreases in altruism with age is that current structural factors in many classrooms and in American society tend to reverse biological tendencies toward increased altruism with age. One such structural factor may be the age composition of most American classrooms, the vast majority of which are composed of same-age peers.

Harter (1983) and Keller (1978) both found evidence that "self-esteem" is related to the child's sense of personal control and competence in every day activities. One way children experience their own competence in mixed-age environments such as Montessori or the vertically grouped British Infant School (Ridgway & Lawton, 1965) is by helping children younger than themselves.

### **Friendship Patterns and Behavior**

Research by Bloom (Goodlad & Anderson, 1987) suggests that the quality of young children's social competence accurately predicts academic as well as social competence in later grades. Social rejection in childhood decreases children's opportunities to achieve social competence (Parker & Asher, 1987) and is increasingly considered a serious problem that adults often fail to acknowledge or correct (Olweus, 1989). A study by Asher, Hymel & Renshaw (1984) revealed that unpopular children are significantly more likely to report episodes of loneliness than popular children. Additional research suggests that children experience greater sociometric isolation (Adams, 1953; Zerby, 1961) in same-age than in mixed-age classrooms. Classes that are highly unidimensional, a construct frequently

associated with same-age grouping, are reported to have more social "stars" (Roseholtz and Simpson, 1984) but also more rejected and/or neglected children..

How well a child is liked by other children, or the child's "sociometric status," has been identified as one of the most accurate ways of selecting children who might be at risk for a variety of serious problems later in their lives (Parker & Asher, 1987). Neglected or withdrawn children have been shown to display significantly greater increases in prosocial behavior when paired with younger peers, than when paired with same-age peers (Furman, Rahe, & Hartup, 1979). With the added practice and confidence these children gain, their social skillfulness may increase and lead to greater acceptance by children of all ages.

### **Antisocial and Aggressive Behavior**

Children who are aggressive and disruptive are frequently disliked and avoided by other children (Dodge, 1983; Hartup & Moore, 1990). Over time, aggressive children tend to associate more frequently with other aggressive children, thus reinforcing and solidifying an aggressive behavioral pattern (Ladd, 1983). Because aggressiveness and social rejection in childhood are the most consistent predictors of later life difficulties (Parker & Asher, 1987), conditions that vary in the extent to which they foster or reduce aggressive, competitive, and disruptive behavior bear careful examination. Indicators that same-age classrooms may be related to higher levels of physical and verbal aggression than mixed-age classrooms may be of particular importance.

Bronfenbrenner (1970) argues that the concentration of same-age peers is a major factor in the extremely high incidence of aggressive, anti-social, and destructive acts in United States society. On the other hand, individuals who are familiar with one another are more likely to avoid aggression and respond positively to one another than are individuals unfamiliar with one another (Marler, 1976; Sherman, 1980). Because children in mixed-age classrooms live together in the same classroom for two or more years, it is likely that mixed-age groups may promote prosocial behavior in children, and concomitantly reduce aggression. Thus, children who are unusually withdrawn or who are aggressive and/or disruptive may be helped by the mixed-age classroom before formal intervention becomes necessary.

Furthermore, it may be that the mixed-age setting is more likely than a same-age setting to avoid the polarization of teacher and students by facilitating an atmosphere of shared responsibility for classroom order. Research supporting this hypothesis is provided by Lougee and Graziano (1985) who observed that children given opportunity to provide leadership with younger children for rule enforcement not only assisted the teacher in reminding younger students of classroom procedures, but also tended to improve in their own behavior.

### **Mixed-Age Education As A Vehicle For Educational Reform**

According to William Miller (1995) of the Washtenaw Intermediate School District of Ann Arbor, Michigan, "Educators have merely accepted the age-graded organizational structure as a way of doing things within the system of public education.. As our society has changed, so must our schools." (p.31). In the face of the lack of success in widespread implementation of alternative educational contexts, the "factory" model of education remains the predominant educational model in America's schools (Cuban, 1989). However, there is increasing evidence that this model is inconsistent with a wealth of recent research on the developing human brain (Huttenlocher, 1990; Kandel & Hawkins, 1992; Squire, 1992) and the kinds of educational strategies that bring about optimal learning and development. Ample research (see Ames, 1992; Johnson, Johnson, et al., 1984; Johnson, 1991; McClellan, 1994) demonstrates that children think more, learn more, remember more, take greater pleasure in learning, spend more time on task, and are more productive in classes that emphasize learning in well-implemented cooperative groups rather than in individualistic or competitive structures. Recent empirical findings using both standardized and local measures of assessment demonstrate academic gains for students participating in mixed-age classrooms (Nye, Cain, Zaharias,

