Social Interaction in an Early Years Multi-age Mathematics Class

By

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SOCIAL INTERACTION IN AN EARLY YEARS MULTI-AGE MATHEMATICS CLASS

BY

DENISE MCWILLIAMS

A Thesis submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements for the degree of

MASTER OF EDUCATION

Abstract

Research into **children's leadership** abilities in **mixed-age** contexts may yield natural ways for educators to foster **prosocial** development. This **micro-ethnographic** study used observation and taped conversations during a ten week period to gather information about the interactions of twenty-four children, ranging in age from six to eight years. They met daily for a one hour mathematics class with the **teacher-researcher**. Analysis showed the oldest children to participate most in facilitation of group work, tutoring, decision-making, and encouraging of others. Some younger children also acted in similar fashion. All children consistently perceived the oldest ones as "leaders". The setting proved beneficial for the sociability of some individuals named as **isolates**.

Acknowledgements

This research is part of my studies for a Masters Degree in Educational Psychology at the University of Manitoba. It follows my interests in Early Years Education as have my other studies for this degree.

I gratefully acknowledge: Kelvin Siefert (my advisor) along with Wayne Serebrin and Paul Madak (my committee members) for their thoughtful advice and assistance; Kim Dobbin (my co-teacher) for her insights and help with daily details; Roberta Vyse (principal of Birds Hill School) and George Wall (superintendent of the River East School Division) for their aid and encouragement. Last, but not least, I would like to acknowledge the support of my husband, John, without which this work would not have been possible.

Preface

This research is of great personal interest to me. I have worked as a teacher of young children for many years and have long believed our system of grouping children into same-age grade levels can influence children in some ways which are negative. It might be argued that this is the most efficient way to group them for the purpose of educating them, but it can also be argued that over years of development the system has grown to consider grade levels to be norms against which to measure the children. This seems to me to be a reversal of educational values. Education ought to be made to fit children, not children made to fit the system's norms.

The multi-age math class, which was the context of this project, provided both a first-hand opportunity for the study of how an alternative arrangement might affect children and the impetus to research existing educational literature pertinent to this topic. It also provided opportunity for reflection on how the arrangement might affect some of my own practices in the classroom.

My primary interest here is the affective side of the children's development since it envelops cognitive learning, being either enhancing or impeding. I found these two 'sides' of learning were not truly separable but I have attempted to focus my discussion on the one. Both take place in the social world of the classroom involving the teacher, the children and children's peer groups. Both proceed together. My inquiry concerns social interaction, because of my beliefs about its importance in its own right and my beliefs about its importance in the realm of cognition. However, the impact of social interaction upon cognition is outside the realm of this study.

Since social development is a result of children's everyday activities within their life worlds (Corsaro, 1985; Hazen, Black, & Fleming-Johnson, 1984; Kemple, 1991; Moore, 1981), we know that young children learn social behaviors in school along with academics. They learn about cooperation, competition, recognition of their own competence, comparison of self to others, being successful, being unsuccessful. Routine practices in schools such as reading groups, testing procedures, stars on work are stratification processes. Stratification also occurs through the subtle differences in interactions. Children conduct themselves according to the perceptions they make during interactions. The processes of social acceptance and rejection can create and sustain socially organized success or failure in school (Cicourel, 1981). As children learn about success and failure, this can contribute to prosocial and/or antisocial behaviors in their interactions with their teachers and with their peers.

Peer interaction provides social problem solving, social reinforcement, and the development of interaction strategies (Hartup & Moore, 1990; Kemple, 1991; Rodgers & Doerre-Ross, 1986). We, as educators, need to study the social structures, the activities, and the interactions of children in their school environment (Corsaro, 1981; Corsaro, 1985; Mehan, 1978; Rodgers & Doerre-Ross, 1986). Through this we can come to better understand the process of social learning in order to provide children with good social learning experiences. With the exception of kindergarten perhaps, where the importance of social development has been recognized traditionally, the cognitive growth of the children is considered to be the prime goal in the school setting. This by itself presents a full workload for teachers. There seems little time to devote to the study of the pupils' social development, yet few would deny its importance.

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Chapter 1

Introduction

Perspectives Gained from Experience

My concern about the possible negative impact of the graded system originated at the time when I began to teach grade one fourteen years ago. My goal of accepting individual progress for each child has always seemed somewhat difficult to maintain in the conventionally graded classroom. Even though we as teachers choose to accommodate children's individual differences, there remains a concern about completing the graded curricula within the specified length of time because the child's next teacher might not work in the same way. There are also the existing constraints of grade level report cards to be completed (in a way that children have their successes acknowledged) and placement for the next year to consider. Early years teachers continue to face this dilemma. These concerns are communicated to the parents both explicitly and implicitly (or indeed the issues can be raised by the parents themselves) and experience shows that the same feelings of concern are communicated to individual children. Achievement is based on the comparative rates of progress within the classroom rather than on the progress of individuals. The standards are derived from grade level norms. This perspective can be damaging to self-concept and it can cause a sense of failure in some children at this very young age.

A second reason for my interest in multi-age grouping has stemmed from the fact that it has always appeared that some young children find it difficult to suddenly be part of a classroom group as large as twenty-five, at times competing for the attention of a single adult. They must also meet new academic challenges, negotiate large school buildings, survive the rush of the playground, and gain acceptance into new peer groups. Much of classroom management entails helping all twenty-five acquire the

same rules of conduct at the same time. Furthermore, in a setting where there is so much to learn, both academically and socially, some children experience unnecessary frustration at their loss of individual attention within a peer group which isn't able to help their adjustment to the situation because the peers, too, are busy coping with their own adjustments. Many school adjustment problems may have lasting effects (Ladd, 1990).

Appropriate social behavior in school could be learned from older children who have already had time to adapt to the classroom. Since early years teachers put much effort into welcoming each new class at the beginning of the school year and into organizing the behavior which they want to occur, the idea of planning this welcoming and this organization with those older children who are already a part of the class would make a good deal of sense. It would be positive for the older children because it would naturally generate a sense of caring for that younger group which would be entering. The new children who are more competitive might find it easier to accept guidance from older children than from same-age children.

Perspectives in the Literature

Children have been grouped into classes according to age for the past century and a half (Pratt, 1983). Pratt suggested that this was not a natural means of grouping children. Families and society at large provide a range of ages within which children can interact. Same-age grouping is a phenomena of the school. The practice has evolved to ease administrative problems and teachers' workloads (Gayfer, 1991; Pratt, 1983), not because it has been proven to help children. Serious study should be given to possible alternatives to the traditional grades as educators continuously strive to improve education.

One of the reasons such study is necessary arises from the recognition of the importance of school adjustment to social development. Recent theories about early school adjustment have suggested that the degree of adaptation is due to support from three main groups, parents, the teacher, and most importantly, peers (Ladd, 1990). Ladd recommends keeping already established friendships together, which is of course ideal, but he does not entertain the idea of groupings where there might exist some children who have deliberately prepared to welcome and befriend the newcomers.

As well, multi-age classes promise an environment which accepts the progress of learners as individuals. Though some research exists to support this statement (Ford, 1977), it is not plentiful, whereas research on grade-level achievement abounds. Though the statements in support of multi-age grouping have focused largely on possible benefits for the younger children, research has shown that when older children assume a teacher role, they often benefit even more (Allen, 1976).

Inherent Problems in the Graded System

Modifications in graded curricula have evolved over the years but not without being somewhat arbitrary. Five years after Sputnik, the American grade-two curriculum was combined with the grade-one curriculum without consideration given to children's developmental levels (Connell, 1987). Grade one content in the 1964 Stanford Achievement Test was dropped into kindergarten in the 1973 edition and then still lower in 1982, with the exception of math concepts which were moved back up three months in 1982 (Connell, 1987). Lilian Katz (1991) stated that the controversy over this downward shift of next-grade expectations prompted the 1986 publication of the position statement by the National Association for Young Children, recommending appropriate practices to be used in teaching children from birth through to the age of eight.

Textbook publishers have been quick to profit from trends in education and thus they exert influence on classroom curricula and practices (Connell, 1987). Experience has taught that many classroom teachers use their commercial guidebooks as their prime curricular sources, rather than using knowledge about child development and then answering the children's needs with methodological ideas from a variety of sources, including the commercial guidebooks.

Conventional wisdom has said that the youngest children in early years classes are more likely to have social and academic problems. "Youngness" has been offered by teachers and parents alike as an explanation for lack of learning and for behaviors which fall outside of grade level norms. This youngness problem is not, however, inevitable. In 1964, Jinks (cited in Shepard & Smith, 1986) found that British teachers praised the abilities of their older pupils who, had they been born in the United States would have been the youngest pupils because of different school entry dates. This paradox exists because of the current perspective on achievement which is measured through classroom comparison rather than through individual progress. Furthermore, the youngest grade one children lag only seven or eight percentile points behind the oldest and this distinction disappears by grade three for most normally developing children (Shepard & Smith, 1986).

Retention has been part of the graded system since its inception and is still in practice. Retention in the elementary school is most commonly seen in the early years. During discussions of the pros and cons of retention, it is not uncommon to hear that 'if a child is going to be retained, the earlier it happens, the easier it is for the child'. In a study of a school district in which the overall retention rates throughout grades kindergarten to twelve was 9.5%, the rates were: grade one, 11.55%; grade two, 6.6%; grade three, 4.6%; grade four, 4.4%; grade five, 5.8%; grade six, 1.6% (Byrnes & Yamamoto, 1984). The study itself focused on children who had been retained in the first grade because the authors believe that parents and teachers think

retention is less socially stigmatizing for younger children. (My personal experience bears out this belief.) Among the conclusions presented, the lack of either increased achievement or motivation raised obvious questions about the practice. The authors recommended exploration of some alternative to retention, though none was offered.

In their meta-analysis on retention, Holmes and Matthews (1984) concluded that children who repeat a grade do not make an amount of progress equal to low achieving children who receive what are called "social promotions". Furthermore, they found that the effects of retention on academic achievement were more detrimental than effects on emotional adjustment and self-concept.

Alternatives to the current system are commonly suggested conclusions in retention research. The creation of non-graded early childhood units which would include kindergarten was the solution of Schultz (1989). Since the average negative effect of retention on academic achievement is even greater than the negative effect on emotional adjustment and self-concept, flexible arrangements that decrease grade isolation were recommended by Smith and Shepard (1987). Cuban (1989) talked of non-graded schools, cross-age grouping, and cooperative learning as valuable, but he cautioned that this would not be enough: teaching and curricular practices also require improvement.

Gradedness should not continue to be accepted just because it has been the practice for more than a century. Systems can be improved and such improvements must be based on research. Since multi-age grouping is an already existing alternative to graded grouping, it is an obvious choice for study.

Affective Development Studies in Multi-age and Social Literature

In the multi-age literature, studies on child-child interaction, leadership opportunities, improved self-concept, increased motivation, and the lowering of

competition are the most prominent (Katz, et al., 1990). All of these topics are pertinent to child development and to school experience. They provide an initial direction for the eventual exploration of the multi-age math class.

Interaction

Social interaction has been found to increase significantly in mixed-age settings (Furman, Rahe, & Hartup, 1979; Goldman, 1981; Mycock, 1967 cited in Ford, 1977). Also, proportionately less parallel play and more interaction occur in the mixed-age setting. In her study of three and four year olds, Goldman (1981) found that this type of grouping is facilitative of social development, fostering interaction for both age levels as well as independence in goal directed play, with less call for teacher guidance. Further, a variety of roles for peers to model different ways of interacting, was found to facilitate social development (Brody, Stoneman, & MacKinnon, 1982).

Values and conventions to be used in the classroom are interactionally negotiated, not unilaterally decided (Mehan, 1978). As social development proceeds, these values and conventions will be tested, continuously refined, and practiced. Student-teacher interaction and student-student interaction are both part of this process. Competent participation requires students to interpret the explicit and implicit rules which govern classroom interaction. Age and experience increase competence. Young children learn 'person schemas' or models which are, in fact, stereotypes based on their encounters with values and conventions shown in behavior (Bukowski, 1990). These schemas become less narrow (less stereotypical) as experience increases.

Leadership

Children are more likely to exhibit prosocial behavior and to offer instruction to younger children than to same-age peers (Brody et al., 1982; Cazden, Cox, Dickenson, Steinberg, & Stone, 1979). Teacher-student roles are not equal in power so it is easier to teach someone younger than an age peer. "Mixed-age experience provides educational and therapeutic leadership experiences" (French, Waas, Stright, & Baker,

1986, p. 1283). Such experience may promote the leadership qualities of organization, opinion soliciting, on-task behavior, and recording for the group, rather than the use of dominance. The researchers stated that many children lack the ability to practice such skills in same-age groups because they are unable to achieve leadership positions, whereas they are able to with younger children. French et al. (1986) used a three year differential in their study and they concluded that a "sufficient age disparity" (p. 1282) was required to show significant results. Further discussion of leadership in such groupings by Stright and French (1988) stated that the question of the natural conditions which cause the prosocial leadership qualities to emerge remains to be addressed.

Denham, McKinley, Couchoud, and Holt (1990) stated that the ability to understand the emotions of others and to respond prosocially are predictors of likability. Children who are liked have more chances to respond positively to their peers and thus to continue prosocial development. This contributes to children's leadership qualities. Though not all children arrive at school with equal amounts of this ability, it does increase as cognition increases so age can be a factor. It allows them to gain the attention of others and to initiate interaction, both abilities being crucial to social development.

Poor peer relationships for children are predictors of future emotional and mental health problems (Hazen, et al., 1984; Rodgers & Ross 1986; Roopnarine & Honig 1985). It is possible that a lack of leadership skills may be a cause of social isolation, and subsequently, of poor relationships. Withdrawn preschool children were helped to become more sociable through mixed-age play experiences (Furman et al., 1979) showing that increased interaction across mixed-ages, where children could be naturally both leaders and followers, was beneficial to those children.

Self-concept

Older children each need to be heroes or 'big people' to younger children, thus having their self esteem raised (Ford, 1977; Kemple, 1991). Higher self-concept was found in multi-age classrooms by Schrankler (1976). He conducted his research with three groups which he called "restricted multi-age" (three year age difference), "complete multi-age" (five to twelve-year-olds), and single-age. He reported significant differences for both multi-age groups in self-esteem and in positive school attitudes. In addition, attendance, which can be considered indicative of attitude to school, was slightly higher for the multi-age groups.

Tutoring has been mentioned above as a type of leadership experience. Teachers have traditionally used it as a means of increasing self-esteem. Joseph Lancaster (1803 cited in Allen, 1976) recognized the mutual advantage for tutors and their pupils. Allen suggested that self-esteem is increased in the following specific ways: tutors gain confidence as they realize that they know more than the children they are teaching; tutors have the satisfaction of feeling useful and needed; tutors are respected and emulated by the younger students.

Motivation

Motivation for learning was found to increase for fourth, fifth, and sixth graders in mixed-age classes (Johnson, Johnson, Pierson, & Lyons, 1985). The students perceived themselves as engaging in more individualistic behavior and as having a greater sense of efficacy than did their peers in homogenous grade classes. Motivation for self-regulation of behavior was found to increase when children took on the role of rule enforcer for younger children (Lougee & Graziano, 1986 cited in Katz et al, 1990).

Motivation for prosocial behavior may occur when older children realize that younger ones may imitate their behavior (Allen, 1976). Becoming a role model encourages responsibility and mature behavior. It constrains undesirable actions.

Effects on Competition

Competition is more apparent in single-age groupings (Pratt, 1983). Gradedness narrows the range of performance requirements and increases the focus on achievement within the narrower confines. Traditionally, all children have been expected to cover the same content and then they have been evaluated to see where they stand in relation to the norm. Skon, Johnson, and Johnson (1981) found greater increases in cognitive reasoning with cooperative methods than through competitive and individual work. As a result, the students in this study who used cooperation, reported more positive attitudes towards learning than did those in competitive or individualized situations.

As stated above, Katz et al. (1990) suggested that mixed-age grouping minimizes competition, and they also contend that such arrangements reduce the discipline problems inherent in competitive situations. A "class ethos marked by caring rather than competitiveness" (p. 5) will generate prosocial behaviors. Single-age classrooms can establish similar climates, but grade level expectations have traditionally sparked competition.

The Problem

Given my personal dissatisfaction with gradedness for young children, and given the research which suggests that prosocial behavior is encouraged in multi-age settings, the following questions were proposed for study:

1. Are there children in the class who help others learn? Is age a factor? What are the children's perceptions about this?
2. How do children feel about working with children of other ages?

Foremost among the questions to be answered was that of the effects such a setting might have upon the older children, presupposing that they would naturally have opportunities to assume leadership positions. The children's perceptions about working with children of other ages are also valuable sources of information of the effects of the multi-age context.

Chapter 2

Methodology

Since the purpose of this research was to gain some understanding of the realities of a multi-age classroom, the context was as important as the raw data which was to be gathered. Indeed, data without contextual description, data which has been carefully controlled, has been a liability for education (McMillan & Schumacher, 1989). Such research has failed to have relevance for teachers in the field. Despite care taken in the work to ensure generalizability, controls cannot be replicated in ordinary classrooms so the value of much quantitative work has been lost. Teaching and learning are highly personalized experiences. Though teachers are interested in the experiences of other teachers and they regularly use ideas generated by other teachers, they never expect or even desire replication.

There is a need for research to take place in classrooms under natural conditions and a need to relate learning theories to classroom contexts in order to improve instruction for all students (Lundsteen, 1991; Mehan, 1982). The concerns which gave rise to this study are two areas of early years education, more individually appropriate instruction, and the development of prosocial attitudes. Though changes in instruction are outside the realm of this paper, I believe it possible to improve both of these areas through such 'natural' investigation.

Attitudes and social development are a very complex part of human life. They cannot be understood by being partitioned into isolated behaviors, controlled, and counted. However, they can be observed in context and analyzed accordingly. Perceptions can be compared to other perceptions as a further means of constructing knowledge. The understanding of human behavior is a process of accumulating knowledge and continuously reformulating it, whilst knowing full well that we cannot

ever see into the minds of others in order to make our understanding complete. Research in this area must be qualitative.

In their discussion of this type of study, Lecompte and Goetz (1982) validate the subjective experiences of the investigator and the participants. 'On the spot' analysis, as they call it, is part of every teaching day. Teachers analyze situations and make informed decisions constantly (Mostyn, 1985). Qualitative research uses these abilities in addition to demanding accurate observation, conscientious recording and thorough explanations.

This work will follow the tradition of constitutive ethnography, as named and described by Mehan (1978). He recommended the approach for education stating that it was incumbent upon educators to examine the many processes of schooling just as carefully as the content is examined. Constitutive studies specifically attempt to describe the interactional encounters through which classroom social structures are assembled. The children and I assembled the social structures of our classroom together (as do all teachers and students) and I have analyzed them as the means of understanding this particular multi-age structure's influence on the children.

Participants

The twenty-four participants were part of a 'pull out' math class, eight from grade one, eight from grade two, eight from grade three. The teachers and I met and selected the children according to ability so that the class would be heterogeneous. (This is the way all class assignments are made in our school. It was my intent to have the mixed-age class reflect the other classes in our school with their ranges of student abilities.) There were fifteen boys and nine girls. The proportions of boys and girls approximated the proportions in the home classrooms. The school population is drawn from a mix of middle class children (offspring of professional people) and children

from a low rental area (offspring of unskilled or unemployed workers). Socioeconomic background played no part in the selection.

One parent of each child signed the permission form (see Appendix A) and each family received an authorization letter from the superintendent of the school division. No parent refused permission and no child dropped out, so no replacements were made. Only one parent phoned to inquire about the project before signing. His child had registered in the school one month before. Five mothers visited to observe during five different classes, as the permission letter welcomed them. When the children and I invited the parents to come and be shown the math activities during an evening in the last week of the project, fifteen of the children came with parents and siblings.

Eighteen of the children were already known to me. I had taught six of the grade twos and three of the grade threes, when they were in kindergarten. Only five children were unknown to me, one from grade two whose parent had called and four from grade one. For the most part, the children knew only their age-mates, not those from the other grades.

