THE EFFECTS OF MULTI-AGE GROUPING AND SINGLE-GRADE GROUPING ON THE SELF-CONCEPT OF SECOND GRADE CHILDREN

THESIS

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Chapter I

Statement of the Problem

Purpose

The purpose of this study was to investigate the effects of multi-age grouping on the self-concept of second grade children.

Need for the Study

How we perceive ourselves is an important issue in everyday life, regardless of one's age. According to Curry and Johnson (1990), how one feels about the self is a life-long developmental process. Although there are a number of issues involved in the development of self-esteem, including acceptance, power and control, moral virtue, and competence, the latter may be of the greatest importance in school-age children (Curry & Johnson, 1990). "How children feel about themselves is integrally tied to their physical, social, moral, emotional, cognitive, and personality development" (Curry & Johnson, 1990, p. 5). It is well documented that a healthy self-concept is positively related to achievement and sociometric, or peer, status (Ahlbrand & Doyle, 1976).

Curry and Johnson (1990) state that children's self-esteem develops through experience, language, and interaction with adults and peers. Positive feelings about oneself provide the "confidence, energy and optimism to master life's tasks" (p. 3), and positive self-esteem is promoted by positive self-experiences. In order for children to encounter positive self-experiences, they "should not be in an environment where they persistently experience themselves as failing, unaccepted, powerless or bad" (Curry & Johnson, 1990. p. 157). Might traditional single-grade groupings promote this type of environment?

In the primary school years, children increasingly compare and evaluate themselves in terms of how they measure up to others, particularly in academic tasks (Curry & Johnson, 1990). This brings a risk of inferiority, according to Curry and Johnson. Would this concept of inferiority within children be promoted more readily in the traditional single-grade groupings?

Decisions on how to group children in order to provide optimum academic growth have long been a part of educational history. Schools not only have an obligation to provide an environment conducive to the academic growth of children, but also an obligation to provide an environment conducive to the social-emotional growth of children. According to Ahlbrand and

Doyle (1976), schools must be "sensitive to how the child sees himself in relationship to significant others in the immediate environment in which he must operate" (p. 494).

This study intends to investigate the relationship between self-esteem and classroom groupings, single-grade and multi-age, in urban second grade children.

Null Hypothesis

There will be no statistically significant difference between the self-concept scores of second grade children learning in a first/second grade multi-age classroom and second grade children learning in a single-grade classroom.

Definitions

Multi-age grouping: A method of school organization which deliberately places children of different ages together in the same class (Mycock, 1972). An arrangement in which children of various ages, abilities, and interests are put together in a learning situation (Stehney, 1970). As multi-age grouping advocates, children generally remain with the same teacher for two to three years. Multi-age grouping is also referred to as mixed-age grouping, multi-

grade grouping, family grouping, and vertical grouping.

Single-grade grouping: A method of school organization which places children into a classroom group containing one specific grade level, generally having a limited age span.

Self-concept: "How the self interprets self-related events in terms of beliefs, concepts, expectancies, and attitudes about the self" (Curry & Johnson, 1990, p. 7).

Limitations of the Study

The size of the sample for this study was relatively small (N=48) due to the fact that it is uncommon for both multi-age classrooms and single-grade classrooms to be found within the same school. The researcher felt it essential that all the subjects attended the designated school, so that all participating teachers shared common philosophies of early childhood education.

A further limitation lies in measuring self-concepts. It was difficult to determine the influence that outside factors, such as children's home situations, might have had on self-concept assessment.

Chapter II

Review of the Literature

Self-Concept Development

Self-concept formation should be viewed as a dynamic, life-long, developmental process. According to Curry and Johnson (1990), youngster's actual self and their concept of this self work together in children's developing personalities. A child's behavior is influenced by his actual self; the physical, psychological, emotional, temperamental, and social characteristics, which in turn affects how others respond to him, which consequently influences how that child conceives of himself. Children's physical, social, moral, emotional, cognitive, and personality development are influenced by how children think and feel about themselves (Curry & Johnson, 1990).

Interactions with others and the environment assist in shaping and reshaping how a child feels about him/herself. School-age children are evaluating themselves according to new standards, which marks a major turning point in their lives. As well, realization that there are different levels of abilities and achievement is surfacing in school-age children.

