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ABSTRACT

Before 1970, no mixed-age groups existed in Swedish nursery schools. By 1991, 43 percent of children enrolled in nursery school were in mixed-age groups of ages 1 to 6 years, and 37 percent were in groups of children ages 3 to 6 years. Mixed-age groups are assumed to have advantages, including positive influences on learning and social development, as well as increased teacher satisfaction. However, a review of comparative studies investigating the effects of age span on children's learning and socio-emotional development and on teachers' satisfaction reveals conflicting conclusions. To determine the effects of mixed-age instruction, additional evaluative research is needed. (MM)

MIXED AGE GROUPS IN SWEDISH NURSERY SCHOOL AND COMPULSORY SCHOOL

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Mixed-age groups in Sweden

The age composition of Swedish nursery school groups has thoroughly transformed during the last two decades. Before 1970, there were no mixed-age groups. Today, one characteristic of Swedish nursery schools is the instructionally motivated mixed-age group. In 1991, only 3% of children enrolled in nursery schools were in same-aged groups (Statistics Sweden, 1992), compared to 43% where toddlers and preschool children were mixed (e.g., children between 1 and 6 years of age) and 37% where children between 3 and 6 years of age were together. The remaining 16% were toddler groups.

Mixed-age classes in primary school have a long history in Sweden and still occur in the countryside, due to few same-aged pupils. In 1988, about 4% of all mixed-age classes at the junior and intermediate level of compulsory school were started because of few pupils (Malmros & Sahlin, 1992). In these *multigraded classes* two or three grades are physically though not instructionally integrated. The teaching therefore often equals that in same-aged classes. The pupils are seated in age-homogenous groups in the same room. The teacher then uses a technique of an "imaginary wall" between the different grades. First one grade is taught a section of knowledge while the other works independently. When the first grade is working with self-instruction the second group is presented a new content. Today, however, many mixed-age classes are started because of believed instructional advantages. Between 1983 and 1988 the *non-graded classes* increased from 1% to 5% (ibid.). Today, there is reason to believe that this number has been doubbled and that approximately 10% of all classes in the compulsory school are non-graded. Most of these classes are to be found at the junior level of the compulsory school. This chapter will describe the assumed advantages of mixed-age groups in Sweden as well as review comparative studies that have investigated the effects of age span on children's learning and socio-emotional development and on teachers' satisfaction.

Assumed advantages of mixed-age groups in nursery school[1]

In 1972, the 1968 Commission on Nursery Provision (SOU 1972:26 and 27) presented its recommendations. One part was devoted to the question of the influence of age span on child groups. The commission recommended two new types of child groups: the toddler group (for children 3 years or younger) and the *sibling group* (for children between 3 and 6 years of age). The motive was that children's chronological age was considered an inadequate criteria to use for formation of child groups; children develop differently and at different speeds. Furthermore, it was stressed that children learn and develop in interaction with older children. Since many children grow up without siblings the natural way of learning has diminished. Thus, if children were allowed to stay in mixed-age groups their social, emotional and intellectual development would be supported. The reason that children younger than 3 years of age were placed in separate groups was that small children were supposed to lack capacity for the social interaction with other children.

In 1981 the Family Aid Commission (SOU 1981:25) proposed that all children in nursery schools should be placed together in one single group, irregardless of age (i.e., from 6 months of age to school start). This group was called the *extended sibling group.* According to the Family Aid Commission, all children have the capacity for social interaction even when very young. The idea was that a large age span, as would be in the extended sibling group, would increase the mixed-age interaction. This, in turn, was assumed to be of importance for children's socio-emotional and intellectual development. Among the things that were mentioned was that a mixed-age group gives better opportunities for co-operation and consideration between its members; the number of conflicts are reduced; and that it comes naturally for older children to help younger ones; that younger children learn from older ones. The difficulty for instructional activities with such

[1]In Sweden the nursery schools accept children from their first year of life up to school entrance at 6 or 7 years of age. The staff consists of child nurses with two years of training after compulsory school and preschool teachers with 2½ years of training after graduation from the gymnasium at a teacher college. Normally there are about 15-18 children in the child groups and three staff members. Ample space (approx. 10 m^2/child) and equipment are available. Most children spend six hours or more each day in the nursery school.

a heterogenous group was acknowledged[2]. The Family Aid Commission claimed however that this problem could be solved by occasionally occurring same-aged sub-groups, e.g. a group in which only 6-year-olds were together. Research shows that the same-aged subgroups became frequent (e.g., Johansson & Sundell, 1989); almost all 6-year-old children participated in same-aged groups, irregardless of the age composition in the nursery school. For younger children, the percentage was between 30 and 50%. Usual topics that were dealt with for the older nursery school children were preparatory reading and arithmetic (ibid.).