For the remainder of this paper, the grade one children will be designated as six year olds, grade two children as seven, and grade three as eight. The children's ages will be included with their names throughout the report in the interests of clarity for readers. The children's names have been changed to protect their identities. "M" in the transcripts designates me.

The Math Program

Current language arts programs have already made steps towards individualization through the removal of commercially designed 'lock-step', graded, programs in favor of using a 'whole language' approach. Because of this, I judged that it might be easier for teachers to envision a multi-age setting in language arts than in

math. As a result, math was chosen for this project in order to increase the general relevance of multi-age settings for those in the field.

This was the third ten-week session of the same kind of class in the school during that school year. The children and I met together from ten to eleven o'clock for ten weeks. On two of the days, only the six year olds were present, and on another two, only the eight year olds were present. Two classes were canceled due to field trips and two due to unavoidable meetings. In total, forty-two classes were multi-age situations.

The children were placed in 'pods' of three, one child of each age in each pod. During free choice days (four each week) they worked in centers which had two pods of children. These groups of six worked together without change for half of the project. I maintained all of the original pods, but changed the 'partner' pods for the last half (see Appendix B for the 'center time' groups). I wanted to let the children work with familiar people, and also to have a chance to work with other people. This change was random with the exception of a deliberate placement of four pods. I combined the pods of a particular six year old boy and a particular eight year old boy because they had each told me separately that they played together outside of school. I also put a particular seven year old boy with an eight year old boy because they had liked working together on the problem solving. The eight year old was a weak student, lacking in confidence, while the seven year old was strong and confident; I was interested in watching their interactions.

During center time the children could work at activities of their choice (see Appendix C for a brief description of these activities), with partners of their choice, but they were to choose activities from their centers and could choose to work with any of the other five people. This choice of activities and of partners, allowed for the acceptance of work at individual levels, minimizing competition as Katz et al. (1990) recommend as necessary to create a climate where a "caring ethos" may develop.

It is important to note, that since they could work at any table or anywhere on the floor, proximity with children not in the set groups occurred and so did interaction. Though it did not appear that the children shared activities across the groups during the course of the observation, study of the results showed that this did occur on occasion.

One day each week (usually Monday) for the last nine weeks, was group problem solving day. The children worked on open ended problems with multiple answers. (See Appendix D for a listing and brief descriptions of the problems.) They worked in their original pods for three of the problems. For the fourth problem, I changed the pods due to conflicts between two boys. (This allowed observation of them with other children, but as members of the same center pod, they could interact as they chose for the entire time in centers.) For the eighth and ninth problems, I changed the pods again because I wished to observe interactions among different children, in particular 'weak' older children with 'strong' younger children (See Appendix E for the problem solving pods).

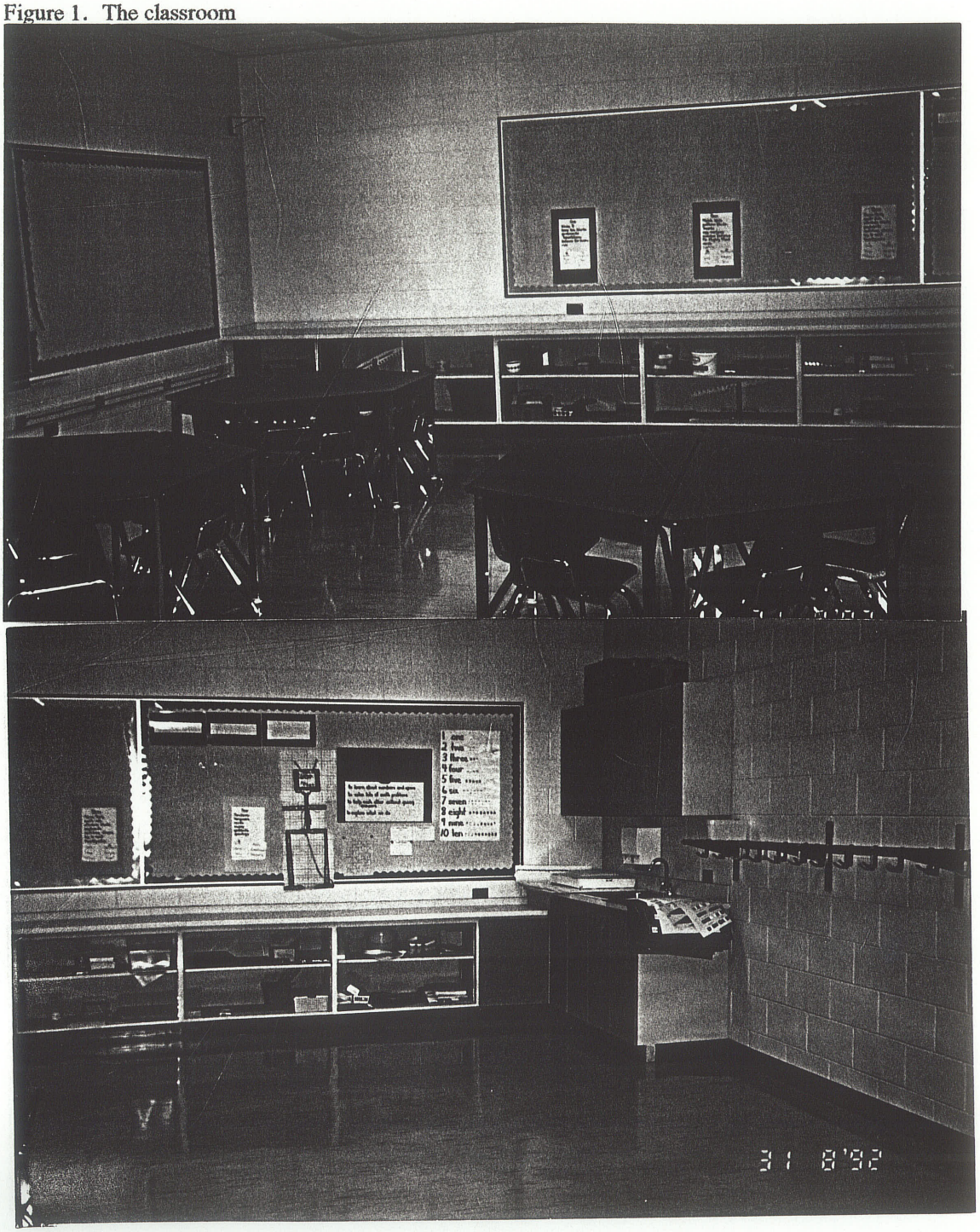
The purpose of the problem solving arrangement was to ensure that the children worked in cross-age groups at those times, because theoretically, given the choice situation on the other days, they might never do this otherwise. In the Gooch Center Study, Lundsteen (1991) used a similar method to obtain specific data. After a time of general observations, she chose to deliberately organize situations which would provide the more focused data she wished to analyze. Indeed, our group problem solving situations yielded some of the richest data.

On Fridays, the children had math fact tests for addition, addition and subtraction, or multiplication. The tests were individualized and the reward for a perfect score was the following Friday "off" with an advance to the next level of difficulty two weeks later. Practice of these facts was allowed during any choice time with anyone in the class. This option, which superseded work in the centers, and called for work with same-age peers, was used often on Thursdays by the eight year

olds after multiplication was introduced. They were very keen to multiply. Individual tests took from five to twenty minutes, then the children worked at their centers.

Physical setting

Figure 1. The classroom



We worked in a regular classroom (approximately eight meters square) which contained ten trapezoid tables with chairs. These were arranged into five hexagon tables for center time activities and separated into trapezoids for problem solving. There were four centers with six to eight activities in each. These were arranged on four sections of shelves, easily accessible to all. There were shelves which we called the "everybody" shelves, which held general supplies (paper, scissors, glue, dice, etc.)

The activities were organized into the centers so that each center had at least one construction material, one game, opportunity for addition and subtraction, a geometry component, opportunity for measurement, and problems to accompany specific materials. Many activities provided for multiple mathematical possibilities. Each center had activities which varied in levels of complexity. (See Appendix C for a complete listing with brief explanations.)

Instructions for the Children

The children were told about center time arrangements on the first day. They were given duotangs which we called 'math journals' for the purpose of recording their activities. They could draw and/or write in these journals (telling about at least one of the day's activities) and they were to keep them nearby wherever they were working. I responded to the journals daily. Journal entries which stated with whom the children worked on activities, or with whom they played the math games, were included in the list of total recorded interactions during choice times which are found in Appendix F.

On the first day, they were also told what our goals were for this experience:

-to learn about numbers and space

-to solve lots of math problems

-to help each other without giving answers

-to explain what we do

These goals were posted on a bulletin board during the ten weeks. The children and I referred to these throughout our time together as was appropriate. Helpfulness to each other was an expectation as it is in many classrooms.

During the problem solving time, the instructions were for each group to plan how each member could contribute to the work. I voiced my expectation that more answers would be generated if all group members contributed at all times. The work involved cutting, pasting, and manipulation of materials as well as organizational thinking. These problems were enjoyed. The groups who wished to continue working at them on the following day were always allowed to do so. About half of the children chose to do this each time, but it was not the same children each time. Sometimes only one or two members of a group worked at their problem the following day. (In the organization of data, these 'second' days were classified as choice situations, rather than prescripted problem solving groupings, and interactions from these days are part of the totals found in Appendix F, whereas interactions from the problem days are not.)

Procedures

Audio taping and observation were the main methods of data collection. Continuous observations (recorded with notes only, or with audio tapes and notes) shall be referred to as episodes. They vary in length of transcription from about one minute to ten minutes. The episodes were usually portions of the complete interactions (children with children and materials, or a single child with materials), such as a teacher would experience while circulating in the classroom. Most episodes were of multi-age situations because observation of such interaction was the purpose of the investigation. However, same-age situations and children who were alone were also recorded.

Table 1

Recorded Episodes

	Written	Taped (with notes)	Taped (without notes)	Totals
Cross-age	55	51	7	113
Same-age	4	8	0	12
Alone	13	13	0	26

I interacted with the children during many of the taping episodes (sometimes more as a teacher, others more as a researcher). At times the children were pleased to talk, at other times engrossed. Shyness (not wishing to talk at all) did not appear to be a problem after the second week.

I was conscious of my obtrusiveness and used the practice of leaving the tape running with the microphone placed as strategically as possible. The seven taped episodes without written notes (see Table 1) are the results of this procedure. This yielded some more natural interaction with the trade-off being a loss of some of the data. I determined it to be worthwhile except in one case where two boys found the loose microphone intriguing and regaled me with their rendition of "The Big Bopper".

On the first day of the project, I had asked each child to introduce herself/himself and to say something of interest. All said their names, though not all added anything. We listened to ourselves. After that, I played back their talk to the children only upon request; I did not offer to play back any tapes. Rather than talking about the tapes themselves as a means of confirmation, I chose simply to talk again about topics of interest. After the first few days, there were few requests. This

approach was intended to minimize awareness of the recording, and thus to minimize obtrusiveness.

As well as taping interactions, I interviewed some children on specific topics. These were differentiated from the episodes referred to as "alone" (see Table 1) by the fact that the interviews were preplanned. (The "alone" episodes were taped because I happened along when a child was working alone with materials and I chose to interact with the child.) The interviews were used to check my perceptions and also to probe some of the children's beliefs about working with different age groups, the meaning of leadership, the causes of conflicts, and their feelings about some of the happenings within the class.

I used note taking during interaction taping if I was not contributing to the talk. I also used note taking as the only procedure in instances where I deemed it to be less obtrusive. For example, if children were not facing me, I chose to position myself behind them and write, rather than move in front of them with the microphone. These comprise some of the written episodes in Table 1. Others are written observations from different positions in the room.

Since nine of the forty-four actual days of the math class were spent solving problems, the children spent thirty-five days in the centers with the freedom already described for choosing with whom to work. On those days, though not at a set time, I looked for children I had not already observed on that specific day to record who was with whom and who was alone. These were not considered episodes and so are not included in Table 1. However, these quick observations and the episodes were combined into a chart showing with whom the children interacted, for the purpose of obtaining an overview of cross-age and same-age interaction, as well as time spent alone.

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obtaining an overview of cross-age and same-age interaction, as well as time spent alone.

This overview is found in Appendix F. It is titled "Recorded Interactions of Each Child in Choice Situations" and an explanation of its make-up is important since it is a mix of subjective and objective information. The interactions recorded include:

1. children's choices as recorded in episodes
2. children's choices as recorded in the brief observations
3. children's statements (naming other children with whom they had worked) as taken from their writing in their math journals

The information shows only which children interacted with which children, it does not indicate if they were in pairs, triads, or groups. It is subjective because I focused on cross-age groups for the episodes, and also because the quick observations were not deliberate attempts to record the entire class at any specified time. It should not be mistaken for an exact record of interactions. However, it does give an indication of cross-age and same-age interactions, and it does show evidence of children working alone as well as confirming which children were more sociable. Most importantly, it provides a starting point from which to look at the individual children on which later discussion will focus. The latter was the reason for the compilation.

The Teacher as Researcher

The Development of My Interest in Multi-age Classes

I have worked as a teacher with children of these ages for twelve years. From almost the beginning of this time, my concerns about the graded system (which were described in the introduction) have been with me. I had talked to colleagues about this and wondered about some possible alternative before I realized that such alternatives

actually existed. When I learned about the multi-age arrangements in the Winnipeg School Division, I managed to visit them over a period of a few years. (The number of these classes increased during this time.)

I followed the development of British Columbia's Primary Program with interest, was able to obtain and read a copy of the curricular document. To further my understanding, I subscribed to the Prime Areas Journal. I continued reading about this topic. In 1990, I went to Victoria on other educational business. While there, I visited two schools to observe the new, multi-age organization. As well, I conversed with several educators (in favor and opposed) about issues including academic achievement and actual classroom organization.

I have become confirmed in my belief that retention is unnecessary if we could allow children time in a non-competitive setting to accomplish the goals of learning. I have also come to believe that some frustration could be removed for both teachers and children if the constraints of the graded system did not exist.

Furthermore, as teachers in Victoria described how only eight (approximately) new children were welcomed into their classrooms each year by them and the older children, I knew that this had to be better than twenty plus children being welcomed, however sincerely, by a single teacher. A further benefit mentioned by the teachers was that of the social and academic security provided by maintaining groupings with the same teacher for more than one school year. The words 'school family' were part of the regular vocabulary in one of the schools.

Supports Provided for this Project

The principal of my school was aware of my interest in this area and agreed to let me try a multi-age math class for an hour a day. The school division provided an assistant for the time of the actual research. As a result, I was freer to carry out the

taping and observing than a regular teacher would be. Kim, a student teacher, assumed the role of co-teacher very naturally and the children responded to her as such. She took responsibility for housekeeping details during class time and she circulated in order to interact with the children as much as possible and to help those who needed prompts to stay on task. On one day, when other duties kept me from arriving until the class was more than half over, everybody was as actively busy as usual when I arrived. Kim and the children had just 'carried on'.

Kim stayed for fifteen or twenty minutes at the and of each day to talk about events and/or children as we hung work on bulletin boards and prepared for the next day. Her insights were as invaluable to me as her help during the class. We did not always have the same perceptions of the children, so talking to her provided checks to my perspective.

Despite the freedom which Kim's presence allowed, not a day went by where I was not fully cognizant of my role as teacher in the setting. Indeed, I would not have chosen to be otherwise. There was important teacher-student interaction which occurred at times when I could not be taping or writing notes. There were individual and small group lessons to be dealt with. There were all the other parts of teaching to be attended.

Personal Reactions

Each evening, I transcribed the tapes and incorporated my written notes into the data. I also injected some of my feelings and reactions. As I reread the pages, I made notes in margins. I have continued to make such notes on the pages quite freely during each rereading and have noticed occasional conflicting comments in a few places. They heighten awareness of multiple perspectives.

Chapter 3

Leadership Among the Eight Year Olds

The effects of this cross-age grouping on the older children was the focus of this work because the literature search indicated that they would have opportunities to assume leadership positions. As leaders, the older children might facilitate the work of the younger children, thus developing their own prosocial skills. The focal point of the observation was the proposed research questions: how the children were or were not facilitative of each other's work; the possible impact of ages on these actions; the children's feelings and perceptions about this. (Indeed, their many exchanges were carried out with differing amounts of patience and respect, occasionally with outright domination.)

This chapter will analyze data on each of the eight year olds as it relates to the question of leadership in this setting. Parten (1971) defined degrees of leadership in this order: (1) following, (2) independent pursuit, (3) following some and directing others, (4) sharing leadership with another, (5) directing alone. I value the characteristics of independent pursuit, sharing leadership with others, and directing alone, believing all to be important. Through the course of this study, I have concluded that even in the classroom, a competent leader needs to be able to operate within all three modes, deciding which suits any given occasion. It is not my intent to place the children into the levels, but instead to use Parten's categories as a means of describing the types of leadership which were displayed. In this class, directing alone by the children was mainly a tutoring activity.

The criteria for evaluating the evidence of leadership as demonstrated by prosocial behavior will consist of the suggested benefits of multi-age classes noted in the literature. These were modeling on task behavior, tutoring, understanding of

others' feelings, giving supportive comments or gestures, and facilitation of group efforts.

The following samples of the children's conversations and actions have been taken from the two arrangements provided, **center time**, when the children could choose to work with whom they liked among those available (which included all three ages), and from the **problem solving time** when they were required to work in their pods (with one child from each age group). These two situations resulted in diverse experiences for the children and are pertinent to daily life in the classroom where partners are sometimes selected, sometimes assigned. Comments from interviews will also be examined.

Cameron

Cameron was a quiet boy, but not shy. He enjoyed being recorded. He even suggested staying at recess and singing a 'coupla' songs. On April 15th, he caught my eye and when I was close enough, volunteered that he and Mitchel (six) were playing the game "Know It". He told me that he was helping Mitchel to find the questions in the booklet which is part of the game. When I asked Mitchel if he could do the questions, Cameron nodded most supportively at Mitchel to indicate that Mitchel should answer positively.

For the first three problem situations, Cameron worked with Donny (seven) and Mitchel (six). As I sat down at their table, on April 21st, Cameron and Donny both talked at once, wanting to explain what the group was doing. Cicourel (1981) suggested that the rules for who speaks first in a social setting may be indicators of status. Having the teacher's attention when there is good news to report does give status and both boys vied for this. I unconsciously gave the status to Cameron by asking him to tell me first. I could have learned more by asking, "Who is going to tell

first?" After I listened to their explanations, Cameron turned to me with a question about procedure.

Cameron: Should I cut them out like this, and then we cut, then we glue?

M: Ask your group what they think.

Cameron: Donny, do you like, want to like, I cut it out and then you color it on the inside? Do you want to do that?

Donny: All right

Mitchel had been rather passive, though smiling, and this may have accounted for Cameron's direct approach to Donny. His use of questioning rather than directing showed consideration and it indicated willingness to share the decision making.

Their next problem day shed some light on their perceptions of leadership. Donny explained the distribution of tasks.

M: *(to Donny)* I see Cameron is doing a job that you didn't mention. Is Cameron doing all of the number sentences?

Cameron and Donny *(together)*: No

Cameron: He's *(nodding at Mitchel)* done some too.

M: You've written some too, Mitchel? *(Smile, but no response.)* Have you switched jobs today? [Yeah] What other job did you do?

Mitchel: Gluing

M: You've done gluing as well? [Mhmm]

(Pause)

M: Who decided how your group should begin?

Cameron: Donny

M: Donny decided how this group should begin. *(To Donny)* You've organized things today?

Donny: Sort of

(I waited for further explanation. None came. The boys worked. All three were contributing. After they discussed some of their number sentences I asked another question.)

M: Who do you think is the leader of your group, Cameron? *(No answer)* Just for today?

Cameron: Donny

M: Why do you say it's Donny?

Cameron: Well he told us, like we switch, like he told us like he's gonna be doing the coloring from now on. I'm gonna be doing the gluing and the questions. *(Nodding at Mitchel)* And he's gonna be doing the coloring and the building.