As primary school-age children exhibit a wide range of developmental levels, many school systems attempt to make children fit the system instead of revising behavioral expectations and curriculum to address expected variations in developmental levels. According to Curry & Johnson, this practice can be detrimental to a child's self-concept.

Multi-Age Grouping

According to Pratt (1983), the modern pattern of age segregation in schools was established in America in the nineteenth century. By 1900, a uniform school entry age was established, as well as the regular practice of progressing through grades on the basis of age (Pratt, 1983).

Pratt (1983) suggests that attempts to reform curriculum or implement alternative forms of instruction are constrained by the requirement that students must learn in homogeneous age groups. Connell (1987) points out that the current "lock-step" educational system prescribes each child to learn the same curriculum in the same amount of time. This system assumes that if some children have not progressed as expected, they have failed, rather than the system has failed to meet their needs.

Advocates feel that multi-age groupings provide a more

equitable system which allows for the developmental and individual differences among children. As multi-age groups resemble a family unit where there is a natural heterogeneity in age, advocates feel that in these groups it is not assumed that all children learn the same things at the same time in the same way, nor do multi-age groups assume that all children will function, perform or develop alike.

The National Association for the Education of Young Children (NAEYC, 1987) reported that rigid adherence to chronological age/grade groupings is inappropriate. It states that developmentally appropriate schools are flexible in how they group children. NAEYC points out that alternative groupings "provide a vehicle for preserving heterogeneous groups while also providing more time for children to develop at their own pace" (1987, p. 66). Katz, Evangelou, and Hartman (1990) quote the National Association of State Boards of Education's 1988 Task Force report recommending that "early childhood units be established in elementary school, to provide a new pedagogy for working with children ages 4 to 8" (1988, p. vii).

Social-Emotional Aspects of Multi-Age Grouping

Pratt's (1983) summary of twenty-seven empirical studies in multi-age grouping concludes that multi-age grouping has a benign effect on social and emotional development; that is, multi-age groups promote increased harmony and nurturance whereas same-age groups create increased competition and aggression. Day and Brice (1977) found significant differences, favoring multi-age groupings over single-grade groupings, among various classroom arrangements in dimensions of classroom behavior. The Classroom Behavior Inventory assessed the task orientation, distractibility, introversion, hostility, and consideration in each classroom arrangement.

A study was conducted by Way (1979) concerning the verbal interaction among children in multi-age classrooms. Similar to Day and Brice, Way observed that children in multi-age groupings were willing to help one another; observing that "children of any age feel comfortable giving help in areas in which they have expertise to children of any age in the classroom" (p. 185).

In a 1983 study of teaching behaviors of 9- and 11- year-old girls in mixed-age and same-age groups, Ludeke and Hartup found that, although the behaviors of the tutees did not vary, the behaviors of the tutors varied among the two types of groups.

When assisting younger students, the tutors were more likely to use supportive feedback, praise, and instruction than when assisting same-age students. Brody, Stoneman, and MacKinnon (1982) also established that children are more likely to exhibit prosocial behavior to younger peers than to same-age peers. Similarly, a 1986 study by French, Waas, Stright and Baker revealed that the context of multi-age groupings enhance the practice of appropriate social skills as well as leadership skills, as the leadership behaviors exhibited by the older children were those that facilitated group processes.

Katz, Evangelou and Hartman (1990) refers to an unpublished review of research by Lougee and Graziano (1986) focusing on non-agemate peer relationships. Lougee and Graziano found that children's self-regulation appears to improve when they are placed in a position to remind younger children of the rules. The review suggests that children in multi-age situations may act as rule "enforcers", strengthening their own ability to obey rules and self-control.

Graziano, French, Brownell and Hartup (1976) involved first and third graders in their study of peer interaction in mixed-age and single-age groups, in which social competence was assessed through a cooperative task. Researchers found that children in the mixed-age groups demonstrated a greater awareness of the task, and that the older children in the group

demonstrated more initiative and assumption of responsibility for completing the task. Graziano et al. revealed that children's sense of responsibility is enhanced as they perceive themselves as more proficient.