The Family Aid Commission (SOU 1981:25) also assumed that a large age span in the child group would be favourable to the nursery school staff, in making the work more stimulating and varying.

Assumed advantages with non-graded school classes

At the end of the 70's a compulsory school in a suburb of Stockholm introduced mixed-age classes at the junior level. The reason was not lack of children of the same age but the belief that *non-graded (NG) classes* would favour the pupil's social and intellectual development. The NG-classes were immediately approved of by all levels of the school administration (e.g., National Board of Education, schools of education and county school boards). The pupils in these classes are normally seated in mixed-age groups, e.g., two 7-year-olds, two 8-year-olds and two 9-year-olds. Several advantages are associated with the NG-class (cf. Nandrup & Renberg, 1992; Andræ Thelin, 1991; skolöverstyrelsen, 1985; Östmar, 1981). One is that individual teaching is easier since the mental level of each pupil becomes apparent for the teachers. The learning is also supposed to be better in that younger pupils learn from older ones. When the older pupils instruct the younger ones, they are also forced to formulate the knowledge in a communicative way which strengthens their knowledge. Another assumed advantage is that the NG-classes influence social development. The integration of different ages, competencies and heights (along with

[2]There are no regulations forcing the staff to use a specific instructional style; the staff are free to choose their own way to work. The aims are both to provide care and to provide educational stimulation. By tradition, the stimulation of socio-emotional development has been considered most important. However, the stimulation of speech and cognitive development has attracted an increased interest during recent years.

different races, sexes and cultures), makes apparent that people are different, which promotes tolerance and counteracts competition and self-assertion. Thus, the older pupils are placed in the role of a good model for the younger ones. All together, the NG-class is believed to foster democratic attitudes and make children tolerant and open-minded.

The NG-class is also assumed to be favourable to the teacher. The teaching in NG-classes demands a more structured planning which is assumed to foster a more flexible attitude to the teaching and children's interests. Another advantage is supposed to be due to the need for collaboration with other teachers. This is assumed to promote an instructional debate among the colleagues, which in turn leads to new instructional methods.

Research on extended sibling groups

The Family Aid Commission (SOU 1981:25) initiated a number of evaluations of pilot projects with extended sibling groups in the second half of the 70's (see SOU 1981:25 for a review of these evaluations). These were all in favour of child groups with a large age-span. The most important advantage was said to be associated with the children's social development. However, these evaluations were characterized by poor research methods. There were, for instance, no comparisons with other types of age composition; short time lag between the implementation and the evaluation; few groups and small samples of children; obscure reliability and validity of adopted measures; no independent observations or tests, only interviews with teachers who worked in these groups and classes.

A second wave of research started at the end of the 80's. This new interest was partly nourished by criticism coming from nursery school teachers (e.g., Svenska fackläraförbundet, 1986; Halvarsson, Hudner & Rolander, 1987). The new evaluations failed to replicate the early supportive results. These evaluations generally have used more sophisticated designs in that they included other types of age compositions as well as included measures of the children's social background.

Learning effects. In a project where the main purpose was to evaluate the effects of age composition (Johansson & Sundell, 1990) 14 nursery schools representing different age spans, were visited twice with a six-month interval. Four of the nursery schools had children between the ages 1 - 6, four between 2 - 6, four between 3 - 6 and two had age-homogeneous groups, one with children between 3 - 4, and one with ages 5 - 6. All

nursery schools had this age composition for at least one year and there was no open criticism among the staff of the age composition. The extended sibling groups (i.e. 1 - 6 and 2 -6) also had well-balanced age compositions. The choice of nursery schools offered natural control groups for the extended sibling groups. All children 3 years and older who attended the 14 groups, and their parents were asked to participate in the study. A total of 179 families participated, with only 9 refusals.