I may have led into this reply with the phrase "just for today", but I pursued the topic to discover the boys' perceptions. I asked Cameron if Donny had always been the leader for their group and he indicated that each of them, including Mitchel, had had a turn. I remembered that the class was told everybody was to share the work on the problems and I wondered if the boys thought this job should be shared too. He may simply have given me the answer he thought I wanted. It was my opinion that Donny and Cameron both had made facilitative suggestions which were accepted by the group. They shared the leadership and Mitchel followed.

On May 11th, a problem solving day with new pods of children, Cameron missed his chair when he sat down and not being hurt, he laughed. Randy (seven), a friend of Cameron outside of school hours, laughed too. I had put them together because I knew they were friends. Randy had been in conflict in his previous pod and I hoped he might cooperate with his friend. As I arrived at their table, their partner Hanna (six) complained to me that they had been fooling around. I had not observed any misbehavior, nor had Kim. Their work on the problem had proceeded sufficiently that I was not overly concerned. My inclination was to suspect Randy might have been

at the bottom of any silliness so I elected to talk to Cameron the following day with Eileen (eight) whose pod had been disrupted by Cole (six). Coincidentally, Cole and Randy had been in the same pod for the first three problems and had had many disagreements. I was curious to know whether either Cameron or Eileen would generate strategies to deal with disruption by other students. I hoped that they might try to eliminate the off-task behavior of the younger boys in the future.

I opened the interview by asking, "What makes a person a good leader?" Cameron struggled with the question.

Cameron: I don't know what you mean

M: What makes a good leader in a group?

Cameron: What's, what's the...helpful...and helpful

M: If you were working in a group of kids and someone else was the leader, not you; what would you want that person to be like?

Cameron: Like...

An answer was supplied by another of two eight year olds who had joined us at this point. I next asked what they thought a leader should do if a child in a group fooled around. Cameron wanted to be first to answer this.

Cameron: If someone was fooling around, if someone went to tell the teacher. The teacher says give him one more chance and you told him to sit down and like to listen whatever you're doing. If he doesn't listen that time, just tell him he wasn't listening.

M: What if the teacher had to go away for a phone call...

Cameron: Just go tell someone else *(He looked at Kim)* like her or something.

M: I meant if there was no grown up and the teacher was away for a bit.

Cameron: Mmmm, that one...

The fact that going to tell an adult was the prime suggestion, appears to be a lack of leadership in Cameron. However, he did add, "If he doesn't listen that time, just tell

him he wasn't listening." It is possible that he might have been beginning to develop some thought about this, or he may have thought 'telling' was the answer which I wanted. Significantly, Cameron never used this 'tell the teacher' strategy during our class. If the critical age for the development of a social cognitive skill is when the skill is undergoing natural change as speculated by Dodge and Feldman (1990), Cameron might have been in the process of developing some independence at this time.

He did continue to give his friend 'some chances' the next time they worked in their pod, but he also did admonish him on May 19th. Randy (seven) discovered the microphone and began joking with it. (I had left it on their table for the purpose of obtaining some natural interaction). It was Hanna (six) who said "Quiet" in an attempt to end the joking. Through a lengthy three way interaction about the very hot weather while they were building toothpick triangles, Cameron alternated between joining Randy and behaving responsibly. He copied Randy's Big Bopper imitation, "Hello-o-o Baby!"; he ignored Randy's singing, "Dum dum dum, dum doodee..."; he tried to refocus with, "Okay, everybody else put their names on"; he sang, "Hello, lalalala"; finally, he admonished Randy about "Wasting tape", pointing to the tape recorder. This occurred at clean up time and there was no response recorded.

Though he had joined right in with Randy on the previous occasion, Cameron did show understanding of others' feelings at another time, by defending Hanna when Randy had clearly changed from silliness to aggression. Randy snatched crayons from her, rolled the dice out of turn and accused her of cheating. Cameron consistently restored each situation, taking the crayons out of Randy's hands to return them, giving the dice to Hanna and confirming her dice rolls. Randy did not object to any of these actions, he just continued on the course he had set. As a result of Cameron's actions and task orientation, the group's activity proceeded, albeit rather jerkily.

Through these episodes, I secretly wanted Cameron to stop his own foolishness and then to try to stop Randy. What Cameron chose to do was walk a tightrope

between his friendship and appropriate school behavior. He participated in his friend's game and yet he maintained the progress of the group work. (Recordings made when I had absented myself did not show any difference.) Though this may not seem like leadership from a teacher's perspective, it must be recognized that Cameron had used some social problem solving skills in order to avoid conflict from either direction.

Cameron and Hanna worked together once through choice and were very productive. This was May 20th, when they worked for an hour increasing the toothpick triangles begun during an episode reported above. My observation was brief; they were happily engrossed. The appearance of their final product was indication of efficient cooperation.

Cameron and Randy also chose to work together. On May 28th they attached all of the geostrips into a line. They asked me if they could take it into the hall to measure it (it was longer than the room), and then they asked if some kids could come into the hall and guess how long it was. I have no transcription of their work, thus no knowledge of who did what part. I did go into the hall with the children who wanted to guess, and observed Cameron and Randy whispering together before taking turns asking the others for their estimates. (Use of 'estimates' was my contribution.) This was a success.

May 12th and 13th, Cameron worked with Jeremy (eight) and Mitchel (six) at their center making geoblock buildings and measuring them. I recorded them on the 13th.

Cameron: How do you spell 'long'?

Jeremy: L O N G

Jeremy (to Mitchel): It was 37

(Mitchel borrowed Jeremy's eraser to erase his number. The boys worked quietly for a minute.)

M: Who did the measuring?

Cameron: Jeremy did

Jeremy: And it was 37

Cameron: 37 *(with emphasis)* **cm long**

(Since they were all capable of building, drawing and measuring, I decided to expand their measuring to include two dimensions, and asked them what they meant when they said 'long', using hand gestures to show 'tall' and 'wide'.)

Cameron and Jeremy: Tall

M: Did you write long or tall?

Cameron: Long

Jeremy: Well I put tall and wide *(which he hadn't)*

(I repeated the lesson on 'tall' and 'wide', almost knocking over the structure with hand gestures.)

Cameron: How do you spell 'tall'?

Jeremy: T A L L. *(He then coached Mitchel through the writing, word by word.)* It - was - 37 - centimeters - C - M - It was 37 cm tall. So put C M there. Now tall, T A L L.

Mitchel: Is this backwards? *(He pointed to his numerals.)*

(While Jeremy helped Mitchel, Cameron had retrieved the meter stick and measured the width, which he reported to be 12 cm. Jeremy coached Mitchel through this part.)

Once the structures were drawn and the measurements duly recorded, Cameron removed the top block.

Jeremy: Don't break it

Cameron: You have to take it one by one so it doesn't...

Jeremy: Okay. *(slowly and deliberately)* One *(The boys counted in unison to 17 as they disassembled the structure. They checked their counting and found it to*

be 18. They recorded how many blocks were used, Jeremy helping Mitchel as before.)

During this episode, Cameron and Mitchel both turned to Jeremy for tutoring with spelling, but Cameron facilitated the work by adding the words "cm long" and also by measuring the width while Jeremy helped Mitchel. This was an example of some "following" and some "leading" according to Parten's (1971) descriptions.

The same three boys played Parcheesi later that day. They joked about the game and enjoyed themselves. Throughout, Cameron moved the die from player to player around the table while the other boys left them wherever they landed. He alone showed this awareness of others. Cameron was in a winning position, almost from the beginning and on the first occasion when he could have taken another player's token off the board, he chose not to do it.

Jeremy: Do you want to take a man out?

Cameron: No thanks

(He didn't take a man out until his third opportunity)

Cameron: 6 plus 6 Ahhhh

Jeremy: 6 plus 6?

Cameron: 6 plus 6!

Jeremy: Hey, how'd you get this man out? Right there?

Cameron: *(Happily)* 1 - 2 - 3 - 4 - 5 - 6

I suspected unfamiliarity with the game may have been part of the reason Cameron did not take a man out in the beginning. I think he was also influenced by the fact that he was winning and happy just to go through the motions of the game in a contented sort of fashion. (He could not be described as a competitive child.) A lot of banter happened in the interim and this, combined perhaps with a better understanding of the game's intent, seemed to have spurred him on. He may have achieved a higher level of

competent participation through this interaction in which he might be described as a follower.

Discussion

Cameron was not assertive in his interactions. He was not strong in mathematics and thus not overly confident. He did take pleasure in helping Mitchel (six) with their math game, evidence of the positive effects of tutoring mentioned by Allen (1976). However, he sought tutoring more than giving it and the data does not reveal examples of younger children seeking his help. This perception on the part of the younger students may be a confirmation of the tenuousness of his leadership.

However, Cameron did show skill in managing to balance the work at hand with maintaining Randy's friendship despite his inappropriateness, and he did defend six year old Hanna from aggression. His awareness of Hanna's plight when the situation was no longer 'fun' demonstrated an understanding of the emotions of others needed in social development (Denham, McKinley, Couchoud, & Holt, 1990). His ways of dealing with it were not to tell an adult, but quietly and firmly to right each wrong. This ability to protect a younger child without escalating a possible conflict in the episode described indicates important prosocial development. The effects on Randy are unknown. Hanna's continuation of the game under such circumstances may be seen as verification of her trust in Cameron as a protector. It was a chance for Cameron to be a "hero" to someone younger in the manner described by Ford (1977) and Kemple (1991).

Cameron was not named by any children as someone with whom they would like to work. Through our ten weeks, he did make supportive statements and he did cooperate in group efforts. He was particularly helpful at clean up time and in sharing materials, but these qualities crossed all ages.

Eileen

Eileen was named by Darcy (seven) and Hanna (six) as someone each would like to work with. Neither knew her before this class. Darcy worked with her at problem solving, but didn't give a coherent reason for his choice when asked why. He said he chose her because she was in grade three. When probed about liking older children he said he liked children the same age and talked about a girl in his class.

On the other hand, Hanna had several interactions with Eileen during center time, as well as being in her problem solving group (with Darcy) for three sessions. She reported choosing Eileen because Eileen "doesn't get mad" and because they took turns deciding what activities to do. The data did not contain exchanges between them, but Hanna did say that Eileen helped her with putting her pages into her duotang.

Interestingly, six year old Hanna had helped Eileen correct some work with the base ten blocks. This was a reversal in expected abilities and roles. On April 9th, they had worked side by side on a pattern of squares which increased in size. Hanna had done hers independently up to sixteen (one by one, two by two, three by three, and four by four) without errors, while Eileen had made rectangles. When I responded to Eileen's journal, I asked her to check her squares. The girls were together again on the following day so I approached them to see if Eileen had made the necessary corrections. She had done sixteen and added thirty-six (six by six). She said Hanna had helped her. Hanna proved herself a capable mathematician on other occasions. Perhaps she chose Eileen because she felt good about being the tutor to an older child.

Of the eight year olds, Eileen spent the most time with the six year olds and an average amount with the sevens. She did not talk when I approached with the tape recorder or even just a notebook. I sensed that she was uncertain of either the class situation or of her role. She did not venture much in either of two interviews, "I don't

know" being her stock answer. Subsequently, observations of her during center time were brief.

During the first problem, Eileen, Darcy, and Hanna had an air of helplessness. They could repeat the directions, but were unable to accomplish much, even after some teacher suggestions. That night as I typed my notes, I wrote, "They will be worth watching". Before the class began the second problem, the group which had been most successful at the first one (discovering the greatest number of different triple scoop ice cream cones), explained how they had organized and distributed the work. It helped; the pod started right away on the different combinations of ten balloons. I immediately moved to observe them.

Darcy: *(To me)* Hi, I have to color.

M: *(After waiting for another contribution)* What do you have to do Eileen?

Eileen: I have to cut it out.

M: Did you say you had just changed jobs? What were you doing before?

Eileen: I was coloring. Everybody's coloring and I was starting to cut and he started to glue and he started to color.

M: Hanna?

Hanna: I'm gluing things.

M: Whose idea was it to change?

Hanna: Eileen's

M: And everybody agreed?

(All three nodded. I waited and listened.)

Darcy: *(Holding up a crayon)* This broke.

Hanna: That's okay. You can still use it.

Eileen: After a while are we going to get to hear some of what we said on the tape?

M: Sure, we could play some back.

Hanna: Someone didn't put the numbers on this one.

Eileen: Me.

Though Eileen had suggested rotating the jobs, Hanna seemed to be as much a leader. She comforted Darcy about the broken crayon and she noticed one of the group's answers without a number sentence. She was the one to show awareness of others' feelings and competent task commitment.

After she wrote the missing numbers, Eileen suddenly tried to increase the pace of work. She became directive, though her manner was encouraging. It was my perception that she wanted her group to succeed.

Eileen: *(to Darcy)* Still color.

(Two minutes later, she took the page Darcy was slowly working on and cut some of it off so she could do it.)

Hanna: Where's the glue cap?

Eileen: *(As she took Darcy's page again to cut more for herself)* Here. *(To Darcy)* **Color!**

(Darcy proceeded to speed up.)

Eileen: *(To Hanna, who had completed the gluing)* Here, start coloring this one!

(Hanna sang to herself as she worked. Eileen had none to cut so she took a page and colored some so as to not be idle.)

Eileen used similar tactics with the pod on their third problem. Darcy and Hanna accepted this approach, and as already stated, named Eileen as a person they liked to work with. I wondered if the younger ones preferred to have someone with more status (age sufficed) tell them what to do. Being told what to do is not uncommon in school and their experience in this unusual setting of multiple ages may have caused uncertainty for them. Studies of long term mixed-age classes where independence is expected might reveal different perspectives in this area.

Eileen's next problem partners were Thomas (seven) and Cole (six). When I approached them, I could see that Cole was turned away from the table while the other two were working at creating their math game about bicycles. He was sighing audibly as he often did to indicate that he was disengaged. (Kim said later that he had worked until the other two had turned down one of his ideas. She did not remember whether it was a valid suggestion.)

Thomas was a competent mathematics student and I had placed him with Eileen to see if shared leadership might occur. When I asked who the leader was during their game-making problem, both boys pointed at Eileen. I asked why they chose her.

Cole: She's smarter than me.

M: So she should be the group leader? *(He nodded.)*

Thomas: 'Cause she's smarter than me.

(She put her head down.)

M: Did you feel like the group leader, Eileen?

Eileen: I don't know.

M: What do you think a group leader does, Eileen?

Eileen: Help people *(She paused as if she might say more but didn't.)*

M: So a leader is a helper?

(Later, I asked Thomas what he thought a leader's job was.)

Thomas: Just to say the rules to everybody, what the rules are and...

M: And did Eileen do that?

Thomas: Yup

M: What did she say?

Thomas: She said that we had to use a dice and that's all.

As I watched them for the few remaining minutes of the class, they didn't talk. The boys perceived it to be natural that Eileen would be smarter, likely because she was older. Eileen's suggestion that a leader would be a helper might be akin to an adult's

saying a leader would be a facilitator. Later, she also agreed with Thomas that a leader would say the rules for everybody. In an interview on another day, she said that a leader should be "a good person, a nice person".

All three of them chose to play the game which they made on Tuesday. This yielded some more natural interaction. As Eileen rolled a six, she laughed because she had rolled a few sixes.

Cole: I win the game! I win the game!

Thomas: It's not **you**. It's Eileen.

Eileen: Yeah, I go.

Thomas: *(As he moved Cole's bicycle token back)* It's Eileen. You stay right there!

Eileen: 1 - 2 - 3 - 4 - 5 - 6

(The game proceeded for several minutes.)

Cole: *(To Thomas)* Your turn.

Thomas: I've got it, I've got it. *(He rolled a one.)*

Cole: *(Reading the question on Thomas's space)* Three times six.

(The eight year olds had just begun to work on multiplication and were quite excited about it so many of their games had multiplication questions.)

Thomas: *(Thoughtfully)* It's not a hundred.

Cole: It's more! I know it, I know it! 110! *(Silence)*

Eileen: Eighteen

Cole: Ah, you...

Eileen: I just had to count.

Cole: Eighteen. You just go one space.

Thomas: Okay Cole, you move. Get a two and you win.

When Jack (eight) arrived, Eileen and Thomas read their game rules to him together and the four played. Cole resumed his facing away from the table except when he was

reminded of his turn by Thomas. As in the previous game, they helped each other with the answers to the game questions and never invoked their 'Go back two spaces rule' for incorrect answers. I speculated that the presence of six year old Cole was the reason for this non-competitive approach. Same-age players might have been more competitive in such a situation.

Thomas told Jack that "You got to be careful" because Eileen wins a lot. Eileen did win again. I was surprised to read in her journal that she thought she was not very good at the game. Was she excessively modest? Did she think she shouldn't win? She did not gain confidence from Thomas's remark to Jack, or from the boys' saying that she was the leader because she was the smartest. I responded, "Oh yes you are good at it," in writing but did not interview her about it because she found such sessions uncomfortable. Ten weeks was not long enough for her to change that feeling.

In her last problem solving pod, Eileen worked with Glenn (seven), who was also very quiet, and Jennifer (six). Initially, they had difficulties figuring how to find solutions and how to organize their recording of toothpick squares on June 8th. It was Jennifer who offered useful suggestions such as turning the poster paper over and starting again on the other side when it was necessary. Also, Jennifer's comments, "There now, let's glue it," and "You do that side, I'll do this side," were the signs of facilitative leadership.

Jennifer: *(After the group had turned the paper over and had laid out its first square, ready to be glued)* Okay, I'll do this too. I'll do it this way.

Eileen: I'll do it, I'll do it. *(The girls glued toothpicks.)* No, this way. Hey, I got that too.

Glenn: I'll stick too.

Eileen: 'Kay, and we're going to start to give... *(All three glued.)*

Jennifer: There, we're done. Now we have to do two.

Eileen : *(Scoffingly)* Easy!

Jennifer: This is easy. All you have to do is make a tiny bit bigger one, then cut it in half. *(She began to move some toothpicks into a square.)* It's easy. All you have to do is just make this one a little bit bigger and just cut it in half. *(She ran out of toothpicks. Twenty were needed for each set of squares.)*

Glenn: I'll go get another twenty.

Jennifer: No, I will. *(They got them and counted together.)*

(I was asked for help at another table. I left the microphone. The next part of the tape had many voices, including my own. I returned to hear Eileen.)

Eileen: Don't get this... Okay, put one in there. No, don't, don't, **no don't!**

(I had to leave them at this point because of a conflict and I took the microphone. At the end of the class, they asked me to look at their work. They had made progress.)

Eileen asserted herself into the decision making. She took control from Jennifer at the beginning of this example, and Jennifer complied cheerfully, giving the group encouragement with the words "There we're done" after. Eileen showed impatience at the end of the taped episode, but the group continued to make the squares, and the two girls chose to spend the following class working on the problem. This would indicate that she never became unpleasantly dictatorial. (Since there was no evidence of such behavior during the study, I think it likely that Eileen did not.)

Discussion

It is clear from the transcript that Eileen did not display the type of leadership which was my observational focus. According to Parten's (1971) descriptions, she followed and led the younger children. In the problem situations she directed younger children, sometimes seeming abrupt but consistently in a friendly manner. She

accepted suggestions from others. It was clear that her purpose was her group's success.

However, Eileen demonstrated much awareness of the younger children in such ways as placing glue or other materials in front of them during turntaking, just as Cameron (eight) had, even when the younger ones did not reciprocate. She helped Kenny (six) to take sticky tape from the dispenser so he wouldn't twist it. When Mitchel (six) asked her if his numerals were backwards and they weren't, she praised him smilingly. There were several brief observations of her being encouraging to the younger children. This setting provided her with ample opportunities to practice this prosocial caring role.

Dodge and Feldman (1990) defined several competencies which they linked to social cognition. Attribution of intentions and self-evaluation were among them. Eileen's inability to articulate a response to the knowledge that Hanna and Darcy picked her as someone they liked to work with may result from a lack of cognition, such as not understanding their intentions. It may be even more likely that she was unable to judge my intentions as I asked the question. Her written remark about not being good at a game which she won three times, and her statement about not knowing if she felt like a leader indicate some lack of evaluation skills. Even her shyness at being observed may be part of such underdeveloped competencies.