NAEYC (1987) states that the development of a sense of competence in children is the major social-emotional developmental task of the early school years. Children begin to understand the limits of their own abilities as they get older, and become more aware of social comparison. As children compare themselves to others favorably and unfavorably, this information becomes a part of the self-concept. NAEYC refers to Hills (1986) and points out that relying on competition and comparison among children hastens their own social comparison, lessening children's optimism about school and their abilities, stifling motivation to learn.

The results of Milburn's (1981) five year study supports this idea. In an experimental school of multi-age classes, children of all ages had a more positive attitude toward school then did the children in traditional grade-level groups. Greater than 50% of the children in the control school disliked school work and thought school was boring, compared to 20% of the experimental school who disliked schoolwork, and less than 10% of the experimental school who thought school was boring.

Furman, Rahe, and Hartup (1979) observed that socially

withdrawn preschool children who participated in multi-age groups, made the greatest gains in sociability when paired with younger peers. The socially withdrawn older children were able to build confidence, interactive skills, and leadership skills, when interacting with younger less socially mature peers in an accepting social environment.

Anxiety in children was investigated by Papay, Costello, Hedl, and Spielberger (1974). The study compared the effects of both trait and state anxiety on the performance of elementary school children in traditional classrooms and individualized multi-age classrooms. State anxiety is the "tension, nervousness, worry, and apprehension that is a result of a stressful situation at a given moment" (p. 155), and trait anxiety refers to "the general anxiety-proneness of an individual" (p. 155). The results of this study indicate that children in multi-age classrooms had significantly less trait anxiety than children in traditional classrooms. Although the first year children in the multi-age groups did not differ from the traditionally grouped children in state anxiety, second year children in multi-age groups had significantly less state anxiety than did second year children in traditional groups.

In the area of self-concept, Pratt (1983) reported that of the twenty-seven studies reviewed, multi-age grouping tended to be associated with better self-concept; none of the studies found

a consistent negative relationship in this area.

Milburn (1981) conducted an extended five-year study to discover what children actually gain from placement in a multi-age classroom. The study involved an experimental school with five multi-age classrooms, and a control school where children were assigned to specific, sequential grade levels. Milburn used the Piers-Harris Children's Self-Concept Scale to compare students in the two schools in the area of self-concept. A comparative analysis of the mean scores on the Piers-Harris revealed a trend towards children in the multi-age classrooms having better self-concepts than their same-age counterparts in the single-grade classrooms, although the analysis demonstrated no statistically significant difference.

Schrankler (1976) assessed the effects of multi-age grouping on children ages five to twelve. Subjects were in three distinct groups: a 'complete' multi-age group with children ages five through twelve, a 'restricted' multi-age group of children with a two or three year age span, and a control group of children in traditional single-grade classrooms. The instrument utilized, the Instructional Objectives Exchange: Measures of Self-Concept, reflected significantly higher scores for children in the multi-age groups in all but one subtest of self-concept. The subtests in which the multi-age groups scored significantly higher evaluated the areas of General Self-Appraisal,

Peer Self-Appraisal, Scholastic Self-Appraisal, Parental Approval, and How About You? which assessed the child's concept of success in school or as a person who has ability. The area of self-concept in which the single-grade group had superior results was What Would You Do?, a measurement of expectations of acceptance and success.

Junell (1970) investigated the effects of multi-age grouping on noncognitive variables. The sample consisted of junior high students formerly in multi-age and single-grade elementary schools. Although results favoring the multi-age group approached significance, Bill's Index of Adjustment and Values revealed no significant differences between the two groups of students in the area of self-concept, contrary to the findings of Milburn (1981) and Schrankler (1976).

Kohler (1972) and Ruedi and West (1972) reported results similar to those found by Junell (1970). Both studies found little evidence of any differences in the self-concepts of children in traditional classrooms and open classrooms. In contrast, Wilson and Langeuin (1972) found that pupils in open classrooms had better attitudes toward school and toward self than pupils in traditional classrooms.