A causal model for the assumed influences on children's development was formulated using a total of 19 possible determinants gathered under 7 latent variables (the child's social background, age, gender, the age span in the child group, the age mixture in games, the instructional style and the length of enrolment). The determinants were chosen according to the results of previous research; they had earlier been related to children's socio-emotional and cognitive-linguistic development.

Structural Equation Modelling (LISREL) indicated that the child's age and social background influenced the child's speech and cognitive competence (Figure 1). A large age-span in the group also increased the mixed-age interaction among the children. There was a small, but significant, influence of a large proportion of mixed-age interaction in games on poorer speech development. A large age-span also influenced negatively the instructional style of the preschool teachers. In groups where there was a large age span between the youngest and the oldest children, there were few teacher-led activities and a less elaborated instructional organization (i.e. obscure goals and a poor system for planning the activities). These nursery schools had children with poorer speech and cognitive competence (registered through two tests each). In conclusion, groups with a large age-span put the children at a disadvantage. The negative consequences seem to be due to poorer instructional activities rather than to problems with playmates. A probable interpretation is that the many ages, representing different mental levels, demanded the use of many age-homogenous sub-groups in which teacher-led instruction could take place. This demanded a complex organization where children were divided into several sub-groups; the sub-groups were placed in different rooms and the responsibility for handling these sub-groups was distributed among the staff. This complex organization became sensitive to disturbances; in case one of the teachers became sick, the whole organization easily collapsed.

/include Figure 1 about here/

Social benefits. Broberg, Hwang, Lamb and Ketterlinus (1989) evaluated the effects of a large age-span on children's socio-emotional competence. A total of 73 first-born children attending 70 nursery schools were followed during a period of two years. Data were collected for family background, quality of home care and quality of the nursery school setting, including measures of the age composition. Using a technique of "soft modelling" or Partial Least Squares (PLS) it was found that a low age range in the child group and a high proportion of the group whose ages were within 12 months of the target child's age contributed positively to the development of children's personalities and social skills (measured with standardized tests and observations of children's free play). The effect of the age range and the age mixture was more powerful than for instance the quality of teacher interaction with the children.

In another study, the socio-emotional status of 179 children was estimated by the nursery school teachers (Johansson and Sundell, 1990). This was neither influenced by the instructional practice, nor by the age span in the child group or the mixed-age interaction in games. The only variables that significantly accounted for the variance were the sex and age of the children.

The extended sibling groups also seem to prevent the nursery school teachers from identifying abused and neglected children. In a study including more than 4.000 children and 100 nursery schools there were significantly fewer such children identified in extended sibling groups compared to groups with a smaller age-span (Sundell, Lundström, Sjölund & Wettergren, 1992).

Teacher satisfaction. A large age span has also been found to complicate the instructional work (Johansson & Sundell, 1990). Teachers of extended sibling groups are for instance overrepresented among those who have contacted psychologists for help with instructional problems (Lönn & Munk, 1991). Furthermore, teachers working in extended sibling groups are less satisfied than those working with child groups with smaller age spans (Johansson & Sundell, 1989; 1990; Sundell, 1991; Nyström, 1992).

Other results. The age composition of the nursery school group does not seem to

influence parent's satisfaction with their children's day care or the motivation to get involved in the instructional work of the nursery school (Johansson & Sundell, 1990). There are also no clear relationships between type of child group and the productivity of the nursery school (Sundell & Lundström, 1991) or children's helth (Johansson & Sundell, 1990)

Research on non-graded classes

Between 1975 and 1988 43 Swedish case-studies of non-graded classes (NG) were carried through. These evaluations confirmed the assumed advantages. As was the case with extended sibling groups, the first evaluations were based mainly on interviews with teachers who worked in NG-classes, including few classes and schools, and without comparisons with age homogenous classes (AH).

Individualized teaching. Results show that the instruction in NG-classes uses the same curriculum as in same-aged classes but that the normal textbooks and teaching aids are replaced with individualized instruction (Andræ Thelin, 1991). However, in well-structured subjects (e.g., foreign language) the teaching often continue in same-aged sub-groups (ibid.).