Though not a strong student, Eileen was not incompetent at mathematics and she was definitely not an unsociable child. She may well have been uncertain of her role in this setting - unable to understand my intentions, unable to see where she should fit. The setting was very open in terms of the children's roles. Perhaps Hanna's superiority in the base ten problem during the first week and her pod's dysfunction with its first problem further skewed her perspective. Another possibility is that she has learned that her role is to be modest and non-assertive.

Jeremy

The earliest data which includes Jeremy, centered on the triple scoop ice cream problem on April 13th. His pod was in conflict for most of the hour. Cole (six) and Randy (seven) seemed to have established a routine of being unable to agree about anything. Jeremy was silent, even when I asked, "What is the group going to do?" and then, "What should happen boys?" As the disagreement continued, I finally intervened with some organizing suggestions. Possibly because I used the word "could", rather than using directives, nothing changed.

Cole: I'm coloring vanilla.

Randy: You could cut out chocolate.

Cole: I can't cut out...I can't draw vanilla. I have to do strawberry.

Jeremy: This isn't brown.

Randy: I'm doing strawberry.

Cole: Then what can I do? He's *(Jeremy's)* doing chocolate. I can't do vanilla 'cause it's already vanilla.

Randy: I know. You could just cut them out.

Cole: I don't wanna.

Randy: Otherwise you could get one of those skin colors and color them that color.

M: I think you should just leave the vanilla white.

Randy: He could just cut them out if he wants to.

Cole: I could do these chocolates. You could do that, those chocolates. Randy, you don't color very nice.

Randy: I'm s'posed to cut them out like that. *(He indicated that he would cut off the part which he was deliberately coloring over the edge as a means of achieving more speed.)*

Cole began to color and Jeremy to assemble the cones. I moved away to watch from a distance. During the incident, I was unaware of Randy's use of "could". Analysis has led me to wonder if Cole was responsible for this particular one of their many conflicts.

The following day, I interviewed Jeremy.

M: Did you ever want to interfere? Did you ever tell them to be quiet or anything?

Jeremy: I wanted to.

M: You didn't though. Why not?

Jeremy: 'CAUSE then I would get in trouble too, like if I got into it *(the fray).*

M: What do you think would happen if you asked them to stop fighting? What's your guess?

Jeremy: I don't know. *(I waited.)* Probably one'd say, "He wouldn't let me glue," if I said, "Be quiet," and he would probably say, "He wouldn't let me have a turn to glue."

M: Have you ever worked with either of these boys before?

Jeremy: No.

M: This is the first time? How do you think your next problem solving time is gonna go?

Jeremy: I hope better.

M: You hope better. Are there any things **you** would be able to do?

Jeremy: I should've like said, "Randy do the first cone and Cole do the other cone, or Randy do one whole page and Cole do the other."

M: So you think if you told them to take turns it might help. Do you think they'll listen to you?

Jeremy: Prob'ly.

As well as learning why Jeremy had not tried to exert any control, I had a hidden agenda. It was to see what would happen if Jeremy tried to keep the boys on-task next time. Following our chat, he walked right over to the boys (who were playing Contra) and spoke to them. Randy immediately tattled that Jeremy was telling them what to do. I went to their table, but did not respond verbally to the complaint. I asked Randy and Cole about the rules of the game which they obviously did not know. I did not want to undermine Jeremy, nor destroy his confidence, so I talked briefly about the rules and left. Jeremy sat and watched them. He may have just learned that tutors need to have entry skills in social situations, just as children need to have entry skills into play groups (Corsaro, 1985). Later from across the room, I noted that the three were playing cards. I could just make out Jeremy saying, "You go first," and "You go now."

Jeremy may have needed to ascertain what my response would be if he intervened in a conflict between others. The promptness with which he approached the boys and took charge (in a friendly way) after our talk, indicates that he did have confidence in his ability and may have even been keen about trying out the role. He was directive in his approach, reflecting an immature stereotypical view of leadership as described by Bukowski (1990). He needed more experience with the leader/tutor role to gain competence.

The next recorded data was on their third problem. They were making and recording combinations of addition with cube-a-link trains. When I asked them who was doing what jobs, Cole was quick to point out each boy's contribution..

M: Who decided what everybody would do here?

Randy: We all did.

Jeremy: Randy did.

M: Randy did...and did everybody agree with it?

Cole and Jeremy: Yeah.

M: And do you think it's working well?

Randy: Yeah, 'cause everybody likes their jobs.

M: Everybody likes their jobs? *(I waited. No negatives.)*

Jeremy: You could start coloring, Cole. *(Cole recorded a train and began singing.)*

Randy: We have another one, 4+0=4, 4+0=4. *(There were to have been no repeats.)* But just different colors but that's okay.

Jeremy: When you're done, Randy, Cole will have... *(This is unclear.)*

Randy: Okay.

One can only speculate about what actually caused this noticeable change, given the sparcity of data. (Cole and Randy continued to spar during the days between April 13th and 27th.) Jeremy was not being directive when I was on the scene. His repeated use of the word "could" is illustrative of this. Later in the same episode, Jeremy helped Randy to write "1/2" when he used the half cubes to make a train. Cole did not remain on task throughout, but Jeremy and Randy did.

This was one of Randy's happiest group activities. It is possible that Jeremy intuitively understood Randy's need to feel in control, and this resulted in his naming of Randy as the decision maker, just as adults sometimes give exaggerated credit to children to emphasize their competence. Randy's need to feel competent was evident throughout the study, causing difficulties because his choice of direction was often in opposition to the group's direction. Randy and Jeremy were recorded in only one other interaction. They chose to play Pizza Party together on May 7th and I joined them to explain how to trade fourths for halves or eighths and so on. They were comfortable together. Jeremy ignored Randy's competitiveness and kept the game moving.

On May 27th, Jeremy worked on finding number patterns through cutting stairs out of graph paper with Jennifer (six) and Glenn (seven). He did the cutting and they wrote numbers. When I asked if he knew whether they might like to cut, he replied in

a surprised manner that they never asked, but he immediately remedied the oversight. This resulted in he and Glenn changing places. Jeremy had not thought of their feelings on his own.

On June 1st, Jeremy showed Kenny (six) how to cut out a pattern block turtle and then gave Kenny another turtle to cut out after he made a mess of the first one. Kenny turned to me with a big smile and said, "Now I know what to do, Jeremy showed me." This was a happy contribution to Jeremy's self-esteem by making him feel respected and needed in the manner described by Allen (1976).

A further example of Jeremy's leadership is found under the section about Cameron on pages 31 and 32. Mitchel (six) turned to Jeremy even though I was present, and Jeremy took the role of tutor. He also tutored Cameron in spelling and in the rules of their game. The three boys worked at different activities for two consecutive classes at that time, a noticeably well sustained period of interaction in our class. There was no use of dominance. There was sharing of the organization with Cameron and clearly modeled on-task behavior.

Discussion

Jeremy was reticent in times of conflict, yet confident in situations of cooperation. The reticence may well have been a result of the context of school, because when we talked about fighting in an interview on April 29th he introduced the topic of hockey. He said that he always fought back in hockey because it made him mad when a player hit him. When I compared it to shoving in the classroom, Jeremy said, "Then I would tell." He did not ever tattle, but then verbal conflict is not the same as shoving, and shoving never occurred in our class.

Jeremy was the eight year old who experienced the most friction in the class. This was because Randy and Cole were in his pod. For the most part, he disassociated

Cole (six) was also part of this group, and the next day Jack played 'Guess my Number' with Cole using the hundred board. They had only played for a few minutes when I joined them.

Cole: We're only gonna play about two rounds.

M: Okay

Jack: I don't wanna play no more though.

Cole: *(with emotion)* **Well I don't care!**

Kyle (eight): You have to play at least two rounds.

Jack: You do?

Cole: Yeah.

Jack: Who said?

Cole: I'm gonna play with them *(Cameron and Cathy were at the same table).*

M: *(To Jack)* Has Cole had a turn to give you one?

Jack: Well, uh, uh, uh, I picked a number and Cole already did it [Mhmm] and he didn't guess it, so I told him it and then I guessed his number. I guessed it on eleven so I don't really want to play no more 'cause I already played the game.

M: So you've each had a turn?

Jack: Yup.

Cole: *(Belligerently)* I like this game though.

Jack began to record the activity in his journal. He was not prepared to give Cole more time, even though Cole was clearly disappointed and Kyle had hinted another round was in order. I did not intervene because I could not know what had preceded this, and I was aware of Cole's social difficulties. Kyle too, was aware and his suggestion was meant to be supportive of Cole. As Cole went to work on his journal, he noticed Jack misspelling his name and angrily said the letters over and over. Jack indicated surprise and calmly corrected it.

During the early problem solving, Jack's group with Thomas (seven) and Emily (six) was very quiet. Thomas said that Jack told everybody what to do on the first occasion and Jack did give an organizational direction while I was there. Thomas was the one who was watching for repeat answers, thus overseeing their solutions. This type of leadership required mathematical competence. Emily did not contribute much though she was definitely capable. The three of them seemed uncomfortable together at the beginning, but as noted above Thomas and Jack came to be friends.

Thomas sought out Jack, something Jack needed for his self-esteem. Thomas told me in a pleased manner during on April 29th that Jack had taught him how to multiply. I would like to have been privy to that lesson for many reasons. (I had taken the eight year olds and various materials so we could figure out 'how to multiply' after the classroom teacher asked me to teach them this. Jack and Cameron spent a great deal of time working on this together, more than the others, all of whom felt proud to be able to multiply. The weekly facts tests showed Jack to be the last of them to actually understand the process. Kim and I spent extra time with him until he did.) Thomas's statement is the only evidence of possible tutoring by Jack. It raises the possibility of long term benefits for Jack in a mixed-age class.

In problem solving with Cathy (seven) and Bridget (six), it was Cathy who took the lead. It was she who offered to explain their work each time I joined them. One of the rules for the bicycle game which they designed on May 4th was "If you answer the question right, move forward one space". (They had a question on each space.) She said to me that she did not understand that rule so I said she should ask her group about it. She asked Jack directly if that meant they then had to answer the question on that new space. His answer, "No, next time," did not satisfy her. She knew it would not work, so she rephrased the question. He repeated his answer. She looked at me but I said nothing. (Either Cathy would force the issue or the problem would surface and

have to be resolved when they began to play.) Unfortunately, the group never chose to play its game so the impractical rule was left.

On May 11th, the same children were combining tens and ones to find combinations and patterns.

Cathy: I need a ten. Jack, I need a ten.

Jack: Okay.

(He passed one to her. They continued their work.)

M: How's your group organized today, Jack?

Jack: Huh?

M: Who's doing what?

Jack: I'm doing the writing.

Cathy: Jack, he's doing the writing and he's passing the papers for the thing and she's *(Bridget)* working on the thing 'cause we finished our number five so she was working on one and we were working on one together.

M: Okay, I understood that. Jack, who decided how it was going to be organized?

Cathy: We came to the table only...

M: Could we let Jack have a go here? Who decided how it would be organized?

Jack: All of us.

M: You talked together? *(Long pause)*

Jack: A bit.

M: A bit? Did you say what you were gonna do? or what happened?

Jack: We said what we were gonna do. Um. She said she wanted to do writing and then, um, she said she wanted to do the gluing and I said I wanted to do the cutting and then we traded the, um, places. She started to do gluing and she started cutting and *(pause)*

M: *(He had not given any indication of whom he meant by "she" in any of his explanation.)* I see. Do you know everybody's name here? Does everybody know everybody's name here?

Jack: Uh, yup. *(He named the girls and I explained why I asked.)*

M: Just carry on then. *(I was indicating that I would just watch and listen.)*

Except for Cathy's being first to offer an explanation, there did not appear to be a leader in this instance. It should be noted that when I asked Jack who was doing what, he responded with an "I" statement. Indeed, this may have been what prompted Cathy to supply the answer to the question. Jack finally concluded that they had all said what they were going to do, naming each person's choices and giving his own 'wants' last.

The three cooperated as they continued, passing the ones and tens among them. Bridget's queries were consistently fielded by Cathy.

Bridget: Do I have to do six?

Cathy: Yeah, do six there.

Later (after several collaborations on the activity, including Jack's cutting pieces which Cathy needed):

Bridget: How many of these little ones?

Cathy: What?

Bridget: How many of these little ones, Cathy?

Cathy: Um, three. 1 - 2 - 3. *(They worked in silence for a few minutes.)*

Cathy: Cut out some ones now.

Jack: That's the ones?

Cathy: For the next one, I'm gonna do all seven ones.

By the end of this exchange, it was obvious that Cathy was arranging the group's solutions, with Jack and Bridget acting as assistants. Furthermore, Bridget looked to Cathy and not Jack for leadership.

During the May 27th problem (pattern block puzzles) Cathy was once again clearly in charge. She volunteered to explain how they were working, and again it was she who was doing most of the thinking. When Jack knocked some pieces out of place as he was tracing them, he made a noise of frustration and a gesture as if to pull his hair out. Cathy immediately stood up and replaced the blocks for him.

Discussion

Jack chose to interact mostly with age-mates. He seemed quite uncomfortable in the single instance of detailed data from a center time with a six year old. (It was Cole.) Aside from his activities with Thomas, Janice (seven) was the only other younger child with whom he interacted for any sustained period (more than a few minutes). Thomas initiated his contacts, but how contacts were made with Janice is not known.

Thomas's attention to Jack was the most observable benefit of this setting for Jack. On April 29th, Thomas chose Jack as the person he would like to work with because Jack would help him with stuff he didn't know how to do, like multiplication. In the same interview, Thomas also said that there was no leader in his problem solving group. My assessment was that he and Jack shared the leadership with Jack assigning the tasks, and Thomas monitoring the solutions for accuracy. They worked well together. Emily (six) did not interact with them verbally, but silently did what was needed. (She was a good mathematician and did not require much direction.) Neither boy was observed trying to socialize with her.

On May 29th, when I was working with Jack, Cathy (seven) asked me how to write two dollars and four cents. I was surprised by Jack's immediate offering to show her, which he did. This was the most confidence which he displayed during the ten weeks. It raised the question of possible benefits of a longer stay in such a setting for

him. He was one of the eight year olds who would likely have deferred to an age-mate had one been present (thank goodness he could ignore a teacher). He would not naturally find many instances to be an expert in his graded classroom. There were no instances noted of younger children asking him for help, and only this single offer. It came after he was able to say, "It was just an accident," when she had cut off part of the group's turtle. Once again, I suspect that he would have left such consoling to someone else if he had been with same-age mates.

Stright and French (1988) stated a need for study of the natural conditions which lead to prosocial development. In the case of students like Jack, a study of cross-age grouping is an obvious choice.

Kyle

Kyle chose teach younger children more often than any other eight year old and he began to do so at the outset. On April 9th, he listened as I talked to Randy (seven) and Cole (six) who were in conflict. He came and sat with us, giving a long explanation of what happens when cards are not shuffled properly and then showing how to do it. After his explanation, I asked Randy what he thought.

Randy: I don't know 'cause I didn't even look at them before. I just got all the good ones and putted them...

Kyle: You don't have to look at them to figure out what...that...He was shuffling and he gave himself the cards and they were all deuces because we put all the deuces together and he got the lot.

M: And what do you think about this, Cole?

Kyle: And he got the low ones.

Cole: It wasn't very good because when I was flipping cards down he was always flipping cards and they were very higher numbers like when I got a 10, he got like a ace.

Kyle: That's like what I'm saying 'cause he prob'ly got the bottom half.

Kyle wanted to be helpful. This is but a small portion of the episode, throughout which Kyle used the third person "he" to refer to each of the boys. It indicates that he was explaining to me, rather than to the boys, though he did address them at the end, saying, "I'll show you how to shuffle." I turned the recorder off at this point, thinking that Kyle would interact with the boys if I left the scene, but Cole asked to hear the tape. He and Kyle stayed and listened. Randy went and sat by himself at the nearest table and played with the cards. I could not tell if he was listening. When I left the boys so did Kyle, and five minutes later Randy came to tell me that Cole was cheating at the game of Contra.

In an interview on June 11th, I was surprised to learn that throughout the ten weeks, Kyle felt he had encountered more negative experiences than positive.

M: How do you feel about working with kids at different ages, like children in grade one and two?

Kyle: Well some of them just quit out on me and some of them just get bored and stop working.

M: Are you talking about during problem solving? *(The previous Monday, his and another pod had been together as a six-some on the floor and the four younger ones had been led off task by Cole who wanted to talk about his birthday. The result had been friction as the three other six and seven year olds responded negatively to Cole. Kyle and Jeremy, the older two, had continued to work on their own until Kyle came and asked me to help.)*

Kyle: And sometimes when I'm playing with them, they like to, um, some of them just like to break something that I do.

M: Really! Who's doing that to you?

Kyle: Well I think Donny (seven). He was always, last time he was making an airplane and he was just having fun and pretending to bash against some tower.

M: Really!! *(I was very surprised.)*

Kyle: Sometimes it broke it.

M: Did you tell him to stop it?

Kyle: Um, I said, "Quit bugging." I was, um, he did. He just started helping us after that a little, and then Darcy (seven) quit out and I was all alone, just doing the tower.

I had no knowledge of this incident, and had thought that he had found his interaction with the younger children satisfying because he had invested so much time in it. As we continued to talk, he said that he sometimes liked to work alone and sometimes he "needed people". As I asked about working with same grade children he began to talk again about some younger children.

Kyle: Yeah, well, um, they *(children in his grade)* mostly, like, uh, they mostly know cause they're older, and they're like, kinds like, more fun to play with, but um, some grade ones and twos, they um, I say, I teach them how to play a game that they already got taught how to play, but they forgot.

M: Do you enjoy teaching kids how to, how to do things?

Kyle: Sometimes. Sometimes when I'm trying to teach them, they um, they uh, they just um, ignore me and they don't know how to play so I have to do it again, show them how to play again. Then they don't listen so, uh, so I don't play with them. [Mhmm] And I say, okay, if you don't know, if I said this already, three times already, you don't know how to play still, I'll just leave.

This may be hypothetical or it may be reflective of some real situation(s). Kyle had used names and details in some of his description of working with others. Once again, what he said was not congruent with my perceptions. He was recorded as having

chosen to work with six year olds ten times, seven year olds ten times, and eight year olds eight times (see Appendix F). He spent long periods of time with the younger children, even when they were not cooperative. He may have thought that this was expected of him because helpfulness had been named as an expectation. He may have just wanted to 'teach' them to do their work well. He may also have needed to get the lack of cooperation 'off his chest' and to test my reactions.

The following example of his helping Cole (six) is illustrative of an interaction about which he felt negative at the end, but which one in which he persisted.

On April 23rd, Cole was trying to record his construction of a cube-a-link rocket on paper with squares equal in size to the square faces of the cube-a-links.

Kyle: Yeah. Keep on going the blocks. Now there's four more, there's another patch of four, and those are all that shape.

Cole: What's 5, 6?

Kyle: There's 5, 6, 7, 8, now 9, 10, 11, 12 *(He pointed to each with his finger and Cole watched.)*

Cole: Yeah 12.

Kyle: You do 12 and those. Keep squares. You just color them in.

Cole: *(Definitely)* Got it!

Kyle: Good...Now you do it right. After, I'll see what you have done and if you have done it right, *(sigh)* I will, um, I'll say it's right.

Cole: What do I have to do with these squares? Like how do I...

Kyle: How do you do that? Now, all you have to do is...

Cole: Oh, you just color the squares in.

(The work proceeded in a similar vein for several minutes.)

Cole: Now the feet!

Kyle: That's gonna be pretty hard.

Cole: *(Emphatically)* The feet are gonna be hard!

Kyle: No, the feet are gonna be easy. See like this. See, it's facing you. Right? (Yeah) It's facing you so I think you will go like that.

Cole: 16

Kyle: You stay there like that. I'll hold on there.

Cole: Kyle, you can work on yours. You don't, you hardly got anything done now.

Kyle: Oh, I got lots done. See.

(Later, as they worked, Cole showed less understanding of what was required. He asked questions about Kyle's directions, until Kyle lost patience.)