Day and Brice (1977) sought to evaluate multi-age groupings and self-contained single-grade classrooms in various areas. One area investigated was self-concept development,

using the Piers-Harris Self-Concept Scale for measurement. Among the classroom grouping arrangements, Day and Brice found no significant differences in the area of self-concept between males and females in individual classrooms or among the classroom arrangements. As well, the data also revealed no significant differences among children of low, middle or high socioeconomic groups in the various settings. Finally, Day and Brice reported no significant differences between the self-concepts of low-achieving subjects and high-achieving subjects in the various classroom arrangements.

Contradictory to the findings of Day and Brice (1977), Katz (1990) reports that multi-age groupings can be particularly advantageous for low-achieving children performing below their age-group norms. Rosenholtz and Simpson's (1984) definition of "multidimensional" classrooms and "unidimensional" classrooms may offer an explanation as to why a multi-age group may be preferable for children performing below age-group norms. Rosenholtz and Simpson define "multidimensional" as those classrooms in which a wide variety of performances are valued and accepted. On the other hand, "unidimensional" classrooms are defined as those in which there is a narrow definition of academic ability and academic work, with a limited range of performance criteria. Descriptions of multi-age classrooms seem to reflect a multidimensional appearance. As

stated in Katz, Kim (1989) reports that children performing below their age group norms "might find it less stressful to interact with younger peers in areas where they lag behind their agemates, thus enhancing their motivation and self-confidence" (p. 7).

Chapter III

Design of the Study

Purpose

The purpose of this study was to investigate the effects of multi-age grouping on the self-concept of second grade children.

Null Hypothesis

There will be no statistically significant difference between the self-concept scores of second grade children learning in a first/second grade multi-age classroom and second grade children learning in a single-grade classroom.

Methodology

Subjects

This study involved forty-eight second grade students attending a public, inner city, early childhood center, grades pre-k through three.

Twenty-three of the subjects were students from a single-grade second grade classroom. Twenty-five of the subjects were students in a first/second grade multi-age classroom.

Instrument

The Child Rating Scale (CRS), developed by the Primary Mental Health Project, Inc. (Rochester, New York), was utilized in this study to assess the perceptions a child has regarding his/her functioning within a school setting.

The Child Rating Scale (CRS) was developed using thousands of first through sixth grade children of diverse racial and ethnic backgrounds from urban, suburban, and rural schools in New York, Pennsylvania and Florida. The Child Rating Scale alpha reliabilities for 1987-1988 samples (N = 1,632) range from .80 to .84.

The CRS follows either group or individual administration procedures, and involves four subscales as well as a Total summary score.

Hightower, Spinell, and Lotyczewski (1990) outline the scales as follows: Subscale1 - Rule Compliance/Acting Out which "assesses a child's perceptions of his/her conduct with regard to following typically established school and classroom rules" (p. 21), Subscale 2 - Anxiety/Withdrawal which "measures a child's perceptions of his/her internal reactions to distress" (p. 21), Subscale 3 - Peer Social Skills which "assesses a child's perceptions of his/her interpersonal functioning and confidence in dealing with peers" (p. 21), Subscale 4 - School Interest

which "measures a child's perceptions of and interest in school related activities" (p. 21).

Procedure

Second grade students were designated as subjects according to their second grade placement in multi-age classrooms and single-grade classrooms.

The subjects involved in multi-age grouping for grade two were administered the Child Rating Scale. The subjects involved in single-grade grouping for grade two also were administered the Child Rating Scale. Administration of the instrument, by the researcher, occurred in March, and was completed in small groups of no more than five children.

Analysis of Data

Scores on the Child Rating Scale from both the multi-age group and the single-grade group were statistically compared. Children's responses were grouped into four empirically derived subscales; Rule Compliance/Acting Out, Anxiety/Withdrawal, Peer Social Skills, and School Interest.

Summary

Forty-eight second grade subjects are students in either a single-grade grouping or a multi-age grouping. In the seventh month of second grade, the self-concept of each of the forty-eight students was assessed using the Child Rating Scale. The scores on the CRS from both the multi-age group and the single-grade group were statistically compared.

Chapter IV

Analysis of Data

Purpose

The purpose of this study was to investigate the effects of multi-age grouping on the self-concept of second grade children.

Findings and Interpretations

Null Hypothesis: There will be no statistically significant difference between the self-concept scores of second grade children learning in a first/second grade multi-age classroom and second grade children learning in a single-grade classroom.