Learning effects. Recent studies (Korse, 1989; Hemer, 1991; Englund, Källgården & Persson, 1992; Pettersson & Santesson, 1992) that compared pupils in AH- with NG-classes have failed to confirm the original advantages with NG-classes. The primary focus of these evaluations have been children's arithmetic competences. All together more than 10.000 pupils have been included in these studies.

The best controlled evaluation (Korse, 1989) included 282 classes consisting of 5.518 children (4% attrition). From this large group, 45 matched classes were selected, including instructionally motivated non-graded classes (NG), age-homogenous (AH) classes and multi-graded (MG) classes (Table 1). The NG- and AH-classes came from the same schools, thus controlling for the socio-economical background[3]. The reading and arithmetic

[3]In the end of the 198[illegible], there were few possibilities for parents in Sweden to influence the choice of school and class that their offspring attended. There was also no difference between the types of classes in frequency of parents with an education above the

skills of these children were measured within some weeks after school start as a part of the normal introduction, using standardized tests. The results were used to distribute remedial teaching resources among the different classes and the teachers were unaware that their classes would be scientifically evaluated. At school start, the test results were equal for all three groups (M=96; *index*=100). When tested after two and a half years the AH- and MG-classes performed statistically better ($p<.05$) on the arithmetic test compared to the NG-classes (Table 1). The difference according to the standardized test was one mental year. The AH- and MG-classes also performed better on the reading test, although the difference was not as great as in arithmetic. The same result was received for each of the three cohorts and for each of the four schools which included matched NG- and AH-classes. The results were even more disadvantageous to NG-classes when the need for remedial teaching was compared. At school start there was no statistical difference between the three types of classes (M=0.28 hours per pupil and week; *index*=0.24). At the follow-up two years later, the situation was different: the NG-classes needed almost twice as much remedial teaching as the other two types of classes (Table 1). This means that the pupils in the NG-classes performed less well although they got about twice as much remedial teaching as the other two groups. Furthermore, the pupils that seem to have gained least from the NG-classes were those with assumed learning difficulties. At school start the proportion was equal in the three groups (M=36%; *index*=30%). In grade 3, half of all pupils in the NG-classes were assessed having learning difficulties whereas the proportion did not change in the AH- and MG-classes. A similar result emerged in Hemer's (1991) study of 145 pupils in grade 3 and 6.

/include Table 1 about here/

Social benefits. The only comparative studies that have dealt with the pupils' socio-emotional development examines self-reliance (Hemer, 1991) and bullying in grade 3 (Sundell, 1993).

Hemer (1991) interviewed 97 pupils in NG-classes and 45 in AH-classes about their

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average (NG- and MG-classes=71%; AH-classes=70%; all 5.518 pupils=73%).

self-reliance, using standardized forms. The results does not favour any type of age composition.

In the study of bullying (Sundell, 1993) 286 pupils in 14 AH-classes were matched with 80 pupils in nine in NG-classes. The pupils answered questions about their social situation in the compulsory school (e.g., are you afraid during the breaks; are you ever beaten-up at school). About 8% of the pupils fulfilled the critieria of being bullied and 2% of being a bully. These frequencies were however not systematically related to the age composition in the classes, thus indicating that also this assumed advantage of the NG-classes is incorrect.

There are also case studies of NG-classes that suggest that the NG-classes might be unconducive to children's social development. Lagerkvist's and Thinesen-Grönmark's (1990) study of 26 randomly chosen boys and girls in five NG-classes found that the assumption that NG-classes promotes cooperation and discourages competition was not unequivocally supported. It can also be questioned whether or not the large age span fosters tolerance. At least the older children found it unfair that the younger got more attention from the teachers. To help others could also be a way for the helper to take a break. More seriously, the researchers found examples of helping that were used to demonstrate superiority rather than altruism. In the NG-classes there was also a poor group spirit, probably because a third of the pupils are replaced each year. More than half of the pupils said that they were aware of their knowledge position among the others in the class. This might have serious consequences for those with learning difficulties. It might be devastating for the self-esteem of an older child to realize that the beginners after some months are more competent than he or she is (cf. Lindberg Leffler and Lindström, 1992). A study by Inger Andersson (personal communication, November 1992) at the Department of Education in Umeå University indicates that there also might be differences between boys and girls in NG-classes at the intermediate level of the compulsory school; the girls were bored with the younger boys in their NG-classes but not vice versa.