Tollett, & Fulton, 1995). This research lends support to the supposition that children's opportunities to interact with more advanced and less advanced peers strengthens their cognitive skills, including, it is likely, social cognition. Additional support for the benefits of the mixed-age classroom is generated by research demonstrating that behaviors elicited in younger children when relating to peers older than themselves include more mature and cognitively complex play (Goldman, 1981; Mounts & Roonarine, 1987; Howes & Farver, 1987). These younger children also exhibit less reliance on adults and greater reliance on their peers for help in caretaking and problem solving situations (Goldman, 1981; Ridgeway & Lawton, 1965; Reuter & Yunik, 1973).

In conclusion, it appears from previous research that mixed-age grouping may be one aspect of a classroom environment that enhances the development of social and cognitive abilities (Piaget, 1977; Tizard, 1986; Vygotsky, 1978).

### **Refining Our Knowledge of the Effects of Mixed-Age Grouping**

Predominant social/emotional effects of educational contexts that have been considered by researchers are children's attitude toward school and self-concept development. While no adverse social effects have been demonstrated in previous research, conflicting or inconclusive results of the mixed-age condition to influence classroom behavior (Sundell, 1994; Veenman, 1995), suggest the need for more refined and definitive investigations, particularly delineating what constitutes the "mixed-age classroom." Veenman, for example, notes that of the 11 studies meeting his criteria for inclusion in a meta analysis directed at the cognitive effects of mixed- versus same-age grouping, only 2 studies presented evidence of initial comparability of the experimental and control groups.

In the following we explore the potential of mixed-age versus same-age grouping in predicting children's prosocial, friendship making, aggressive and antisocial behaviors. Our intent is to establish greater control over the many variables that may confound attempts to investigate the apparent differences between mixed- and same-age classrooms. We have taken several steps to do so. First we performed a pretest on kindergarten children who were all enrolled in same age groups to detect potential initial differences that might account for later differences in social behavior at 1st through 5th grade. Second we took steps to insure that the schools participating in the study were similar in their philosophic and procedural approach to children's education, regardless of whether children were enrolled in mixed-age or same age classrooms. Third, using multiple regression data analysis, we controlled statistically for the many child, teacher, and classroom variables that might confound the validity of mixed-age versus same-age classroom in predicting children's social behavior. In so doing, we hoped to identify if, and to what extent, mixed-age grouping, versus child, teacher, and classroom characteristics, make a unique contribution to the creation of a classroom milieu that supports children's social development.

### **Methods**

Data was collected regarding children's prosocial, aggressive and friendship behaviors as predicted by a variety of classroom variables using a teacher rating scale that included 27 items rated on a continuum of one to four (1 = never and 4 = usually). The most central concern of this investigation was children's prosocial, friendship, and aggressive behaviors as related to their participation in same- or mixed-age classrooms. Because the scale for all items runs in the same direction, results must be interpreted carefully. For example item number 4 "Has friends in Class" runs from Never (#1) to Very Often (#4). However, Item # 6 "Physically aggressive with other children," also runs in the same direction, from Never (#1) to Very Often (#4). Therefore, the direction of the effect size is critical to interpreting the results of the findings.



## Subjects

Subjects were recruited from two suburban middle class elementary schools (schools A & B) in the greater Chicago area, and from two Milwaukee schools (Schools C & D) serving the same inner city population. School A functions primarily as a mixed-age classroom model (grades K-5), with a limited number of single grade classes offered at each grade level. School B offers primarily single grade classes (grades K-8) with three mixed-age classes offered for children in the first and second grade age ranges. School C is comprised primarily of mixed-age classes (grades 1-5), with the exception of kindergarten. School D offers primarily same-age classes (grades K-5). Schools C and D draw from the same geographic area. Schools A and B are very similar in the demographic make-up of their population, which includes middle to upper-middle class households. Non-white students in schools C and D combined make up approximately 12% of the student population.