Children's responses from the Child Rating Scale were grouped into four empirically derived subscales; Rule Compliance/Acting Out, Anxiety/Withdrawal, Peer Social Skills, and School Interest. The mean scores were calculated for each of the four subscales from both the multi-age group and the single-grade group. The results are shown in Table 1.

Table 1

Mean Score Comparison Between Self-Concept Subscale Scores of Second Graders in Multi-age and Single-grade Classrooms

	Multi-age	Single-grade
Rules	Mean = 16.40 SD = 2.14	Mean = 15.65 SD = 1.85
Anxiety	Mean = 9.48 SD = 2.14	Mean = 9.48 SD = 2.71
Social	Mean = 15.88 SD = 1.59	Mean = 14.91 SD = 2.39
Interest	Mean = 16.00 SD = 2.29	Mean = 14.70 SD = 2.60

An independent t-test was used to compare the means from the multi-age group and the single-grade group for each of the four subscales. Results are shown in Table 2.

Table 2

Independent t-Test Results for Multi-age and Single-Grade Classrooms on Self-Concept Subscale Scores

	Calculated t
Rules	t = 1.29
Anxiety	t = 0.00
Social	t = 1.66
Interest	t = 1.85

Critical t (alpha = .05, df = 46) = 2.01

The critical value of t at the 95% confidence level and 46 degrees of freedom was 2.01. The researcher failed to reject the null hypothesis for all of the four subscales, as each of the calculated t scores was less than the critical value of t.

Chapter V

Conclusions and Implications

Purpose

The purpose of this study was to investigate the effects of multi-age grouping on the self-concept of second grade children.

Conclusions

The researcher observed that the mean scores calculated for each of the four subscales; Rule Compliance/Acting Out, Anxiety/Withdrawal, Peer Social Skills, and School Interest, from both the multi-age group and the single-grade group were similar.

The independent t-test analysis of these scores revealed that there was no statistically significant difference between the self-concept of the second graders in the multi-age or single-grade group on any of the four subscales.

Therefore, the researcher could not conclude that placement in a multi-age or single-grade classroom significantly impacts the self-concept development of second grade children in the areas rule compliance, anxiety, peer social skills, and school interest.

Although there was no significant difference between the subjects in the multi-age and single-grade groups in these four areas, the researcher acknowledges that the instrument used in this study did not measure the academic self-concept of students. That is, how children assess their own academic ability.

The researcher feels that this area may have revealed a significant difference between the two groups with a higher mean score from the multi-age group. This hypothesis stems from Curry and Johnson's (1990) research that states that in the primary school years, children increasingly compare and evaluate themselves in terms of how they measure up to others. The second graders in a single-grade classroom are evaluating themselves against others who are in the same grade and age group. The second graders in a first/second grade multi-age may not compare themselves as readily to others since a wide range of ages and abilities is expected.

The researcher felt it necessary to select subjects from the same school, where all participating teachers shared a common philosophy of early childhood education. It was evident through observation and interviews with the participating teachers, that the entire school, including each of the participating classrooms, believed that building self-esteem is the path to

successful learning. This similarity among the classrooms may have contributed to the negligible differences between the mean scores of the multi-age and single-grade groups.

Implications for Research

Further investigations could include the following:

1. Studies comparing groups of second grade children who had previous placements in only multi-age or single-grade classrooms.

2. Studies to further explore the academic self-concept of second grade children in multi-age and single-grade classrooms.

3. Studies comparing the self-concept of second grade children in first/second grade multi-age classrooms with second grade children in second/third grade multi-age classrooms.

4. Studies investigating the relationship between self-concept and academic performance.

5. Studies exploring the relationship between student's rating of their self-concept and teacher's rating of the perceived self-concept of the same students.

6. Studies comparing the self-concept of the lower achieving second graders in a first/second grade multi-age classroom with the lower achieving second graders in a single-grade classroom.

References

Ahlbrand, W. P., & Doyle, W. J. (1976). Classroom grouping and sociometric status. The Elementary School Journal, 79(8), 493-499.

BredeKamp, S. (Ed.). (1987). Developmentally appropriate practice in early childhood programs serving children from birth through age 8. Washington, DC: National Association for the Education of Young Children.