Teacher satisfaction. Teachers working in NG-classes are generally satisfied with their work (e.g., Andrea Thelin, 1991). Since the teachers themselves chose to work in these classes and since there are no comparisons with teachers in AH-classes it is not possible to evaluate the effect of the age composition. A result that indicates that not all teachers working in NG-classes are satisfied emerges in Malmros' and Sahlin's (1992) follow-up

survey of NG-classes. Of the NG-classes that existed in 1982/83, 30% ceased to exist five years later (i.e., they become AH-classes). This suggests that some teachers find it hard to work in NG-classes.

Conclusions and research implications

There are several similarities between the extended sibling groups in nursery school and the nongraded classes in compulsory school. First, both groups are assumed to lead to the same advantages, i.e., an increased learning and social development among the children and an increased work satisfaction among the teachers. Second, both groups appeared simultaneously at the end of the 1970's. Third, they were kindly received by the nursery school and compulsory school administrations. Fourth, same-aged subgroups has been frequent within the mixed-age groups. Fifth, the first evaluations confirmed the advantages that were associated with these mixed-age groups, thus favouring groups with a large age span. However, since these evaluations were characterized by poor research methods, the conclusion must be preliminary. Finally, recent comparative evaluations do not confirm the assumed advantages; the mixed-age groups were either disadvantagous to the children's development or of no significant importance. This result seriously questions the mixed-age group's justification, both in nursery school and in compulsory school.

One explanation why the children in the age-homogenous groups were more skilled than those in the mixed-age groups is that instruction becomes more complicated to plan in the mixed-age group. This makes them more sensitive to disturbances. This could be an explanation of why the pupils that seemed to gain least from the nongraded class in the compulsory school were those with learning difficulties. These pupils have elsewhere (cf. Brophy, 1986) been found to be those who need most instruction from their teachers to gain knowledge. Another explanation is that teachers tend to adjust their instruction according to the least advanced pupils (cf, Ahlström, Emanuelsson & Wallin, 1986). In a multi-graded class where the two age groups are treated as two separated classes this might still be manageable. In a class where three age groups are integrated, the teacher might be unable to separate the pupils different mental levels, thus leading to a slower pace in the instruction.

The conclusion is, however, preliminary because of the need for improved evaluations. First, there is an absolute need for research which compares mixed-age groups with age-

homogenous groups. Second, there should be clearer distinctions between age composition, curriculum issues and instructional method issues. To evaluate the effects of the mixed-age group unambiguously, one must hold curriculum content, materials and instructional methods constant, limit samples to teachers who have sufficient classroom management skills, and control the amount of time allocated to particular instructional objectives. This demands an emphasis on detailed records of classroom events that retain important context information and allow for a fine-grained microanalysis of the interaction between teacher(s) and children. Another major obstacle in the interpretation of the research is that the evaluations seldom include measures of parent's influences and/or other compensatory activities. If a large age span among the children in the same group leads to a poorer instruction that obstructs learning, parents might adapt to this situation by providing the children with extra teaching. Thus, the lack of obvious effects of the age composition actually might be an illusion due to a failure to relate the child's development to the right amount of learning experience. Therefore, variation in nursery school and school quality ought be examined along with relevant family factors as well as received remedial instruction to obtain an accurate description of how children fare in nursery and compulsory school.

Altogether, the results from comparative evaluations do not support the idea that a large age-span is conducive to children's learning and socio-emotional development. If this result is confirmed in future research, the introduction of mixed-age classes in Swedish nursery school and compulsory school exemplifies the dangers of instructional recommendations based on untested theories and extrapolations from personal experiences.

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Table 1. Performance in grade 3 (cf., Korse, 1989)

	Age-homo-geneous (AH)	*Multi-graded (MG)*	*Non-graded (NG)*	*F(2/6)* **
Classes	19	12	14	–
Pupils	372	244	267	–
Reading*	98.6	99.1	90.2	9.09
Arithmetic*	102.5	97.4	86.8	12.09
r.tuition reading (hrs/week)	0.24	0.22	0.41	18.88
r.tuition arithmetic (hrs/week)	0.19	0.27	0.52	21.76

**index=100 (based on the results from 5.518 pupils); ** all p's <.01*