A total of 649 students from 29 classrooms were included in the study. The mixed-age condition included a total of 177 males and 135 females. Same-age classes included a total of 152 males and 173 females. Not included in these numbers is a pre-test we conducted with 159 kindergarten students (all enrolled in same-age classes) whose teachers rated them on their social behavior. In addition, 117 third grade students (all of whom were then enrolled in same-age classes) were rated by their teachers in a post test approximately 1 year after their participation for at least one year in a mixed-age or same age classroom.

## Instruments

**Teacher rating scale.** Teacher ratings, particularly of younger children, have been found to be reliable indicators of children's social skill development (Hartup, 1983). The teacher rating form used in the current research is an outgrowth of a teacher rating tool originally developed by Asher and Renshaw (1988; S.R. Asher, personal communication), and refinements that grew out of research correlated with children's social skill development and acceptance by peers (Coie & Dodge, 1983).

While there are disadvantages to the use of teacher ratings as a means of gaining information about children's social behavior, not the least of which is the lack of uniformity in judgment from one class to the next, there are also some advantages to this form of assessment (McClellan, 1991). For example, teacher ratings may be a particularly valuable approach to the assessment of children's aggressive behavior because aggression occurs rarely in classrooms and is therefore difficult to substantiate using observational techniques (Hartup, 1983; Winsler, 1993).

Finally, while studies using experimental models offer ideal control of the conditions affecting the dependent variable of interest, ecological validity is often low. That is, it is conceivable that results may be statistically significant under experimental conditions, but lacking in predictive value when examined in actual social or other environments where the impact and interplay of a multitude of variables is usually much more complex (McClellan, 1991).

The rating scale used in the current study broadened the areas of social skills rated and added a number of questions with this intention in mind. For example, a question that had not been addressed by either Asher and Renshaw (1988) or McClellan (1991) was the willingness of children to include less popular children in their play or friendship groups.

Teacher Rating Scales were administered by 29 teachers who rated 649 students currently enrolled in mixed-age or same-age classrooms. Consistent with observation about the importance of creating instruments that do not lead teachers or other evaluators to pick up on a researcher's expectations and respond to questions in a patterned manner, not all of the items included in the teacher rating instrument were central to the issues explored in the current investigation. In addition, items of interest were distributed throughout the rating scale rather than grouped with areas of similar interest.

Behaviors of interest were children's prosocial behavior, friendship behavior, aggressive behavior, and a more generalized negative or anti-social behavior. Sub-scales were developed from the 27 item Teacher Rating Scale around the variables of interest and were comprised of the

following: 1) a prosocial behavior scale (Standardized Reliability Alpha = .88) including 7 questions about the teacher's observation of each child's willingness to include children who were often excluded in play groups, nurturing behavior toward other children, and cooperative behavior; 2) a friendship behavior scale (Standardized Alpha = .92) including 4 questions about the teacher's observation of each child's inclusion in play and work groups, and how well the child was liked and accepted by other children; 3) a verbal and physical aggressive behavior scale (Standardized Alpha = .86) including 3 questions about the teacher's observations of each child's verbal and physical aggression toward other children as well as the degree to which they were perceived by their teachers as disruptive to the play and work of other children; and 4) a negative behavior scale (Standardized Alpha = .80) including 5 questions about the teacher's observation of each child's verbal and physical aggression, disruptive behavior with other children, competitiveness, and degree of tattling on other children.

### **Procedures**

**Sample selection.** For the purposes of the study, schools A and B were considered as a pair, as were schools C and D. Several common parameters were indicative of both mixed- and same-age classrooms in all of the paired schools: 1) All classes utilize a whole language/integrated curricular approach to teaching reading, writing, language arts, science and social studies; 2) All classes utilize a hands-on approach to teaching mathematics; 3) With the exception of kindergarten and special needs classes, all classes within each school have approximately the same amount of time allotted for instruction by specialists in the areas of art, physical education, computers, music and library science; 4) Within each school all classes in grades 1-5 have the same structure in length and time of the school day, lunch and recess; 5) Mixed- and same-age classes in schools A and B are balanced with respect to sex, socio-economic class, student achievement, motivation, and special needs students. Mixed-age classes in school C, and same age classes in school D are similar in ethnic and socio-economic composition, because both schools draw students from the same geographic area. School C has a 75% minority population (primarily African-American); school D has a 99% African-American population.