Kyle: Yes! See - you keep this here! *(Very quietly)* Now you're aggravating me.

Cole: That looks like 61 *(He pointed to 16.)*

Kyle: *(Emphatically)* Please, you have to do it. You have to do it **yourself** now. I already showed you. I almost did the whole thing. Now it's your turn. See, now you put 19 here. See, 1 and a 9. Now you do 20. You do block number 20.

Though Kyle lost patience at this point, he had been patient for a long time. On a daily basis, Cole was very frequently off task, both during work in the centers and during the problem solving. Kyle had succeeded in keeping him on task for about fifteen minutes. Furthermore, Cole had achieved some understanding of what he was being shown. Neither Kim, nor I, could have achieved better results. As well, this dialogue contained the single piece of evidence of Cole verbalizing a caring attitude towards another child in the class. It was possible that he was responding to Kyle's modeling, confirming Allen's (1976) statement about tutors being respected and emulated.

Kyle saw himself as a teacher when he told Cole to "do it right" and then said he would check it. Other evidence of this role were Kyle's use of language such as,

"Now do you get it?" and, "Now you see," to make certain Cole was attending. For his part, Cole asked many questions showing that he accepted Kyle's role.

Throughout the research tapes, Cole can be heard singing to himself and sighing. I have concluded that these are his way of tuning out of the interaction. During this episode, he only hummed once. Kyle responded quickly with "Okay..." and Cole went back to work. Kyle's on task behavior and his intuitive understanding of Cole's feelings when he began humming are both signs of leadership. Denham, McKinley, Couchoud, and Holt (1990) stated that children who demonstrate such understanding are more likely to be liked, thus being able to gain attention and to initiate interaction, both abilities being important to social development.

On May 5th, Kyle and Roland (six) played the bicycle game which they had designed with Darcy (seven) the previous day. I queried what happened if a person couldn't answer the question.

M: ...And are you allowed to help if a person can't do it?

K: Yeah, you can help a bit.

R: But you can't tell him the answer.

M: I see, so did Kyle help?

Roland: Yup.

M: What did he do to help.

Kyle: Well, I showed him what the number would be if you counted it up low.

M: What do you mean, the low number?

Kyle: Like it was 700 plus 700. You would do 7 plus 7 and you would get up with the uh number.

This was another sustained interaction where Kyle acted as tutor, but very different in mood from the one with Cole. Roland and Kyle were both expansively happy.

On a day when I was explaining how to play the Match Shapes game to Mitchel (six), Kyle sat beside us and took over the explanation, just as he had done in the cards

example already mentioned. Then he sat quietly and watched Mitchel move the shapes around before going off to work with Jimmy (eight). There could be no doubt that he liked to assume the teacher role.

Kyle and Cathy (seven) shared the giving of directions in a weighing activity with Jennifer (six). Cathy stood in the middle and Jennifer's queries were directed towards her. I was standing behind them, scribbling in my notebook. At one point, Kyle asked me how to write 'three quarters' during this exchange and I showed him. When Cathy asked how to write a 'half', I referred her to Kyle. She checked her '1/2' later with me, an indication that she did not trust his tutoring completely. None of the six year olds displayed a similar lack of confidence.

Discussion

As has been mentioned, Kyle's interview belied the fact that he frequently chose to tutor younger children. He did encounter some frustrations, but he persevered. Even in the problem situations, he took this role. Maybe the children would have been more appreciative if he was less thorough. (Teachers have been known to answer in paragraphs when a sentence was requested, much to the chagrin of their students.)

The examples of successful tutoring all involve six year olds and may be seen as confirmation of the French, Waas, Stright, and Baker (1986) statement that sufficient age disparity is needed for this to be successful. They suggested a minimum two year difference. It is possible that Kyle 'lumped' the younger children into a single category, thinking they all needed help with most things. This is the type of stereotyping to which Bukowski (1990) referred, and which he stated decreased with age and experience. I speculated that if Kyle had entered the mixed-age setting in the youngest group, rather than in the oldest, his perspective might have been different.

His interaction with age-mates was comfortable and showed sharing of the knowledge needed. Cathy (seven) was the single younger person with whom equality was achieved. With her, he achieved shared leadership in Parten's (1971) sense.

Though he was negative about the younger children during our interview, it was my opinion that Kyle likely benefited from working with them. He received positive feedback in all the examples found in the data, except for his intervention in the dispute over cards shuffling. Such feedback comes through the tacit acceptance of his directions and questions requiring further assistance.

Jimmy

Jimmy dominated many of the situations in which younger children were involved. He was both benevolent and impatient. He saw himself as a leader with responsibilities, well organized and very capable. From the first day, he interacted with a variety of children. Because leadership in mixed-age settings was the focus of this study, and Jimmy 'took the lead' in groups, he was observed frequently.

With Glenn (seven) and Kenny (six), who were in his original pod, Jimmy was helpful and supportive as well as impatient. Kim and I thought at first that he was like a big brother and then we began to wonder if he was domineering. On the first day of the study, when Glenn said he didn't know how their game was organized (I think he just didn't want to talk about it), Jimmy said encouragingly, "He knows, he knows."

On another day, the three were in a group of seven children sharing tangrams and pattern blocks.

Jimmy: Ohhh! *(He was having trouble with his problem.)*

Mitchel (six): It's okay. *(Everybody concentrated on his own problem for a few minutes.)*

Jimmy: *(Turning to Glenn and indicating Glenn's work)* That's too easy.

(Glenn continued to work in silence.)

Glenn: *(Clapped the table as he found the solution)* I picked an easy one! I picked an easy one!

Jimmy: *(Mimicking in sing song voice)* I picked an easy one. I picked an easy one. I'll tell the teacher.

Jimmy did not know I was close by and he did not move to "tell". Instead, as Glenn tidied the file folder of problems, Jimmy showed his sense of responsibility by helping him and then placing the folder in the center of the table to make more room because it was very crowded. He returned to his tangram problem and showed frustration again.

Jimmy: *(To no one in particular)* It's boring. I think we did enough tangrams.

(He began to put away the tangrams.)

Glenn: No. Kenny needs it.

Kenny looked up, but neither Glenn nor Jimmy said anything more so he continued as before. These exchanges seemed interactive, yet each boy was working individually, unaffected by whatever remarks were made. It was Glenn who demonstrated awareness of Kenny's needs. Later in that same class, a short observation noted Jimmy was trying to explain how to play Solitaire to Bridget (six). Several minutes later, he gave up because it was clear that she did not understand and he dealt the cards between them for a game of "Go Fish". He recognized the level of her competence.

Jimmy saw his role as the director during problem solving. On April 21st, Kenny (six) was away so Jimmy and Glenn (seven) were alone, making combinations of red, green, and blue balloons which added up to ten. As I observed, I could see that Jimmy was in charge of the solutions and Glenn was relegated to cutting. I asked if they were planning to switch roles and Jimmy nodded affirmation. When I returned to their group ten minutes later, Glenn was still cutting. I asked if they had made any changes and Jimmy rubbed Glenn's head, saying that last time Glenn was their best

cutter so he was cutting again. (He was cutting two unaligned papers at a time, fast, but not definitely not well, in my opinion.)

M: So you didn't switch?

Jimmy: Let's switch now.

Glenn: Okay

(They changed chairs. Jimmy began to cut but Glenn did not know what to do because he had not taken part in any of the thinking. He was not incapable as he was to prove on the following week. Jimmy gave directions and Glenn followed.)

The following day, I asked Jimmy what he had learned form working on the problem. His explanation of the calculation was detailed and complete. Then I asked what really interested me.

M: What do you think Glenn learned?

Jimmy: *(Sigh)* I'd have to ask him.

M: Did he understand the nine green - one blue, eight green - two blues?

Jimmy: Well no. I don't think so. He was just cutting them out.

M: So he didn't really take part in the mathematical part of it?

Jimmy: Well he kept asking me questions and that's what got him into the mathematical part.

M: What kind?

Jimmy: Like, he said he put a something down that I knew I had right from the start and he said, "Why?" Well, because, like, I'm going like, nine green - one blue, and naturally saying I'm going down and so when I'm finished that category, I know that I'm finished with that, and so he, um, learned from that but I don't think he understands it completely.

M: Do you think if you had explained it to him, he might have?

Jimmy: Yeah, I think so.

I told him it was important for all the children to understand the problems and made a mental note to watch the group next week. As I analyzed this, I regretted the suggestion that Jimmy give explanations, rather than simply sharing in the organization. I had implied that he should be a tutor.

They were my first stop on April 27th. One glance showed that there was no change, except that Kenny was doing the gluing. Jimmy said quickly that they were going to change jobs after the first ten cube-a-link trains. I sat down to watch quietly. After five minutes, I intervened, saying that Glenn and Kenny were perfectly capable of doing more than cutting and gluing. I was interrupted by another student at that point and when I returned my attention to the group, Glenn spoke to me.

Glenn: Can we put them like this? *(He showed me a block of "five" trains attached to each other vertically as well as horizontally.)*

M: You need room to put the number sentences underneath.

Glenn: Could we put them beside it?

M: That might work. See what your group thinks.

(Kenny said something about his pencil as Glenn started his explanation.)

M: Just a sec' here. Glenn is telling something to your group. Listen to what Glenn is saying.

Glenn: You can put in this square here *(indicating a space on the paper)* and you could put the math questions beside it.

Jimmy: *(After a long pause)* Well, I don't think so because... like, ah, you'd have a like, you need two sheets like, one sheet for a person. Know what I mean?

Glenn: I know what you mean.

*(I did **not** know what he meant.)*

M: So you don't think that's a good idea? *(My tone said that I **did** think it was.)*

Jimmy: No because, um, like, people want to look at it and they'll get mixed up probably.

M: Hmmm.

I interviewed Glenn the next day, saying that I thought his idea was a good one. I waited for him to comment but he didn't.

M: Your group didn't do that, did it? *(Pause)*

M: Can you tell me about that? *(Pause)*

M: How do you feel about that? *(Pause)*

M: Did it matter to you? Did you feel disappointed?

Glenn: It didn't matter to me. It was just a suggestion.

The only clue Glenn gave about his reason for acquiescence was his statement that Jimmy was the leader because he was the oldest. Glenn was not a talkative child at any time. (Interestingly, Glenn interacted with Jimmy in two choice situations after this episode. This could be seen either as confirmation of his acceptance of the roles or a lack of concern.) The following week, I changed the problem solving pods, deliberately placing Jimmy with Janice, an assertive seven year old.

From May 4th to May 19th, with Janice and Mitchel (six), the dynamics of problem solving were quite different. Jimmy and Janice both made suggestions, though he made more. It was shared leadership with questions and negotiations about how to proceed.

Janice: Do you want to have, like, come up, like, to the last one and let's go back ten spaces or...

Jimmy: The last space is finish so it has to go there.

Janice: Let's not...

Jimmy: How many spaces are in the ...*(he counted to 22)* 22. If you make them go back ten spaces it's like making them go back half the board.

Janice: So five.

Jimmy: Yeah, five. Okay. Okay.

Janice: We'll put it right here

Jimmy: Okay, wait. I'm gonna start drawing the , I'm gonna draw the start and Jennifer can draw the um...

Janice: *(Firmly)* Janice

Jimmy: Janice can draw the finish and you *(to Mitchel)* can draw the, um, like where the popped tire should be, and should we make, like, a bonus right here? *(Pause)* Like, bridge go um, short cut, short cut?

Janice: We...

Jimmy: And then we could

Janice: And then we could... *(with emphasis)* And then we could like maybe just spread a line here

Jimmy: Or like a bridge

Janice: Or like a bridge, like here to here

Jimmy: That's too far

Janice: Or from here to here, okay?

Jimmy: Yeah okay. Okay, so...

Janice: Let's fix it, okay?

Both she and Mitchel chose to work with Jimmy on the following day when it was not required and I was not needed to intervene. All three participated, though only two of them communicated verbally.

I placed Randy (seven) with Jimmy for the last round of problems (May 27th to June 8th). I had been watching Randy because of his frequent conflicts. He, too, was assertive. Randy had a great deal of difficulty working with others. For example, he wanted to make the largest set of stairs in that pattern activity, rather than making sets which fit with the group's progress through the pattern. This typified his need to make

the "biggest" or the "only" one in these multiple solution activities. I was curious to know how Jimmy would react to such demands.

This grouping yielded the most surprising data in the study. After their first efforts as a pod, I interviewed them altogether. (Randy had worked separately on the floor making his very large set of numbered stairs while Jimmy and Bridget (six) had worked together at a table, making stairs in order from smallest to largest as the problem had been directed.) When I asked about cooperation, they all agreed that they had not worked together, Randy somewhat sheepishly. Then Jimmy spoke.

> Jimmy: Well, I don't think we worked particularly good but I learned something, like that, like I used to be, like be, have a real big temper, and that's what, before I came to mathlab and um...Well like, I, Bridget didn't know how to make stairs and so when I like, like for example, I say make a five one. I mean like, count on the sides when it's jagged like that, so you count five blocks up...And then she'd just count like five, uh, five blocks up, then go like that and down. Then it's quite simple, then she understands it. Then so, and then, well, in my and Bridget's part, I think our group worked very well together.
>
> *Later, I asked him privately how he felt about this.*
>
> Jimmy: Well I feel pretty good because I didn't have that much friends. [Mhmm] and I was, I was known as the class devil 'cause I always turn red when I was mad and everything like that.

Did working with younger children lessen his outbursts? Likely there were other factors, but his perception clearly was that it had. Lougee and Graziano (1986) found that when older children took on the role of rule enforcer for younger ones, as Jimmy did with Randy, they become motivated to regulate their own behavior.

Randy proceeded to work separately from his partners again on the next problem. There was a physical separation as well as an organizational one, because Randy would not work at the table. Jimmy tried to coax him into working together and

when this failed, he suggested to Bridget, "Let's move down to the floor." During clean up, Jimmy asked to speak to me after class. Before he said anything, he looked around the room to see if Randy had left.

Jimmy: Well I spoke to Randy and he matured up and I gave him a reason like, nobody did that I think. And so, so I think that made him feel like he's needed. I can see he's impatient. [Mhmm] Like he can't wait. [Mhmm] And I made one mistake by making me go first instead of him because I knew he was, he would do that.

(He continued, saying that Randy was working with the group more so I asked what he had said that had helped.)

Jimmy: Well I said that um, while you're working down there, we're having a lot of trouble up here, and um, and if you want to work, you have to help us glue, see um, the sticks *(toothpicks in squares)* on so we could put it underneath the table or wherever, and put your activity on top, and we need you to help us 'cause it'll go faster...

Jimmy was obviously feeling good about himself and the way he had incorporated Randy's competitiveness into working with the group, just as he had felt good about the way he had worked earlier to help Bridget understand the stairs problem.

Discussion

The change in Jimmy's work in the problem solving pods was significant. He had more patience in June than in April which was remarkable, given that he worked with compliant children in April, whereas his June experience with Randy was quite different. He also showed more awareness of the needs of his group members. During the center time work, he interacted comfortably with all three age groups throughout the ten weeks.

Volunteering the information about being previously known as the class devil and about "now" having friends shows an emotional reflectiveness rarely articulated by young children. His teacher confirmed that he had shown temper on occasion, though not in the months of May and June. She did not describe him as friendless. Nonetheless, his perceptions were the most important here. He may have gained self-esteem through his tutoring role (Allen, 76; Brody, Stoneman, and MacKinnon, 1982). His manner of directing the younger children had improved from assigning them to cutting and gluing, to having them take turns in finding solutions and to having them share in the decision making. He recognized the social implications of this. Long term study would be needed to show any real depth of change.

Only with Janice (seven) did he show sharing of leadership. He described his view of leadership in mid May in response to Cameron's (eight) statement that a leader should be a "nice boss".

> Jimmy: But if you're too nice, you could um, people will get through to you, like in parents. If you're too nice, kids'll start saying like, so if I do something bad, they're not gonna reprimand me. So they're gonna start doing bad things, like with grade oners, you don't know what's gonna, you don't know if they're gonna turn nice or bad. And so what I've done with Kenny, Kenny's a real tough kid to work with, so what I've done with him is be nice to him, but not too nice. *(He had shown a parental type of responsibility towards Kenny.)*
>
> M: Mhmm. So you've tried to help him grow a bit?
>
> Jimmy: Like with the weights. I told him I'll play anything you want after you do weights.

His maintenance of control in most mixed-age episodes reflected this view of the need to make the younger ones do their work. Keeping them on task was very important to him. French, Waas, Stright, and Baker (1986) cited on-task behavior as an indication of leadership (though they did not include the use of bribery as a means). In same-age

interaction, Jimmy was consistently on-task and assertive but did not exhibit this sense of responsibility for the others.

Marty

Marty was quietly confident and very competent in mathematics. He said that he liked "to help other kids out" when asked how he felt about working with children of other ages. He explained to Roland (six) how to do tangram puzzles and to create shapes with geostrips. Mitchel (six) said that Marty helped him with words in his journal. As described earlier, he also encouraged Jack (eight) to explain the game he had invented. With Thomas (seven) he interacted as an equal. However, Marty spent most of his choice time with same-age children so less data was collected about him than other eight year olds.

During problem solving when cross-age interaction was a necessity, he was sparing with his communication though certainly cooperative. He offered the information that his group, which included Tammy (seven) and Emily (six), was working well on the turtle problem when I asked them how things were going on May 27th. When I inquired about what made things go well in a group, he responded it was because they were quiet. Emily echoed this and Tammy said it was because they cooperated. (I had placed the three together because they were all very quiet and I thought it might accommodate interaction if there was no need to compete for 'the floor'. Tammy and Marty were certainly comfortable, but Emily was withdrawn, as before.) Marty indicated on another occasion that work proceeded properly because the children were "quiet". Clearly, he valued such conditions.

The first time this pod was together, they began their bicycle game.

M: How did you decide to make your game like this, Marty?

Marty: Well, I'm not sure. We just started writing math questions and then we started writing down, like go back two spaces or go forward, and we just kept going like that. And hardly anybody was talking.

(They continued to work quietly.)

M: So people just filled things in?

Marty: Yup.

M: No talking at all?

Marty: Not very much.

(After they explained more of their game, I asked what happened if someone got a wrong answer.)

Marty: We haven't done that rule yet so we should leave a little bit of space at the bottom. *(Tammy, who was coloring the rule box, stopped.)*

M: What will you do if someone gets a wrong answer?

Emily: Move back a space?

M: Move back a space?

Marty: That's a good one. I like that one.

Tammy added this to their game. Marty showed support for Emily's suggestion, and organizational leadership in his suggestion to leave space for the rule. "We should" indicates group inclusiveness, a prosocial use of language.

Discussion

Marty's belief in quietness, as the element which enhanced work, was very strong. He verbalized it on three occasions. "I'm not bragging at all but, we've been, we're really quiet and we hardly say anything," was the most forceful comment. He differentiated between on-task and off-task talk. When working with Janice (seven)

and Roland (six) on the first problem, he and Janice both chided Roland's for his irrelevant chatter.

Marty always volunteered to explain how his pod was functioning when I approached. Being first to speak for the group is a sign of leadership. He consistently said that they all just started in without any talk. Nobody was named as a decision maker. He and Janice (seven) shared the leadership in their pods, in the example which has been mentioned. He also shared the leadership with Cathy (seven), and this was confirmed through their both being asked for help by Mitchel (six) with cutting and with numbers.

Valerie

Aside from with Bridget (six) and Tammy (seven), Valerie did not choose to interact much. She knew both girls before the math class; Bridget was her neighbor and Tammy was in the same Brownie pack. (I unwittingly placed them together from the beginning.) Kim and I both noted that Valerie was sometimes short with Bridget. Indeed, she did not show patience with other children at times during the problem solving either. Her classroom teacher said that Valerie had difficulties socially with the girls in her home classroom, being overly concerned with maintaining the status quo in her clique. She refused newcomers and clung to those in the "in" group. She worked independently, but often seemed preoccupied. I wondered if she would rather have been in her own classroom during our math time.