Brody, G. H., Stoneman, Z., & MacKinnon, C. E. (1982). Role asymmetries in interaction among school aged children, their younger siblings, and their friends. Child Development, 53, 1364-1370.

Connell, D. R. (1987, July). The first 30 years were the fairest: Notes from the kindergarten and ungraded primary (K-1-2). Young Children, 42(5), 30-39.

Curry, N. E., & Johnson, C. J. (1990). Beyond self-esteem: Developing a genuine sense of human value. Washington, DC: National Association for the Education of Young Children.

Day, B., & Brice, R. (1977). Academic achievement, self-concept development, and behavior patterns of six-year old children in open classrooms. The Elementary School Journal, 78(2), 135-139.

French, D. C., Waas, G. A., Stright, A. L., & Baker, J. A. (1986). Leadership asymmetries in mixed-age children's groups. Child Development, 50, 915-922.

Furman, W., Rahe, D. F., & Hartup, W. W. (1979). Rehabilitation of socially withdrawn preschool children through mixed-age and same-age socialization. Child Development, 50, 915-922.

Graziano, W. G., French, D., Brownell, C. A., & Hartup, W. (1976). Peer interaction in same-age and mixed-age triads in relation to chronological age and incentive condition. Child Development, 47, 707-714.

Hightower, A. D., Cowen, E. L., Spinell, A. P., Lotyczewski, B. S., Guare, J. C., Rohrbeck, C. A., & Brown, L. P. (1987). The Child Rating Scale: The development of a socioemotional self-rating scale for elementary school children. School Psychology Review, 16, 239-255.

Hightower, A. D., Cowen, E. L., Spinell, A. P., Lotyczewski, B. S. (1990). PMHP evaluation and forms. Primary Mental Health Project: Rochester, NY.

Hills, T. (1986). Classroom motivation: Helping students want to learn and achieve in school. Trenton: New Jersey Department of Education.

Junell, J. S. (1970). An analysis of the effects of multi-grading on a number of noncognitive variables. Doctoral dissertation, University of Washington, Seattle, WA.

Katz, L., Evangelou, D., & Hartman, A. (1990). The case for mixed-age grouping in early education. Washington, DC: National Association for the Education of Young Children.

Kim, S. H. (1989). Effect of mixed age interaction on "at risk" children. Unpublished paper, University of Illinois, Urbana, Il.

Kohler, P. T. (1972). A comparison of open and traditional education conditions that promote self-concept. (ERIC Document Reproduction Service No. ED 075 903)

Ludeke, R., & Hartup, W. (1983). Teaching behaviors of 9- and 11- year-old girls in mixed-age and same-age dyads. Journal of Educational Psychology. 75(6), 908-914.

Milburn, D. (1981). A study of multi-age or family-grouped classrooms. Phi Delta Kappan, 62, 513-514.

Mycock, M. A. (1972). Vertical grouping. In V. R. Rogers (Ed.), Teaching in the British Primary School, (pp. 34-59). New York: Macmillan.

Papay, J. P., Costello, R. J., Hedl, J. J., & Spielberger, C. D. (1975). Effects of trait and state anxiety on the performance of elementary school children in traditional and individualized multiage classrooms. Journal of Educational Psychology, 67, 840-846.

Pratt, D. (1983, April). Age segregation in schools. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Quebec, Canada. (ERIC Document Reproduction Service No. ED 231 038)

Reudi, J. & West, C. K. (1972). Pupil self-concept in an open school and in a traditional school. (ERIC Document Reproduction Service No. ED 066 217)

Rosenholtz, S. J. & Simpson, C. (1984). The formation of ability conceptions: Developmental trend or social construction? Review of Educational Research, 54(1), 31-63.

Shrankler, W. J. (1976). Family grouping and the affective domain. Elementary School Journal, 76, 432-439.

Stehney, V. A. (1970). Why multi-age grouping in the elementary school? National Elementary Principal, 49, 21-23.

Way, J. (1979). Verbal interaction in multiage classrooms. The Elementary School Journal, 79(3), 178-186.

Wilson, F. S. & Langeuin, R. (1972). Are pupils in the open plan school different? Journal of Educational Research, 66, 115-118.