**Data collection.** Rating scales were distributed to classroom teachers in the spring of the school year. Teachers were asked to respond to each item from a "gut feeling" rather than to observe each child carefully before responding. The intent of these instructions was to provide consistency in teacher's manner of responding, and to capture teacher's uncensored response. It might be argued that this is consistent with peer assessments of the sociometric status of their fellow students and that "sociometric status" or a more global response to individuals by their peers. If this is the case, it is interesting that sociometric status has been found to be a more reliable indicator of children who will face later life social, emotional, academic, and academic difficulties than other forms of assessment such as observational studies (Parker and Asher, 1987).

Teacher assessments of student behavior was collected anonymously for all students within a classroom. In addition, each teacher completed a teacher information survey that provided information about teacher and classroom characteristics. These surveys were also coded, guaranteeing teacher's responses would remain anonymous and private. Care was also taken to address issues of concern regarding survey information (Edelbrock, 1983): 1) Survey completion was requested during the spring of the school term, allowing ample opportunity for teachers to be familiar with their students; 2) No first year teachers were included in the study; 3) Teachers were provided anonymity in their responses; and 4) All teacher respondents were given similar instructions and time frames within which to complete the surveys.

**Pre- and post test.** Kindergarten and third grade students who were not exposed to the mixed-age condition provided a cohort control group for this study. A pretest of social behavior was provided by teacher ratings of kindergarten children, all of whom were same-age grouped. Children's choice for mixed- or same-age classes for the following year were obtained subsequent to the teacher

ratings. Follow-up teacher ratings were taken of third grade children, some of whom had experienced a mixed-age classroom during their previous two years.

**Parent background assessment.** An additional consideration when trying to tease out the effects of mixed- versus same-age grouping on children's social behavior is selection bias based on parent characteristics and preferences. Because assignment to mixed- or same-age class configuration is most often offered as a choice to parents, a pilot study (Kinsey, 1996) was conducted to investigate possible biases in this choice. Using a two tiered approach to data collection, subjects (parents of children in mixed- and same-age classrooms) were asked to complete an anonymous questionnaire requesting information on family socio-economic and literacy contexts. On the basis of the questionnaire data, volunteers were selected to participate in a 30 minute semi-structured interview session. Forty six questionnaires were completed. Eight thirty minute interviews were conducted. A two-tailed t-test was used to analyze questionnaire data. Results from both survey and interview data indicated that there were no significant differences between families who chose mixed-age or same-age classroom placements, when considering the variables of home literacy environments, parental age, and educational/occupational level.

**Data analysis and control variables.** This was an investigation rather than an experimental study, although to a certain extent conditions existed that contributed to randomized conditions. For example, the vast majority of the students between 1<sup>st</sup> and 5<sup>th</sup> grade at School C were rated by teachers. All of these students participated in mixed-age grouped classes. Of the classrooms that participated at School D, which included students between 1<sup>st</sup> and 5<sup>th</sup> grades, all children within each classroom were rated by teachers. These students all belonged to same-age classes. All students between kindergarten and 3<sup>rd</sup> grade at school B were rated by their teachers. Thus teachers, with the exception of school A, where participation was optional, gave their full participation or close to it for students between 1<sup>st</sup> and 5<sup>th</sup> grade. When school A was eliminated from the data, no differences were found in the direction and magnitude of the predictive effects of the data analysis.

Multiple Regression Analysis was used to both acknowledge the complexity of "real world" classrooms and the difficulty of controlling for or partialing out potentially hundreds of confounding variables in pre-existing classrooms. Numerous potentially confounding predictive variables were controlled for or partialled out. These variables include the child's sex, race, and age; teacher age, teacher's years of experience; classroom parameters such as the number of activities and materials offered on a weekly basis, and the frequency of children's opportunity to work individually or in small groups.

## **Results**

In an extensive review of the research few studies investigating mixed versus same-age grouping were found that used random assignment to groups. In addition, a lack of information about similarities or differences in curricular and organizational structure is problematic in evaluating mixed-age-grouping versus same-age grouping as predictive of social or other outcomes (Veenman, 1995). Care was therefore taken in the current investigation to identify schools that were similar in their general orientation. Teachers that were not at least in their second year of teaching were eliminated from the study. Site visits by university researchers were conducted to determine if participating schools and classrooms using mixed- or same-age grouping were adequately similar for inclusion in the study. It is with a fair degree of confidence that we suggest that results of the research represent an adequate appraisal of a contemporary mixed-age model of education.