Valerie's pod (including Tammy and Bridget) found the most solutions to the first problem, on April 13th, about arrangements of triple scoop ice cream cones. Since a couple of pods had not known how to organize, we took a few moments before beginning the second problem on April 21st to have the three girls explain how their group had worked. Kim accompanied Bridget to one corner to tell the six year olds, I

taped Tammy with the seven year olds, and Valerie was alone in another corner with the eight year olds. Through Tammy, I learned that they had rotated the tasks. (Another factor in their success, which Kim and I had observed, was that Valerie had kept a close check on their answers.) The girls' explanations made a difference. All groups began to work immediately on the second problem.

Valerie's unsociability was demonstrated in several ways. In working with Donny (seven) and Kenny (six) on their bicycle game, Valerie wrote all of the math questions. She used only multiplication and told Kim that the game was "for grade three".

In solving the pattern block turtle problem with Thomas (seven) and Roland (six) she was openly uncooperative. This activity stretched the children's ability to function in groups more than any other because they had to share papers and materials. We did not have enough pattern blocks to do it otherwise. I saw Roland was building a pattern block structure off to one side while Thomas and Valerie had covered the turtle with tan pieces in the hope of finding the largest possible number of pieces used. It was a solution worth exploring, but I saw quickly that it did not work. First, I asked them if it was possible, then suggested they compare it with another one which was hanging on the board. They insisted that it was alright. I finally moved some pieces tentatively. Through all of this I was aware that Thomas was involved in the exploration but she was not. Indeed, she did not make eye contact which made me wonder if she realized all along that it wouldn't work but refused to accept it. She and Thomas moved the blocks again and she said, "It worked." I watched. They tried to trace their solution to record it.

M: *(After more minutes of watching)* I guess the question arises. Does this fit and hold the shape of the outside of it? *(I moved some blocks.)* That does...but does this over here?

At this point Roland became involved and he and Thomas tried to make it work. Valerie was silent. When Thomas eventually concluded, "It doesn't fit," I told them it had been a good try but they might as well try something else.

I watched their second attempt. The paper was in front of Valerie and she dominated the placing of blocks. Thomas managed to place a few when she moved her arm enough for him to do so. Roland watched from across the table. After a few minutes, I could no longer resist saying that I did not think it was fair for the paper not to be shared. Valerie moved it a little towards Thomas, not half way. They completed a turtle.

Thomas: Roland, do you want to cut this out? *(Roland shook his head.)* He says no. Well...

Roland: Yeah. I'll cut it out.

Thomas: We're getting those pieces.

M: Are you.

Thomas: How much time do we have left?

Roland: Thomas *(His tone says Thomas was being impertinent.)*

M: Till about ten to. *(10:50)*

Roland: Thomas, do you ever watch "Square One"?

Thomas: Huh?

This continued for some time. Roland cut and chattered while the others moved blocks without conversing.

Roland: When someone in the class, well they - oh, no! I cut the tail!

Thomas: *(Calmly, as he moved the tail back into position)* Oh, there you go.

Roland: I need some glue to ...

(Valerie and Thomas continued their work through more chatter.)

Roland: Thomas, I accidentally cut the tail.

Thomas: That's, ah, well, tape it back on then.

Roland: *(Forcefully)* Glue it!

The dynamics remained the same for the rest of the class. Roland glued the tail onto the turtle. Valerie and Thomas found another possibility, making their total four different solutions. Thomas exhibited leadership in his method of soliciting (French, Waas, Stright, & Baker, 1986) Roland's contribution of cutting. He also responded to Roland's distress, and Roland turned to him for help.

The following week, Thomas came to me to say that they were having trouble with the toothpick squares. When I arrived, Valerie showed frustration and asked to go to the washroom to wash the glue off her hands. I read this to be avoidance and suggested she could rub them clean over the waste basket, which she did. After they had found the solution for two squares (with my support), she relaxed visibly and the three of them seemed to work together. I was aware of them as I observed at another table. At the end of class, they had found solutions for three and four squares which was an average number.

I interviewed Valerie twice near the end of this study. She was hesitant, but reflectively honest.

M: Does it make a difference to you whether you work with kids that are older than you, the same as you, or younger than you?

Valerie: Nope...Well it kinda does, but it will make things easier if there's kids my age or older, because they won't ask me that many questions.

M: And you don't like kids asking you questions?

Valerie: Well...I don't really mind it.

(I think she gave the response she thought I would approve. After some other questions, I returned to this.)

M: What's **not** good about working with younger kids?

Valerie: Sometimes, like, say, Kenny (six) um, I was trying to help him with his thing and he was getting kind of mixed up, and he was, he always gets mixed up,

like doing numbers and that, so he put instead of 110, he put 1010 and we got all mixed up. And that's Kenny, and we were going slower then.

(She was referring to the stairs pattern problem. She related another similar incident with Kenny. I asked about being a helper, first to a teacher, which she liked, and then to helping "kids".)

Valerie: Well that is...Well I'm not really helpful sometimes to kids. [No?] 'Cause sometimes they don't even ask me questions and they do the wrong things without asking anyone, then, but sometimes like when we do group work, then it gets more better and I could help them more.

M: What ways can you help kids?

Valerie: Um, well, if they're stuck on something, then I could help them with it.

M: Do you mean...How do you mean you help them if they are stuck?

Valerie: Well if it was in math, I would help them get, try and figure out the answer that...Help them figure out the answer, but I won't tell them it.

(I should have asked for a specific example.)

On June 12th, I interviewed her again and asked her to tell me "things she had done which were helpful". As she was faltering with her answer, Jennifer (six) came to us to say she could not fit her block recording onto her page. I remembered from another time that she could not scale a drawing. Valerie was very competent in this area, showing the beginning of using perspective, so I said maybe she and I could go together and help Jennifer.

When we arrived, Valerie did not immediately rise to the occasion. Instead, she sat passively beside me and did not respond to Jennifer's description of her trouble. I was aware of having contrived this and after Valerie's initial failure to reply, I was obliged to ask Jennifer to repeat her problem "So Valerie could hear". Valerie then suggested that Jennifer draw her tower from the bottom block upwards and when she got to the top of the page, she could do the next block at the bottom and go up again.

After some false starts and repetitions this is what Jennifer ultimately did. Her suggestion showed Valerie's comprehension of Jennifer's inability to draw a smaller version, and was an appropriate solution. Though Valerie had demonstrated social cognition in her assessment of the younger child's ability, her attitude certainly could not be considered prosocial.

Discussion

Valerie did not seem at ease in this setting. Likely she missed her close friends in her home room. Perhaps she was uncomfortable at being forced to work with younger children. She was happiest doing independent activities, though she was not unhappy in Tammy's company. She did not care to be a tutor, to work in the groups, or even to interact much with the same-age children in this class. It is possible that she may have liked groups with older children (nine or ten).

Though Valerie interacted least of all the eight year olds, she was definitely not an isolate. She might better be described as not making new friends easily. A long term stay in a mixed-age class where she had begun among the youngest and then eventually become the oldest might have been very helpful to her. We can speculate that she might have been more flexible in her choices.

Chapter 4

Conclusions

The focus of this work had been cross-age interaction and its effect on the older children in particular. These specific questions were asked:

1. Are there children in the class who help others learn? Is age a factor? What are the children's perceptions about this?

2. How do children feel about working with children of other ages?

Age and Leadership

Within the context of those questions, leadership was defined as taking the role of assisting with cognitive or social learning. This could be done through direct tutoring, responding to the ideas of others with acceptance or encouragement, facilitation of activities, modeling of situation appropriate behavior. I expected the older children to fill this role because they would be generally more experienced. Indeed, evidence of such leadership was found among the eight year olds in varying amounts and has been described in the previous chapter.

However, it was not confined to that age group. Some of the seven year olds, notably Thomas and Cathy, showed themselves to be equally capable. As well, two other seven year olds, Janice and Donny, achieved shared leadership in some situations. Janice was particularly persistent in her attempts to do this, even when her ideas were not accepted initially. Also, some data showed the six year olds, Hanna and Jennifer, making important contributions to group decisions and to the work itself. This indicates that leadership in the class was not just a factor of age. Being able to organize group work and to make suitable suggestions in ways which accommodated all

participants, as well as staying on task were among the foremost abilities shared by the "leaders".

Acceptance of Others' Contributions

Acceptance of contributions by younger children was considered a sign of social leadership on the part of the older ones. This was the valued shared leadership described by Parten (1971). Cameron, Jeremy, and Marty were adept at this. They used verbal recognition to reinforce their acceptance of others' ideas. The three were comfortable in groups of any age as well as working independently. (Working independently also signified leadership since it was evidence of purposeful activity.) Jack and Eileen accepted and used the contributions of others, but did not give much overt recognition.

Kyle and Jimmy showed more evidence of wanting to direct alone in group work, perhaps assuming that they would naturally be more capable because of age. Kyle seemed often motivated by the desire to be helpful, and to resolve conflicts for the younger ones, whereas Jimmy seemed motivated by his belief in his ability to do a superior job. From among the eight year olds, only Valerie appeared least able to accept the contributions of younger children. She was also the least interactive with her own age group.

Notably, four of the seven year olds practiced shared leadership in this class and not just when they were readily recognized as contributors by the eight year olds. They seemed to expect to be part of decision making and were not content to do otherwise. This setting may provide a good ground for the development of this type of social ability. Longer studies are needed to explore this. Of the six year olds, only Jennifer and Hanna made any significant contributions to group progress. Their contributions were accepted, but less easily. Both worked with Eileen and she did not always seem to understand the worth of their mathematical or organizational ideas.

The Role of Mathematical Competence

Mathematical competence also appeared to be a factor, but definitely not a guarantee, in the issue of leadership. From among the eight year olds, Cameron, Jack, and Eileen, who were the three weakest mathematicians, used the fewest leadership skills. They shared decision making when it was appropriate, but tutoring, an important part of the prosocial form of directing alone, did not comprise much of their interaction overall. Contrastingly, Valerie who was a proficient mathematician and perceptive in her judgments, elected not to work with others very much, and thus not to be put into either leader or follower positions.

The younger children who exercised the most leadership, Thomas (seven), Cathy (seven), and Hanna (six) were all good students, but there were other good students who did not assume leadership in this setting. All three of the younger children just named participated in tutoring and in decision making, as well as in independent work.

Mathematical competence may have been a negative factor in Jimmy's interactions. He did not entrust any decision making to younger children initially. He told them what to do and expected them to obey. Jimmy's personal reflections which led him to trying to improve his approach by the end of the research, may also have been driven by his cognitive competence. This particular result of the multi-age grouping provides an interesting topic for long term studies.

The Children's Perspectives

Perceptions About Leadership

The setting did have an impact on the children's expectations for leadership. The younger ones always named the eight year olds as the leaders, saying that this was because they were smarter. (There was ample evidence of the older children helping younger ones with various types of work, to account for the attribution.) However, this was not necessarily my perception of the leadership as it was occurring.

Sometimes the seven year olds, and even occasionally the six year olds, exhibited more leadership behaviors, but they continued to defer to the older ones in the groups. There were several illustrations of this, the most notable being the time Cathy (seven) was aware of the implications of an inappropriate rule for their game while Jack (eight) was not. She questioned it twice and then desisted. The younger children never took over the direction of their groups completely. This perception the younger ones had about the leadership of the older ones may be a contributing factor in the increase of self-esteem of children in the multi-age settings as reported by Schrankler (1976).

In defining leadership, the children from all three age groups consistently used the words "helper", "nice", and "smarter" along with "told us what to do". Several children stated that their group leaders were smarter because they were older. Certainly, children's competence increases with age so the last comment is not surprising. However, there were instances when seven year olds said the eight year olds were "smarter" than they were, even though the interaction they experienced did not appear to bear this out.

When they were asked how leaders were helpful to them, the children generally gave examples which concerned facilitation of math activities. This verified tutoring as

a leadership experience for children. The six and seven year olds did not mention 'housekeeping' examples in this context. Contrastingly, when the eight year olds were citing instances of being helped by class members, they mentioned cleaning up and fetching as the most common ways younger ones had helped them.

Two eight year old boys, who were leaders among their regular classmates, defined leadership in more discerning ways. Jimmy said that as well as being helpful, a leader does not show discouragement, in order to keep younger children from becoming discouraged. Marty said that a leader would not be afraid to speak out in situations where there were problems and that leaders were people who knew quite a bit. On the other hand, Cameron, Eileen, and Jack, who would not be expected to achieve leadership with same-age peers, simply said good leaders were "nice bosses". Bukowski (1990) stated that age and experience allow children to develop models of roles which become less and less stereotypical. Jimmy and Marty provided some evidence as confirmation of this.

Though some descriptions of leadership were not necessarily prosocial ("told us what to do" for example), none was distinctly antisocial. This may be seen as a result of this group's life experiences. Jimmy was the only child who disagreed with the use of the word "nice" saying that if parents were too nice, "kids would get through to them". He provided the only example of a diverse leadership style, the use of domination. Conversely, his adoption of a parent-type role towards Kenny (six) and Randy (seven) proved to be far more positive than negative overall.

Perceptions About Working with Children of Other Ages

I asked how children felt about working with older and younger peers in many of the interviews. Two eight year olds made unexpected comments as they compared playing with different age groups. Marty said that "When the kids are bigger, it's hard

to think of something. When the kids are littler, it's easier 'cause they think good, I think. They make up their own things." Jeremy said, "Lots of older kids like don't want to play much. They always play other things." I saw these remarks as a significant confirmation of the value of multi-age settings. Peer pressure may be exerted to play in particular ways as children grow older. Thus children may come to feel subtle constraints about what is age appropriate play as a result of the narrowly defined age groupings imposed by the graded system of schooling. Both of these boys interacted well with age-mates and younger children, but they liked having the freedom to choose.

Among positive remarks made by younger children about working with older children were: "because they do math"; "because younger kids are bossy"; "older kids help me with stuff"; "they take turns". These have in common a recognition of social goals to be constructed through work and in play. They show the younger children's awareness of these goals and the value of having the older children as role models. Added to their beliefs that older children were smarter and older children were the leaders, this too can be taken as confirmation of the merit of the multi-age setting.

Surprisingly, the younger children made no negative comments about any of the older children, despite evidence of occasional impatience on the part of some eight year olds towards the younger children. The only two exceptions to this lack of negativity, Randy (seven) and Cole (six), verbalized resentment about attempted intervention in their many conflicts. This same perception was reflected in the fact that the younger children did not tattle about the older children. (Once again, Randy and Cole provided the exceptions - nine of fourteen recorded tattles involved them, and age did not seem to be a factor.)

The older children made positive remarks about working with younger children as well: "there can be jobs for everyone"; "little ones can learn"; "they cooperate"; "we help each other"; "they make me feel grown up"; "it feels good to help".

However, Kyle and Valerie were negative about this. Kyle said he preferred to work with older children, even though he devoted so much time to tutoring the young ones. Valerie said she did not really like working with younger children, but she was not interactive in general and I wondered if she simply would have been happier in her regular class. (She never verbalized this.) More studies of longer duration are clearly needed to clarify the attitudes of the older children in particular.

One difference in perspective across the age groups was indicated through the naming of persons with whom they liked to work/play. The six and seven year olds readily named older children, as well as age-mates, but the eight year olds preferred age-mates, and only named the younger ones in instances when they had established a bond, such as Jeremy had with Mitchel (six) in their neighborhood, and such as Jack developed with Thomas (seven) through this class.

Effects on Individual Eight Year Olds

One of the purposes of this research was to see if any of the eight year olds who might not have a chance to become leaders among same-age peers could do so among younger children. Cameron, Jack, and Eileen fit this category. These children sought help in interactions with the same-age children in this setting, rarely initiating directions for activities. Their classroom teacher confirmed this observation.

Cameron and Eileen interacted positively with younger children frequently, and Jack occasionally. These instances were examples of shared decision making. Eileen was sought as a working partner by several younger children and Jack was sought by Thomas (seven). Cameron was not named by any younger children as someone they might choose to work with though he certainly interacted comfortably with them.

Jack's teacher confirmed that it would be highly unlikely he would be chosen by his age-mates for any help with academic work, yet Thomas said Jack taught him how

to multiply. Jack's offering to tell Cathy (seven) how to write $2.04 provided an opportunity for him to 'tutor'. This instance with Cathy happened on May 29th, after eight weeks of the math class and was the only recorded example of such volunteering. This example may be seen as a gain in confidence, substantiating Allen's (1976) views on the value of tutoring. Further study would be very worthwhile to see if children like Jack might take more risks of this type in similar contexts.

Cameron's defense of Hanna (six) from Randy's (seven) aggression provided him with a chance to display a type of leadership which he might not have accomplished in his regular classroom. He was not assertive by nature even in playing games which required friendly competition. His means of handling of the situation with Randy bore this out. Cameron acted silently to restore order in each circumstance, but there was little attempt to reinforce his actions in any way.

As mentioned, Jimmy voluntarily stated that he had changed as a result of working with the younger children. He was not concerned about the younger children initially. He offered a few encouraging comments on occasion, but he did not view their learning as important. During April, he saw them as contributors of menial tasks in group efforts. In May, he was observed negotiating decisions with Janice (seven), and by the end of the ten weeks, he had assumed a parental-like responsibility for Kenny (six) and Randy (seven), both of whom lacked math skills. In addition, Jimmy dealt with Randy's conflicts by trying to make Randy feel needed. Jimmy, who had appeared domineering in the beginning, reported beoming more patient and having more friends. It is possible that other factors were involved in this, but his perception was that his participation in this class was the reason for change.

Though age itself was not found to be a predictor of prosocial leadership here, the setting allowed for the practice of the skills involved and did result in care being shown for the younger students by the older students, as well as respect being shown by

the younger. These examples support both the Ford (1977) and the Katz et. al (1990) comprehensive reviews of multi-age research.

Effects on Me, the Teacher

I entered the project expecting to find the grouping to be a positive experience for the children and it was. I have heard some children talking about it a year later and they said they were lucky to have participated. Certainly, it was special because it was a change. They enjoyed the freedom and the wide variety of the choice activities. They enjoyed the open ended problems which eventually covered our walls. They liked being responsible for their own learning of their "facts". However, all of these things could occur in any classroom.

I found much evidence of cooperation among the children and acceptance of each other's work. It was a pleasure for me to watch. I viewed their work on a much more individual basis. This was a result of the multi-age setting, but more importantly, a result of the depth of the research observation. I did not find myself comparing their work very much except when I was checking their Friday facts tests and when I talked with the teachers. Seeing each child's progress in the context of the work which he or she was actually doing was very satisfying to me, convincing me that children can take responsibility for their learning and that each child's learning in multi-age settings could be assessed individually without need of grade level standards. To reach this conclusion, in a similar way, would be valuable to other teachers.

Having to "teach multiplication" to the eight year olds caused me to feel the grade level constraints I discussed in chapter one (and it also raised the specter of serious age level comparison). It focused my attention on two important concerns: (a.) One was the need for teachers in such settings to be aware of the development of mathematical learning in the same way we are becoming aware of the development of language arts learning. Only in this way will we be able to individualize this very

important area of the school curriculum. This development has become an area of personal inquiry for me.

(b.) The second concern was the possibility of some sort of constraints (similar to those of grade levels) at the end of a three or a six year period. This raises the question, "At what age, if any, would achievement levels be appropriate?"

All of this has underlined my personal direction as a teacher. Education must treat children as individuals. We must know what types of learning to provide and how to give the children control of their academic learning.

Implications

Though this research is not sufficient to state that mixed-age classes will improve children's prosocial abilities in general, it definitely did provide positive experiences for the children involved. Stright and French (1988) recommended study of this type of setting as one of the natural conditions which might lead children to the development of prosocial leadership. The cross-age interaction observed during this project demonstrated a good deal of such prosocial practice. As well, Corsaro (1985) has described socialization as children's eventual reproduction of the adult world, and adults are naturally leaders for children. Children use their developing skills to achieve this "reproduction of the adult world" through interaction with peers. This research supports that view and provides evidence that multi-age classes may allow wider opportunities for the practice of the social knowledge already acquired through interaction with adults.