Additional precautions were also taken to partial out competing or confounding effects of the mixed-age-versus same-age conditions that have not been taken into account in past research when evaluating the effects of mixed-age versus same-age classrooms on children's academic, intellectual, or social behaviors. An attempt was made to further partial out the effects of the many variables that might be related to a similar philosophy of teaching within or across schools and might therefore be confounded with the effects of same- versus mixed-age grouping.

**Pretest.** We obtained teacher ratings of 159 children's social behavior in kindergarten. No differences in kindergarten students (who were all in single-age kindergarten classrooms) were found between those students subsequently assigned to same-age or mixed-age classrooms.

**Significant Predictive Variables.** Control variables were based on those variables that have been found to be related to classroom differences (Oden & Ramsey, 1993), individual, family and community variables such as SES, and the child's sex (Maccoby, 1992), or informal information obtained from elementary school teachers about the kinds of things that effect children's social behavior. Supporting the reliability of the current study, those predictive variables found in past research to be associated with child behavior were, for the most part, consistent with current findings.

Consistent with Nye (1995), no significant differences were found between teacher variables in same- versus mixed-age classrooms. Nor, for the most part, were teacher experience, age, or educational level related to children's social behaviors. Of the 12 variables noted in Table 1, the three predictive variables that are highly significant across all four dependent variables (prosocial behavior, friendship behavior, negative behavior, and negative/anti-social behavior) are the child's sex, the class size, and the grouping condition (mixed-age or same-age). The effect sizes are quite moderate but still exceed the effect sizes in most other categories by a large margin.

Consistent with past research (Maccoby, 1992), the child's sex was found to be significantly predictive of social behavior with females rated as significantly more prosocial, and boy's judged as more aggressive and negative in their social behavior. In addition, Tanner and Decotis (1995) found gender differences between boys and girls in attitude toward school with girls demonstrating more positive attitudes towards school and school subjects than boys. These differences held in our study irrespective of participation in mixed- or same-age groups. Educational research has shown that girls generally have a more positive attitude toward school, particularly during the primary years (Tanner & Decotis, 1995). It is possible that attitudes may impact on social behavior. These findings are consistent with the current study that suggests gender is, like inclusion in a mixed-age or same-age group, moderately predictive of children's social behavior.

**Mixed-age grouping versus same-age grouping.** As discussed above, the significance of the effect of the mixed- versus same-age grouping was substantial and exceeded all other variables if significance alone is evaluated (see Table 1). Although effect size (see Table 1) was moderate, only the child's sex was more predictive of social behavior across dependent variables (aggression, etc.) than was the child's participation in a mixed- or same-age classroom. In interpreting Table 1 it is important to note that mixed-age was coded 1, and same-age was coded 2. In addition, the dependent variables (child behaviors) rated by the teachers were coded from "Never = 1" to Very Often = 4 using a Likert scale. Because the scale for all items runs in the same direction, results must be interpreted carefully. For example item number 4 "Has friends in Class" runs from Never (#1) to Very Often (#4). However, Item # 6 "Physically aggressive with other children," also runs in the same direction, from Never (#1) to Very Often (#4). Therefore, the direction of the effect size for child behavior scales is critical when interpreting the results of the findings. Predictive variables were coded as noted in Figure 1 and are also important when interpreting the relationship between predictive and dependent variables.

Briefly, mixed-age grouping is highly significant ( $P < .0000$ ) in predicting increased levels of children's Prosocial Behavior ( $p < .0000$ ) and Friendship Behavior ( $p < .01$ ). Mixed-age grouped classrooms are also highly significant ( $p < .0000$ ) in predicting reduced levels of Negative and Aggressive behaviors among classroom children (see Table 2).

Table 1

**First Through Fifth Grade Students: Summary Table of Standardized Regression Coefficients Across Dependent Variables**

		Dependent Variables			
		b Prosocial Behavior	b Friendship Behavior	b Aggressive Behavior	b Negative Behavior
Predictive Variables					
Child/family Related	child's sex	.26****	.08*	-.27****	-.24****
	ethnicity	.13**	.11*	-.10*	-.07
	child's age	.15**	.06	.17**	.27****
	SES	.11	.07	-.22**	-.24**
Teacher Related	teacher's age	.06	.07	-.003	.06
	teacher's experience	.008	.12	-.10	-.08
	teacher's ed. level	.02	.07	-.003	-.11*
Classroom Related	class size	.23****	.19***	-.22****	-.15**
	staff num. in class	.14**	-.11	.08	.07
	time spent in groups	-.21****	-.25****	.05	-.09
	choice of activity	.07	.20**	-.13*	-.07
	<b>GROUPING: MIXED (code 1) SAME code 2)</b>	<b>-.21****</b>	<b>-.14**</b>	<b>.20****</b>	<b>.26****</b>

n = 649 \* p < .05, \*\*p < .01, \*\*\*p < .001, \*\*\*\*p < .000, \*\*\*\*\*p < .0000

Table 2

**Means of Prosocial, Friendship, Negative, and Aggressive Behavior for First through Fifth Grade Students in Same-age and Mixed-age Classrooms**

Scale	Mixed-age Mean (SD)	Same-age Mean (SD)
Prosocial Behavior	2.68 (.74)	2.22 ** (.68)
Friendship Behavior	3.20 (.72)	3.00 * (.74)
Negative Behavior	1.76 (.61)	1.89 ** (.66)
Aggressive Behavior	1.57 (.67)	1.67 ** (.78)

N = 649 Children from 1st through 5th grade  
 n(Same-Age) = 334 Students  
 n(Mixed-Age) = 315 Students

\* p < .01  
 \*\* p < .0000

**Interaction Effects.** The strength of the differences in predictive power between boys and girls suggests that this is an area where it is particularly important to note potential interactive effects between the participation of girls and boys in mixed- versus same-age groupings. No interaction effects were found indicating that the mixed-age classroom is equally beneficial to boys and girls in terms of reduced aggression and negative behavior, and increased prosocial and friendship/peer acceptance behaviors. Nor were interaction effects found in socio-economic-status, ethnicity, or class size.

**3<sup>rd</sup> Grade Results.** In 3<sup>rd</sup> grade all classes at school B became same-age classes. As noted, greater aggression was significant for children who had formally participated in same age classes versus children who had participated in mixed age first through second grade classes ( $p = .02$ , see Table 3). Negative Behavior approached significance. Differences in prosocial and friendship behaviors were not significant, but were in the direction of previous findings supporting the mixed-age condition. The carry over of reduced aggression for children who moved from a mixed-age to a same-age experience is interesting because of research which demonstrates that increased aggression is one of the most stable and predictive variables for later life difficulties (Parker & Asher, 1987). In addition to possible long term consequences, the importance of short term benefits in classroom variables should not be considered inconsequential. As Forman (1996, Reggio Emilia electronic discussion group) notes, long term effects are not necessarily a reliable measure of the merits of a particular teaching method. "If we refine our attention to the form of improved performance then we can support methods that render these forms. Every child has a right to be competent within and in terms of the current month. If we pay close attention to the months, the years will take care of themselves."

**Table 3**

**Means of Prosocial, Friendship, Negative, and Aggressive Behavior for Third Grade Students after Same-age or Mixed-age Classroom in First and Second Grade**

Scale	Mixed-Age Mean (SD)	Same-Age Mean (SD)
Prosocial Behavior	2.36 (.74)	2.12 (.70)
Friendship Behavior	3.00 (.92)	2.95 (.86)
Negative Behavior	1.85 (.61)	1.92 (.58)
Aggressive Behavior	1.47 (.64)	1.65 * (.64)

N = 117 Third Grade Students  
 n(Same-Age) = 99 Students  
 n(Mixed-Age) = 18 Students

\* p = .02

**Discussion**

Oden & Ramsey (1993) note that the usefulness of research into children's social competence is often compromised because researchers, in an attempt to design carefully controlled studies that eliminate confounding variables in contrived random assignment situations, lose ecological validity. Such research may prove significant and provide a sizable effect size but provide little information about the effect size variable of interest when it is related to hundreds of other variables that are at play in a typical classroom, community, and family. We cannot control for or change the numerous genetic and environmental social characteristics that a child brings to the classroom. But we can begin to identify those variables in the classroom - through investigations in real classroom as well as experimental, observational studies - that have unique as well as cumulative effects on children's social behavior and development