Roopnarine, Ahmeduzzaman, Donnely, Gill, Mennis, Arky, Dingler, McLaughlin, Talukder (1992) concluded that mixed-age groupings fostered more cooperative-constructive play than cooperative-dramatic play, speculating the reason to be a matter of less dependence on verbal fluency for construction activities. Because

my study was almost entirely based upon cooperative-constructive and game playing interaction, the results may appear more favorable than results from settings with different types of interaction. The implications of this for school experiences could prove very interesting; children in mixed-age settings may show strengths in the curricular areas of mathematics and science rather than in the liberal arts. However, like most research on these settings, the work of Roopnarine et al. (1992) involved preschoolers, rather than school-age children. There is much room for future exploration of the school context, including the specifics of language and mathematical development.

Recommendations

(1.) The limitations of a time frame as short as three months needs to be considered in drawing significant conclusions. Therefor, as I have mentioned in several instances throughout, there is a need for similar research over longer periods.
(2.) There is a need for teacher reflection on the decrease in comparison of children allowed by such settings. A natural focus toward individual learning would follow.
(3.) The decrease in teacher comparison of individual children has led me to question the role of competition within schools. Competition has been used by educators as a motivating force, in both explicit and implicit ways. Experience has shown it to be evident in many classrooms. This is another topic which we need to study in depth.
(4.) More mixed-age research is clearly needed to focus on school-age children and on specific types of learning.

Katz, Evangelou, and Hartman (1990) stated that multi-age settings minimize competition because they compel teachers to organize learning activities which accommodate a wide range of abilities, demanding different levels of contributions to any group efforts. Having completed this study, I concur. The setting supported my

'teacher perspective' on individualism. In analyzing the data, I found it necessary to begin by looking at each child separately rather than looking for common themes. Reflection is an invaluable tool in working with children as well as in research.

Before we can report with any certainty about these settings for school children, a great deal more research into cognitive as well as social learning must occur. It is possible future study will conclude that mixed-age groupings are superior for some types of school endeavors, and same-age groupings are for others.

Chapter 5

Of Further Interest: A View of "Isolates" in this Setting

The following discussion of "isolates" was not intended originally. It occurred as a result of my sifting through the raw data before writing. I made several different types of lists and charts as I strove to fit several hundred pages into compact, yet meaningful formats. One of the last of these was the Recorded Interactions found in Appendix F. It provided a representation of the number of each child's interactions and with whom these had occurred.

Emily's lack of interaction was visually striking within this framework. It caused me to remember one of the Monday morning meetings I had with the teachers. Because Kim had drawn my attention to Emily's isolation, I had asked the teachers to tell me if they might describe any of the participating children as isolates. (I did not say why I was asking.) I wanted to know if Emily was just reacting to the class or if this was her normal behavior. I had also been curious about any other children they might mention, but then had not given this issue much more thought until I saw these particular records.

As mentioned, Emily's isolation was noticeably obvious. The absence of interactions with boys was also interesting. I checked to see if any other children had not chosen to interact with the opposite sex. Randy (seven) was the only other child. His profile was also unusual. He and Cole (six) had interacted fourteen times, most of them in conflict. As well, these three children had the greatest number of recorded observations of being alone. Emily's total was seven, the boys' were six each.

Researchers often divide lonely children into two groups, the rejected and the neglected (Roopnarine & Honig, 1985). Rejected children are those whose bids for entry into social interaction are often rebuffed, and who are not liked by the other children. Neglected children are usually shy, withdrawn and ignored by their

classmates. The data showed that Randy, Cole and Emily were indeed lonely, despite the boys' unusual relationship.

Thus, I decided to look up the names of the other children named as isolates on that Monday morning. Mitchel (six) was one because he preferred adult attention, Kenny (six) because he was never chosen when the children picked partners, and Janice (seven) because she was not always cooperative. The teacher of the eight year olds did not believe there were any isolates in that group. Later, during this meeting, the grade one teacher had come back to this topic and mentioned Emily (six) who had cried and had difficulty separating from Mom in September.

A comparison of the numbers of interactions contradicted the teachers' observations. Three of the four children named were shown to have been relatively interactive. The six year old boys, Mitchel and Kenny, were decidedly more interactive with older children and Janice was interactive with all three age levels. Emily, alone readily fit the description of isolate. Though study of teacher perspectives is outside the realm of this report, consideration of the children named became of immediate interest to me, as researcher and as a teacher.

Mitchel (six)

Mitchel was known to me from recess time. He liked to walk around with a teacher, rather than to play with the children. He had often walked with me, and I had asked him what he liked to play when he played with other children. His answer was "I don't know". When asked if he liked to swing or to play soccer, he said yes but never wanted to do those things just then. Mitchel's teacher confirmed this recess behavior and said he was much the same in class, needing a lot of adult approval.

Table 2

Mitchel's Recorded Interactions (as found in Appendix F)

With six year olds	With seven year olds	With eight year olds
1 Cole	1 Cathy	4 Jeremy
	6 Donny	2 Marty
	1 Janice	2 Jimmy
	1 Darcy	1 Eileen
		6 Cameron

Clearly Mitchel was more sociable with older children. However, during the first while, he frequently worked alone and showed his work to Kim or to me. He needed our attention as part of his adjustment to this new situation. On April 8th, he wanted to talk on tape but he said little. Bridget (six), who was nearby said, "I think Mitchel is a little bit shy to talk on the *.(?).*" I asked Mitchel if that was true and he smiled and nodded. Shyness may be largely independent of peer status in early and middle childhood (Hartup & Moore, 1990). It may only be problematic when it coincides with negative self-perceptions. The following narration of Mitchel's interactions include only positive experiences.

The next day, Mitchel made shapes on a geoboard at a table with Donny (seven). I explained to them together how to record their work. Donny understood readily and he showed Mitchel again after I left them. On April 15th, Mitchel played Know It with Cameron (eight). I asked Mitchel how he was doing with reading the questions. There were two sets of questions available for the board and they had chosen the more difficult set. He said he could read some while Cameron nodded encouragement at him.

The next recording of Mitchel was not until May 5th. It was a Tuesday and he was working with Jimmy (eight) on their problem game from the day before. Then Janice (seven) joined them later and they worked comfortably together for the remainder of the hour. The following day, Mitchel was at a table with six other children of different ages, doing assorted activities. He and Eileen (eight) were sharing a red crayon and he showed his work to Eileen for approval when it was complete. The only time he talked while I observed was to Jimmy, who said in frustration that his tangram problem was giving him trouble. Mitchel comforted him saying, "It's okay."

When the pods were rearranged at the centers on May 8th, Mitchel's pod was placed with Jeremy's (eight) pod because they had named each other as children they preferred to be with. Jeremy said, "Oh boy!" when he saw the change. I wondered if they might work together daily, but they did not.

On May 12th and 13th, Mitchel worked with Cameron (eight) and Jeremy to build and record block structures. Cole (six) was with them for a time on the first day, but he deliberately knocked over the structure and I asked him to work at another activity. Mitchel did not talk much, but he contributed to the building and to solving the question of a missing block as the boys were drawing their structures. He checked with Jeremy to see if any of his numbers were backwards and he asked Jeremy how to spell some words, even though I was present. Cameron also asked Jeremy about spelling.

Later that day the three of them played Parcheesi. After Cameron could have knocked one of Mitchel's men out, Mitchel teased him about the numbers on the die.

Mitchel: Hey, this was six and five

Cameron: No

Mitchel: Sure. This was six and nothing

Jeremy: Oh, you almost...if you'd o' moved this guy, you'd 'a' knocked him out

Mitchel: This was a six and a one

Cameron: Who? Who out?

Jeremy: If you'd o' moved this guy, you would o' gone one, two, three, four, five, six

Mitchel: *(with a little laugh)* Knocked me out??? Whoa!

Cameron: *(catching on)* Hey!

May 22nd, Mitchel and Donny (seven) were building with geoblocks. Randy (seven) and Cameron (eight) were beside them, also building. Cole (six) stood and watched, then put a block on Cameron and Randy's structure. Cameron and Randy did not acknowledge Cole. They moved away about a meter and began their own independent buildings. Cole began a building of his own and then added a block to Mitchel and Donny's structure. Donny moved to another activity and Mitchel and Cole completed the building together. All of this was accomplished without words but clearly the shared goal of completing the building together constituted an interactive episode (Goffman as cited in Corsaro, 1985). It was recorded as such. Corsaro stated that children often do not allow entry of another person into their play once it is underway. Though his peers did not, Mitchel did allow it. This is the only recording of an interaction between him and a same-age child. It did raise the question of why Mitchel did not follow his prior partners. It is possible that he was intent on the existing building and not wanting to leave it. He did not stop work throughout, other than to watch as Cole placed his blocks.

Discussion

Outside of his regular classmates, Jeremy (eight) was the only child in the class whom Mitchel knew ahead of time. Mitchel interacted with children he had not known before, all of whom were older. The only interaction he had with a same-age child (related above) was initiated by the other child, who disrupted the original interactive

groups and persisted in attempting to join. Mitchel did not talk much overall, but he did listen and he did contribute to group efforts with materials. He showed supportiveness, he shared, he was recorded teasing in a friendly manner twice.

At the end of the third week of the project, I wrote that Mitchel was one of four children who seemed to be most consistently alone. However, he was neither neglected nor rejected. There are two records of compliments for his work given by eight year olds. He was given help with his backwards numbers and his spelling when he asked. Kyle (eight) took over an explanation I was giving Mitchel about a game. Furthermore, Mitchel was named by Hanna (six) as her second choice of persons with whom to work.

The fact that Mitchel's interactions were almost entirely with older children, and that he interacted more with eight year olds (fifteen times), than with seven year old children (nine times), indicated that mixed-age grouping with a three year age span was beneficial for him. There was no record of Mitchel's having chosen same-age children once during the study. None of the records indicate whether he or the older children were the initiators of their joint efforts but this information may be less pertinent than the fact that he was accepted by them. It might be said that he would never have worked with same-age mates had older ones not been available, because of the teacher's statement listing him as an isolate, usually alone in the regular classroom and at recess.

Kenny (six)

On the second day of the project, I approached a cross-age group of boys playing a game and asked them how they felt about playing a game with people they didn't know well. Kenny made the comment, "Well very good, um, because I like meeting new people that I don't like and some people that I get to know names. I like

it." He was saying that when he knows people, he likes them, and that getting to know their names is important to this process. Unlike Mitchel, he enjoyed talking.

Table 3

Kenny's Recorded Interactions (As found in Appendix F)

With six year olds	With seven year olds	With eight year olds
4 Bridget	2 Cathy	5 Jimmy
	1 Darcy	1 Jeremy
	1 Janice	
	6 Glenn	

Kenny, like Mitchel, interacted more with older children, though more with seven than eight year olds. The teacher described Kenny was an isolate because no one chose him when the children in his class were picking partners or groups.

Most of his interactions were with Jimmy (eight) and Glenn (seven) because the three of them were a pod and together for all of the center days. Five episodes were recorded for the three boys in group activities and these were spread evenly throughout the project. Kim and I noticed that Jimmy was impatient with Kenny on separate occasions when Kenny chose not to complete a task. Jimmy volunteered his feelings about Kenny during an interview on the topic of what makes a good leader:

> Jimmy: But if you're too nice you could... um, people will get through to you, like in parents, if you're too nice, kids'll start saying like...so if I do something bad, they're not going to reprimand me so they're gonna start doing bad things. Like the Grade Oners, you don't know what's gonna, you don't know if they're gonna turn nice or bad, and so what I've done with Kenny... Kenny's a real tough

kid to work with, so what I've done with him, I've been nice to him but not too nice...

M: Mhmm. So you've tried to help him grow a bit?

Jimmy: Like with the weights, I told him I'll play anything you want after you do weights.

Both Kim and I had watched Jimmy go to get Kenny to work on the weights and we agreed that Jimmy was quite impatient with Kenny, when he indicated he did not want to participate. This knowledge, put together with the views expressed by Jimmy, shows that sense of responsibility felt by Jimmy towards Kenny which was described as parental. Jimmy chose to make certain that Kenny participated in this instance and he assisted Kenny through the activity until cleanup time. Because Kenny named Jimmy as a chosen work-mate more than once, he did not seem to have any residual resentment towards the older boy for this.

Cathy (seven) and Janice (seven) also assisted Kenny, who was a weak student, on separate occasions. Kenny was an active participant with them, however. For example, as Cathy poured containers of rice for measuring, he counted. He also turned the rice tub around after she had used most of the rice on one side so it would be easier for her to reach the remainder. No instances of impatience were part of these records.

On April 14th, Bridget (six) and Kenny were together for the hour.

Kenny: Me and Bridget, we made a toothpick racing track. Well, actually it's not a racing track. It's a house and the road was attached and it's like that. I made a different one and Bridget made the same kind... *(He gave the microphone to Bridget.)*

Bridget: I did with Kenny, a road, and it's, and I colored it on my poetry book *(She pointed to her journal.)*

Later in this conversation, Bridget told me that Kenny had helped her, and when we finally made a mathematics connection to the activity, I asked Kenny to help Bridget

record her estimate of the number of toothpicks they had used. Kim said she thought that Kenny was the 'leader' when he and Bridget interacted. Bridget had confirmed this explicitly and I had done so implicitly.

On June 8th, he was part of a minor conflict. During one of the problem solving classes, six boys were working on the floor close together. Cole (six) began talking about his birthday. The others, including Kenny, rejected his choice of conversation and the younger group members began talking amongst themselves while the two older members continued working until one of them became frustrated and told me. Kenny was a part of the total group which rejected Cole and part of the younger group which stopped working. He was not the isolate.

Discussion

Among the six year old children, Kenny's total number of recorded interactions was average, and Kim and I agreed that he was not an isolate in this setting. The older children did assume a 'helper' role with him, yet he too displayed this role with his age-mate, Bridget. In the problem solving situations, he contributed to physical aspects of the work such as cutting and gluing, as he was directed by others. Though he was not named as someone that the others would choose to work with, he participated in group efforts and was only recorded as being alone once. He may be neglected in some situations, but he does not appear to be rejected.

In an interview, he said that what he liked best about the math class was the toys. He went on to say that he liked the problems and pointed to his favorite.

M: Do you remember whom you did it with?

Kenny: *(Looking for the names on the paper),* Uhh. Jimmy and Glenn

M: Did you like working with Jimmy and Glenn?

Kenny: Yeah

M: Do you like working with older kids?

Kenny: Yeah *Sigh* I get used to bigger kids

Though I was certain that the sigh meant Kenny did not like this topic, I pursued it. I wanted to know his feelings about this.

M: Would you rather play with kids in the math class that are in your grade or kids that are older?

Kenny: Kids that are older and in my grade

M: Why?

Kenny: Well 'cause they're kind of nice to me

M: Who is nice to you?

Kenny: Um, Randy (seven), Glenn (seven), Jimmy (eight)

M: What do they do when they are nice to you?

Kenny: They take turns playing whatever we want [Mhmm] Like today, if I picked and Donny (seven) or someone does a ... the one to the day after ...

The taking of turns may have reflected Jimmy's (eight) means of engaging Kenny in the weight work. There were no recorded interactions with Donny (seven), and the rest of the interview, which was not pertinent to sociability, left me very uncertain about the reality of Kenny's comments. (However, he did say that the older kids helped him write in his journal, something which Kim and I had observed.) Teachers' views of realities are not necessarily children's. Children's social cognition is yet another part of their development (Bukowski, 1990), and Kenny's age may be seen as a factor in his perhaps limited perceptions.

Kenny's not having been seen as an isolate in the setting may have been a direct result of the use of the pods for grouping and the demonstration of responsibility toward him shown by some of the older children. The problem days required whole group involvement and he may have liked doing the problems for that reason. The actual structure of the class with the expectation of helpfulness provided a positive

experience for him. Use of deliberately chosen small groups and encouragement of cooperation were among strategies suggested by Roopnarine and Honig (1985) to help young, unpopular children.

Janice (seven)

Janice had some difficulty adjusting to school from the beginning of kindergarten. She refused to comply with teachers and with her peers on occasion. There were temper tantrums, but fortunately, teachers reported that these had become less frequent by grade two. However, a lack of cooperation with peers and teachers still occurred.

On the second day of our class, she drew my attention to a construction made by Bridget (six) and Kenny (six). She stood to the side while I admired it and then went back to her own work. On the negative side, on another day, she circled Jack's (eight) head with a coin stamp as if it were an airplane until I was obliged to intervene.

Table 4

Janice's Recorded Interactions (As found in Appendix F)

With six year olds	With seven year olds	With eight year olds
1 Kenny	1 Cathy	3 Jack
1 Mitchel	2 Thomas	1 Marty
2 Roland	1 Donny	1 Jimmy
2 Emily	1 Tammy	

She was recorded as being alone four times and observations of her in groups indicated that she worked independently for the most part, using interaction in a functional way (to obtain a material, check spelling, etc.). She was often one of the last to leave the class at recess time because she took extra care completing her journal and on one occasion, she was carefully checking her sums with a calculator.

Janice was recorded initiating building with Thomas (seven), and initiating joining a group weighing objects. Research has shown that unpopular children are more likely to be ignored or rejected when they attempt to enter groups (Kemple, 1991). These same children become less and less successful as their expectations become self-fulfilling prophesies.

Only four recordings about Janice fell into the episode category. The others were brief observations and records from her journal about having played with others. During problem solving situations, two episodes were recorded. On April 21st, she told Roland (six) and Marty(eight) about a movie she had seen. At one point, she told Roland to get another piece of paper, which he did, and observation showed that the group worked together well.

On May 27th, she was part of a group from which two transcriptions were extracted. Interestingly, she came on one occasion to tell me that Jimmy (eight) was not allowing her and Mitchel (six) to contribute. I deliberately did not arrive for several minutes, and the group was engrossed when I came on the scene so I did not intervene. It is possible that the knowledge of possible teacher intervention caused Jimmy to cooperate, or that having told me gave Janice confidence enough to gain entry into the planning of their bicycle game. They were comfortably negotiating the direction of their work when I arrived. In the second episode, she contentedly repaired pattern block arrangements which were knocked by the boys and she was the one who made sure that the materials were kept central for everybody's use.

One negative episode was recorded. It was with a same-age peer, Cathy. Cathy had shown Janice's group her group's solution for part of the toothpick squares problem. Janice had copied that solution (other answers were possible, but not easy) and Cathy was upset. During the mediation, the children in the groups had opportunity to tell how they felt about this, but both girls did not change their positions on the fairness of the situation. The six year olds did not venture opinions, and the eight year old who had actually found that part of the solution in the first place was dubious about the seriousness of the copying under the circumstances. Certainly we were left to wonder if Janice had been younger or older than Cathy, would the disturbance have occurred? Research has indicated that same-age groupings foster competition (Johnson et al, 1985; Katz et al, 1990). Or, did Cathy already have negative feelings about Janice from previous interactions? These questions cannot be answered from within the scope of this data.

Discussion

Given the positive and negative observations of Janice in this study, her status might be more readily described as "controversial" (Coie, Dodge, & Kupersmidt, 1990). This label was defined as being neither popular, nor rejected. Controversial children were socially active, aggressive, easily aroused to anger, as well as facilitative of the social efforts of others. Since Brody et al. (1982) found that a variety of roles for peers to model was efficacious to social development, this mixed-age context may have been responsible for this description of Janice.

Janice's attempts to initiate interaction in this context were successful; she did not experience rejection. This is indicative of social competence (Corsaro, 1985; Roopnarine & Honig, 1985). Furthermore, she did work independently within groups in choice settings. This independence may have reflected her attitude toward learning

more than a lack of sociability. Solitary play among the oldest children in a mixed-age setting has been described as goal directed and educational by Goldman (1981). Janice also worked cooperatively in the problem solving groups, and was recorded as being particularly facilitative of the group efforts on one occasion.

Janice was named twice by Emily (six) as someone with whom Emily would like to work. She was not named by others, so it is possible that she is rejected in her regular classroom and this is why she was named by her teacher. Whether her two interactions with Emily were initiated by her or by Emily is unknown. The fact that unpopular children have been seen to play more with other unpopular children (Ladd, 1983 as cited in Roopnarine & Honig, 1985) may also have been responsible for Emily's choice. Emily was an isolate in our setting. She was the least interactive of all the children.