We have learned a lot in the last dozen years or so about individual differences in children's social acceptance by peers but we know far less about the classroom contexts that effect children's behavior and acceptance in classroom settings. A large portion of the research that concerns itself with children's social development has focused on the role of the individual child's behavior as a major factor in his or her status as accepted, rejected, or neglected by peers (Oden & Ramsey, 1993). Less attention has been paid to the possibility that the kinds of environments that are created for children may impact on their social behavior (i.e. aggressive behavior, prosocial behavior, etc.) with their peers and may influence levels of rejection or neglect by peers. It may be that environmental factors such as the inclusion of relatively large numbers of children of the same age in one group, vying with one another for a place in the classroom community, exacerbates the very social deficits in children that we then attempt to measure and/or ameliorate.

The presence (Kagan, Reznick, & Gibbons, 1989) and tenacity (Coie & Kupersmidt, 1983) of individual differences in social skill and acceptance, and subsequent skill training have been documented and is not disputed. Rather, the issue of interest in this study is what kinds of social environments encourage, in our classroom communities, the growth and, where necessary, remediation of children's social skills. Specifically, the question of interest in this study has been if the way children are grouped (whether they are grouped homogeneously or heterogeneously) potentially contributes to children's social behavior for better or worse.

Although there are clearly limitations to this study, we believe the direction of the data and questions raised warrant further study. Specifically the data suggests that participation in a mixed-age classroom does predict that children's behavior will be more prosocial, more grounded in friendship and acceptance by peers, and less fraught with aggression and negative behavior than does a same-age classroom..

Although parent and child pre-tests at kindergarten indicated no significant differences in social behavior, children who participated at 1<sup>st</sup> - 5<sup>th</sup> grade in same- versus mixed-age groups were not assigned randomly to mixed- versus same-age classrooms. Nor were teachers. Various teacher and classroom variables were controlled for statistically, to minimize these differences, but the complexity of all that goes into determining whether a teacher will choose to teach in a mixed- or same-age classroom is, in all likelihood, more complex than those variables we were able to control for. Future research might explore the random assignment of teachers (trained in both approaches) to a mixed- or same age context.

Many other questions have yet to be explored. For example, are there age spans (two, three, four years?) that are most beneficial to the social development of children in a mixed-age classroom (Katz, et al., 1990). Do children in mixed-age groups need to be taught particular skills for functioning in this kind of environment? Fuchs, et, al, (1996) offers evidence that children who are specifically trained in facilitating the learning of others (rather than lecturing their younger peers for example) are more effective in bringing about cognitive growth in the process of helping children solve an intellectual (or presumably social) problem.

Mixed-age grouping is not a magic bullet. Nor is it a technique we recommend that teachers used without consideration to complementary teaching and learning strategies. Rather it is an approach that teachers interested in innovation come to see as a part of an evolving sense of the many characteristics (cooperative learning, the project approach, learning centers and a decentralized classroom, for example) that contribute to educational environments they believe are most beneficial for children's intellectual, academic, physical, dispositional, social, and emotional development. Many questions remain to be explored as we attempt to maximize the benefits of the mixed-age classroom among a constellation of complementary approaches to children's learning.

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**Figure 1. Coding System For Predictive Variables**

**Mixed or Same Age Grouping**

- 1 mixed
- 2 same

**Child's Ethnicity**

- 1 minority
- 2 white

**Socio-Economic Status**

- 1 low income
- 2 middle income

**Child's Sex**

- 1 male
- 2 female

**Child has Choice in Activity**

- 1 frequently
- 2 sometimes
- 3 not usually
- 4 no

**Num. Children in Class**

On a of Continuum of 20 - 29

**Activities Available in Class on a Weekly Basis**

- 1 1-4
- 2 5-8
- 3 9-12
- 4 12

**Frequency of Opportunities to Work in Small Groups/Per Week**

- 1 frequently
- 2 often
- 3 sometimes
- 4 never

**Grade**

- 1 1st
- 2 2nd
- 3 3rd
- 4 4th
- 5 5th

**Staff Number/Class**

- 1 1
- 2 2

**Num. of Years Teacher has Taught  
On a Continuum**

**Teacher's Degree**

- 1 BA
- 2 BA+
- 3 MA
- 4 MA+

**Teacher's Age**

- 1 22-30
- 2 31-45
- 3 46-55
- 4 56+

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