Since Janice's interactions were spread fairly evenly across the age levels, it could be said that the presence of mixed-age children was beneficial to her. Her "controversial" status in this class was preferable to her status in her same-age class where she was rejected. Since Coie et al. (1990) reported that the status of rejected children remained stable across groups, similar study for children who are like Janice is necessary across mixed-age settings to confirm these apparent benefits.

Emily (six)

On the third day of the math class, Kim drew my attention to Emily's isolation. As mentioned, her classroom teacher had added her name to Mitchel's and Kenny's after reflection on this issue (but without prompting).

In the first week of the study, Emily went home from the math class twice, saying she didn't feel well. The third time she didn't feel well, I asked her to stay until recess, and she felt better then. She was absent altogether from three classes during the

first two weeks, and again said she didn't feel well during the third week, but we asked her to stay and just do as much as she was able. The classroom teacher stated that this reflected Emily's behavior at the beginning of the school year and that her mother indicated that adjustment to new situations was difficult. The teacher contacted the mother about the difficulties in the math class and the mother talked to Emily. She did not say she was unwell after that. Ladd (1987 & 1990) has linked school avoidance with poor adjustment resulting from poor peer relations at school. Experienced teachers also link this to adjustment problems, but not necessarily to a lack of positive peer relationships.

Emily showed herself to be particularly competent in mathematics and worked very well in this setting. During the Tuesday after the May 19th problem making toothpick triangles, she worked on alone, taking her group's solution further than that of any other group.

Table 5

Emily's Recorded Interactions (As found in Appendix F)

With six year olds	With seven year olds	With eight year olds
6 Hanna	2 Janice	1 Eileen

Three is the fewest recorded interactants which any of the children had. Emily was recorded alone seven times; this was the greatest number in the class. Two of the "alone" records showed her to be watching other children, not involved with her own materials. On April 21, during the problem solving, she also spent time watching children, particularly others than in her group.

On April 15, Emily readily named Janice (seven) as someone with whom she would like to work. They were in the same center for the first half of the math class. Janice and she had been at the same table once but they had each worked separately, perhaps evidence of goal directed, educational activity. When I asked, Emily said she had never asked Janice to play. Since Janice had also been named as an isolate, this may have had significance as has already been suggested. However, she might have chosen Janice because they did have goal direction in common. Though there were eventually two interactions between them recorded, the data does not include which of them initiated these.

On June 11, Emily was interviewed and once again she named Janice as someone she liked.

Researcher: ...How do you feel about working with older kids?

Emily: *(With emphasis)* Good!

M: Yeah? *(Long wait for additional information)* Would you rather work with older kids or younger kids?

Emily: Both

M: You like both? [Mhmm] Which older kids do you like to work with?

Emily: Janice, Eileen, umm... *(She had played her Tens game with Eileen (eight) that day)*

She was not forthcoming with information on the next few questions, though she did say she had worked with Tammy (seven) on problems and she liked her. They had worked cooperatively, though neither communicated much.

M: When you're working with older kids, what sorts of things happen that you like?

Emily: Well some of them are not as bossy as little kids, as little ones are

M: They're not as bossy. When they want you to do something, how do they do it if they don't boss you? *(long wait)*

Emily: Well, they ask me to do it and they say, and if they, if they ask me, if they ask me something, if they ask me to do something, that, that, that, I, that, I can ask them to do some things that I want them to do.

Reciprocity in their dealings was what she liked about the older children. (Kenny, too, had liked that about the older children.) However, this last statement appeared to be hypothetical, rather than a relation of any event.

She appeared to find the interview situation mildly uncomfortable, so I did not take the opportunity to ask the same question about younger children. However, on May 29th, when I was talking to Kenny and he said that babies were 'bad', Emily volunteered that babies could be quite bad, she had a two year old at home. Perhaps when she mentioned "little kids" this is what she had in mind, rather than six year olds.

During the bicycle game creation on May 4th, Emily made a suggestion which was praised by Marty (eight) and adopted by him and Tammy (seven). Marty said that their group was doing well because they were working quietly. (He said this about them on another occasion as well.) Tammy said it was because they were cooperating. After these comments, I asked Emily and she repeated that it was because they were working quietly. It was surprising that Marty was not someone named by Emily as a person with whom she would like to work, since they had been very successful as a problem solving pod. The question it raises for further research is: Do young school-age children who are isolates feel more secure with peers of the same sex?

Discussion

Emily was not named by anyone as a preferred work-mate. This, combined with her lack of interaction, indicated that she might be neglected by her peers. Rejection was not evidenced and Emily did interact successfully with Hanna (six) a total of six times, so she was not completely neglected by her peers. However,

children who are often chosen by others for interaction have that many more opportunities to develop their social competence (Kemple, 1991) and subsequently their confidence. Though competent and confident cognitively, Emily was not the same socially.

Emily was in need of successful social experiences. The availability of older and more competent models may have been helpful to her. Since older children have learned to be more empathetic (Burleson, 1982), they would be more likely to give her the positive responses she required. Longtitudinal study of effects of multi-age groupings on withdrawn children is needed to confirm or deny this hypothesis.

Of the four children mentioned in this chapter, Emily was the one who appeared to most fit the description of "isolate". Exploration of interventions suitable to children like her, should include the availability of empathetic, goal directed children, both characteristics more likely to be found in older school children.

Conclusions and Implications

The literature review in the chapter one stated that mixed-age grouping for three and four year olds was found to facilitate social development, fostering interaction and goal directed play with less call for adult guidance (Brody, Stoneman, & McKinnon, 1982; Goldman, 1981). As well, withdrawn preschool children were found to become more sociable through mixed-age play (Furman et al., 1979). The evidence presented in this chapter supported those findings for some six and seven year olds in a school setting which included eight year olds.

Among the specific positive effects found here were:

1. Mitchel's looking to older children for help and approval after he had adjusted to the setting, rather than looking to an adult ;

2. Kenny's lack of negative self-perceptions because of his increased participation which resulted from the older children's sense of responsibility;
3. Marty's lack of competitiveness about the copied problem solution which allowed Janice to exit a potentially explosive situation simply by using an apology;
4. Emily's ability to be a competent contributor in mixed-age groups, plus her naming of older, goal directed peers as preferred work-mates.

It should be noted that of the four, only Emily was more interactive with a same-age peer than others. The dates of her nine recorded interactions (six with Hanna) were all in the last half of the class except for one, and were evenly distributed so as not to indicate any shifts or changes in choice over time. The increase in interactiveness was more likely due to adjustment to a new group than to the type of group itself.

Though this context attended to children who had grown past preschool in age and experience, it demonstrated that possible benefits from multi-age grouping did not diminish. Further research with school children is needed to provide the impetus necessary for educators to arrange such groupings as a natural means of fostering social development.

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Appendix A
Letter of Permission

Dear _____;

Your child, _____, is invited to participate in a mathematics program in which children from grades one, two and three will be working together for one hour each day during a ten week period from April to June, of the school year.

Your child's work will be based on his/her individual level, and the topics will match those covered in the regular classroom during this time.

Work will be conducted with a problem solving approach and the children will learn that there are often many ways of solving a single problem. They will be taught to keep records of their activities in daily math journals.

The students will work individually and in groups of two and three. They will be encouraged to consult with each other and to help each other. Skills and concepts will be developed by each child at his/her own pace in a cooperative, non competitive setting.

Your child's progress will be carefully monitored and you will receive a report at the school's regular reporting period. Parents will be welcome to visit the math class at any time. Towards the end of the ten weeks, the children and I will invite you to a special evening when they will show you the activities which are their favorites.

In particular, in this session, your child will be interviewed as part of my Master's Degree research project. The interviews will sometimes be tape recorded and sometimes not. The research concerns how the children group themselves in this mixed-age setting. The interviews will sometimes be planned and sometimes spontaneous. they will take place during the math class. The questions will be about the children's preferences to work alone or in groups, as well as about how the activities proceed when they are together.

The children's identities will be kept entirely confidential through the use of false names in the written thesis and the oral discussion of the results. The tapes will be destroyed after the research is complete.

This is the third session of the mixed-age program in Bird's Hill School, though the first to be used for research. The children in the previous two classes were very comfortable in this setting. In fact, they enjoyed the experience because it provided a change from their daily routine.

Your child's participation in this project is voluntary and you will be free to withdraw your child at any time should you so wish and any information collected will not be used. Should you agree to your child's participation, you will be provided with a two page summary of the findings at the end of June. This research has been sanctioned by the River East School Division.

If you agree to permit your child to participate in the research, please sign the form below. Should you have any questions, do not hesitate to call me at school. The number is 663-7669.

Thank you.

Denise McWilliams

.....

I give permission for my child,_____, to participate in the ten week (April to June) mixed-age math class. Taped interviews with my child, as well as written observations of my child may be used for educational research.

Signature of Parent _____

Date _____

Appendix B
Groups at the Centers
(from April 7 to May 7)

Six year olds	Mitchel Hanna	Roland Emily	Bridget Kenny	Cole Jennifer
Seven year olds	Donny Darcy	Janice Thomas	Tammy Glenn	Randy Cathy
Eight year olds	Cameron Eileen	Marty Jack	Valerie Jimmy	Jeremy Kyle

Groups at the Centers
(from May 7 to June 16)

Six year olds	Mitchel Cole	Hanna Emily	Jennifer Kenny	Bridget Roland
Seven year olds	Donny Randy	Darcy Thomas	Cathy Glenn	Tammy Janice
Eight year olds	Cameron Jeremy	Eileen Jack	Kyle Jimmy	Valerie Marty

Appendix C
Activities in the Centers

Center One:

Know It - Game in which the goal is to collect pattern block shapes in order to be the first to complete a dodecagon. Each space has a question which must be answered for the participant to get a shape. The spaces are numbered and the questions are in a book. (I made a second book of questions which were as varied as the commercial ones, but less difficult.)
Base ten blocks, matching stamps, and approximately twenty-five problems with different levels of difficulty
Geoboards, blank recording sheets, and approximately twenty-five geoboard problems with different levels of difficulty
Tessellation tracers
Balance for Bears with set of plastic bears in three sizes and weights. (Two small bears weigh the same as one medium and three small bears weigh the same as one large.)
Rice, twelve transparent household containers (numbered on the bottom to ease recording), and graduated cylinders

Center Two:

Match Wits - Game of matching shapes with three attributes (color, shape, size). Each match gets a score based on the total from the adjoining cards.
Pattern blocks and approximately twenty-five problems of different levels of difficulty
Attribute beads with three attributes (color, shape, size), laces
Egg cartons with numbers from 1 to 12 - bingo chips or dice to be placed inside, lid closed, shook, and added the number + 1 or number on dice. (Bingo chips could be taped together for other addends.)
Number balance with ten gram weights to demonstrate addition
Mr. Mighty Mind - Shapes and problems to solve
Playing cards

Center Three:

Pizza Party - Game of trading fractions (1/2, 1/3, 1/4, 1/6, 1/8, 1/9, 1/12, 1/16) to make as many whole pizzas as possible
Cube-a-links (with additional circular and quarter shapes) and twenty-five problems of different levels of difficulty)
Attribute blocks with four attributes (color, size, shape, thickness) and five problems
Pegboards, pegs, blank recording sheets, and a box of problems

Matching shapes - Game of matching tiles with three identical shapes, but in different placements and positions
Big to small - Seven sticks and seven paper dolls with ascending orders of sizes
Colored toothpicks

Center Four:

Parcheesi - Game of strategy (Four players role die and move around board.)
Tangrams and package of tangram puzzles
Playing cards
Money, cash drawer, and matching stamps
Geoblocks - Wooden blocks of various shapes and sizes
Geostrips - Plastic strips of four lengths with holes (approximately every four cm) for attaching with pins

Appendix D
Problems to be Solved by Cross-age Pods

April 13 Make as many triple scoop ice cream cones as you can using chocolate, vanilla and strawberry.

April 21 Make as many combinations of colors as you can for ten balloons, using red, blue, and green. Record the results.

April 27 Make as many different combinations of cube-a-link trains as you can with four, five, and six cube-a-links. Record the addition sentences.

May 4 Create a game about bicycles using a game board.

May 11 Make as many combinations of stars (ones) and strips (tens) as are possible using five, six, and seven pieces. Record their value. What is the pattern?

May 19 Make as many adjoining toothpick triangles as you can. Record the numbers of triangles and the number of toothpicks used. What is the pattern?

May 27 and June 1 (Half the pods did each problem each day.) 1. Make as many different turtles in the outline as possible. Trace to record. Count how many pieces used and place with all other turtles collected in class in order of least number to greatest number of pieces used. 2. Cut stairs from large graph paper starting from a set with one stair, then two stairs, and so on as high as you are able. What is the pattern?

June 8 Using twenty toothpicks each time, make one square, two squares, and so on. Each set of squares must be touching at a corner or joined by at least one toothpick.

Appendix E
Problem Solving pods

April 13th, 21st, 27th:

Six year olds	Jennifer	Hanna	Emily	Kenny
Seven year olds	Cathy	Darcy	Thomas	Glenn
Eight year olds	Kyle	Eileen	Jack	Jimmy
Six year olds	Roland	Bridget	Mitchel	Cole
Seven year olds	Janice	Tammy	Donny	Randy
Eight year olds	Marty	Valerie	Cameron	Jeremy

May 4th, 11th, 17th, 27th:

Six year olds	Mitchel	Emily	Bridget	Hanna
Seven year olds	Janice	Tammy	Cathy	Randy
Eight year olds	Jimmy	Marty	Jack	Cameron
Six year olds	Cole	Jennifer	Roland	Kenny
Seven year olds	Thomas	Glenn	Darcy	Donny
Eight year olds	Eileen	Jeremy	Kyle	Valerie

June 1st, 8th:

Six year olds	Bridget	Mitchel	Hanna	Emily
Seven year olds	Randy	Cathy	Tammy	Janice
Eight year olds	Jimmy	Marty	Jack	Cameron
Six year olds	Jennifer	Kenny	Cole	Roland
Seven year olds	Glenn	Darcy	Donny	Thomas
Eight year olds	Eileen	Jeremy	Kyle	Valerie

Appendix F
Recorded Interactions of Each Child in Choice Situations

Six Year Olds	With Six Year Olds	With Seven Year Olds	With Eight Year Olds	Alone
Jennifer	4 Hanna	12 Cathy	3 Eileen 4 Kyle	3
Kenny	4 Bridget	2 Cathy 1Darcy 1 Janice 6 Glenn	5 Jimmy 1 Jeremy	1
Hanna	4 Jennifer 6 Emily	3 Cathy 1 Tammy	1 Jack 4 Eileen 1 Cameron	3
Mitchel	1 Cole	1 Cathy 6 Donald 1 Janice 1 Darcy	4 Jeremy 2 Marty 2 Jimmy 1 Eileen 6 Cameron	5
Roland	1 Bridget	1 Darcy 1 Donny 2 Janice	3 Kyle 2 Marty	3
Emily	6 Hanna	2 Janice	1 Eileen	7
Cole	1 Mitchel 1 Bridget	5 Cathy 1 Thomas 14 Randy 1 Glenn	2 Jack 3 Kyle 1 Valerie 1 Eileen 2 Cameron 6 Jeremy	6
Bridget	4 Kenny 1 Roland 1 Cole	4 Tammy 2 Glenn	2 Jimmy 3 Valerie 1 Eileen	0

Seven Year Olds

Cathy	12 Jennifer 2 Kenny 3 Hanna 1 Mitchel 5 Cole	3 Darcy 1 Janice 1 Tammy 1 Glenn	6 Kyle 3 Jimmy 1 Valerie 1 Cameron 2 Eileen	1
Thomas	1 Cole	2 Darcy 2 Glenn 2 Janice	3 Jack 3 Marty 2 Jimmy 1 Eileen	1
Darcy	1 Kenny 1 Roland 1 Mitchel	12 Donny 3 Cathy 2 Thomas	2 Kyle 1 Jack 1 Valerie 1 Eileen 2 Cameron 1 Jeremy	1
Donny	6 Mitchel 1 Roland	12 Darcy 2 Randy 1 Janice	1 Valerie 2 Eileen	1
Randy	14 Cole	2 Donny	2 Cameron 4 Jeremy 2 Kyle	6
Janice	1 Kenny 1 Mitchel 2 Roland 2 Emily	1 Cathy 2 Thomas 1 Donny 1 Tammy	3 Jack 1 Marty 1 Jimmy	4
Tammy	1 Hanna 4 Bridget	1 Cathy 2 Glenn 1 Janice	1 Marty 5 Valerie 1 Jimmy	1
Glenn	6 Kenny 1 Cole 2 Bridget	1 Cathy 2 Thomas 2 Tammy	4 Jimmy	2

Eight Year Olds

Jack	1 Hanna 2 Cole	3 Thomas 3 Janice 1 Darcy	6 Marty 4 Jimmy 1 Cameron 2 Eileen	1
Kyle	4 Jennifer 3 Roland 3 Cole	6 Cathy 2 Darcy 2 Randy	3 Jimmy 4 Jeremy 1 Eileen	3
Marty	2 Mitchel 3 Roland	3 Thomas 1 Janice 1 Tammy	6 Jack 2 Valerie 7 Jeremy 1 Jimmy 3 Cameron	2
Jimmy	5 Kenny 2 Mitchel 2 Bridget	3 Cathy 2 Thomas 4 Glenn 1 Tammy 1 Janice	3 Kyle 4 Jack 2 Jeremy 1 Marty	3
Valerie	1 Cole 3 Bridget	1 Cathy 1 Donny 5 Tammy 1 Darcy	2 Marty 1 Eileen	3
Eileen	3 Jennifer 4 Hanna 1 Mitchel 1 Emily 1 Cole 1 Bridget	1 Thomas 1 Darcy 2 Cathy 2 Donny	1 Valerie 2 Cameron 2 Jack 1 Kyle	1
Cameron	1 Hanna 6 Mitchel 2 Cole	1 Cathy 2 Randy 2 Darcy	3 Marty 2 Eileen 1 Jack 2 Jeremy	3
Jeremy	1 Kenny 4 Mitchel 6 Cole	4 Randy 1 Darcy	7 Marty 4 Kyle 2 Jimmy 2 Cameron	1

THE UNIVERSITY OF MANITOBA

FACULTY OF EDUCATION
Research and Ethics Committee

Winnipeg, Manitoba
Canada R3T 2N2
Telephone: (204) 474-9014
Fax: (204) 275-5962

April 15, 1992

Ms. Denise McWilliams

, Manitoba

Dear Ms. McWilliams:

Thank you for sending me the revised letter of consent as well as the letter of permission from the River East School Division consent concerning the proposed research, "Social interaction in an Early years multi-age mathematics class". I have reviewed these and am pleased to report that they conform to the ethics policies and procedures of the Faculty. Accordingly, I have attached a copy of the signed ethics approval form.

Good luck with your research.

Yours truly,

Stan B. Straw, Ph.D.
Chair, Research and Ethics Committee

JCK/ew

Enc.

cc. Dr. K. Seifert, Advisor

Faculty of Education
ETHICS APPROVAL FORM

To be completed by the applicant:

Title of Study:

Social Interaction in an Early Years Multi-age Mathematics Class

Name of Principal Investigator(s) (please print):

Denise McWilliams

Name of Thesis/Dissertation Advisor or Course Instructor (if Principal Investigator is a student) (please print):

Kelvin Seifert

I/We, the undersigned, agree to abide by the University of Manitoba's ethical standards and guidelines for research involving human subjects, and agree to carry out the study named above as described in the Ethics Review Application.

Signature of Thesis/Dissertation Advisor or Course Instructor (if required)

Signature(s) of Principal Investigator(s)

To be completed by the Research and Ethics Committee:

This is to certify that the Faculty of Education Research and Ethics Committee has reviewed the proposed study named above and has concluded that it conforms with the University of Manitoba's ethical standards and guidelines for research involving human subjects.

S.B. .....
UNIVERSITY OF MANITOBA

Name of Research and Ethics Committee Chairperson

April 15/92
Date

Signature of Research and Ethics Committee Chairperson