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## Single-age and multi-age groupings in kindergarten and their effect on literacy achievement

by

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### ABSTRACT

The authors of this paper report on a study that considered the effect of classroom grouping on the literacy achievement of kindergarten students. Data collected from students were used in bivariate and multivariate analyses. Information of a mostly qualitative nature was also gathered from teachers and subjected to analysis. Taken together, the results of these analyses indicated that class type (i.e., single-age versus multi-age) did not affect the overall literacy test results of the kindergarten students. The implications of this study for current educational practice and future research are discussed.

### Introduction

Multi-grade and multi-age classrooms are common in many countries (Lloyd, 1999, 2002). Generally speaking, multi-grade classrooms are classes in which students of more than one grade level are taught together for staffing and/or financial reasons. These classes are sometimes referred to as composite classes or split classes. Frequently, multi-grade classes are formed to cope with small student populations in rural locations. Multi-age classes, on the other hand, tend to be classes where students are grouped for pedagogical reasons. These classes allow for a range of groupings that cross age and grade boundaries.

The advantages and disadvantages of both multi-grade and multi-age classes have been extensively studied. Slavin (1987), for instance, reviewed ability groupings that crossed grade distinctions. Employing a best-evidence synthesis, he was able to show that student achievement tended to rise when students were grouped for one subject (usually numeracy or literacy). He also concluded that the research evidence did not support full-day ability grouping placements. Using a meta-analysis, Kulik and Kulik (1992) found similar findings to those noted by Slavin (1987). They reported that cross-grade grouping and within class grouping (in heterogeneous classes) has a positive influence on achievement.

Veenman (1995) undertook a comprehensive review of multi-grade and multi-age classes by examining studies from a variety of countries and contexts. He found there were no consistent differences in student achievement according to class organisation and type. Mason and Burns (1996) expressed some concerns with Veenman's conclusions. They argued that his review ignored a number of key issues, including selection bias and

lower-quality instruction. To exemplify, they felt that many school administrators often selected students for multi-grade classes using criteria such as independence, cooperativeness, and competence, therefore leaving comparisons between multi-grade and single-grade classes difficult.

Russell, Rowe, and Hill (1998) found somewhat different results than Veenman (1995, 1996). Their analysis of Australian data from the Victoria Quality Schools Project found some significant, negative effects on literacy achievement in multi-grade classes. In a New Zealand study carried out by Wilkinson (1998), students in multi-grade classes were also found to perform less well in some aspects of reading (e.g., comprehension) when compared with their peers in single-year classes. This researcher surmised that teachers tended to form more reading groups in multi-grade classes and, as a consequence, each student received less direct and intensive support for literacy learning. However, in a follow-up study, Wilkinson and Hamilton (2003) concluded that the earlier interpretation could not be substantiated and that the teacher and his/her instructional practice were more likely to affect student achievement compared with class composition/organisation. Lloyd's (2002) study of multi-age classes in Australian rural schools also lends support to the conclusions drawn by Wilkinson and Hamilton (2003).

Very little research has concentrated on the advantages or disadvantages of different groupings in kindergarten programs. Firstly, Adair (1978), as cited in Veenman (1995), investigated students in multi-grade and single-grade kindergarten/grade one classes and found no significant differences for academic skills. Secondly, Katz, Evangelou, and Hartman (1989) reviewed studies that explored social development in early childhood settings and also considered the cognitive effects of mixed-age grouping. These researchers concluded that the positive effects of mixed-age grouping on cognitive development were most likely derived from the cognitive conflict arising from the interaction with children of varying levels of cognitive maturity. Lastly, Christie and Stone (1999) analyzed free play opportunities and compared the collaborative literacy interactions that occurred in a play centre in two class arrangements. They found that children in the multi-age group engaged in a larger amount and broader range of collaborative literacy activities than did the same-age kindergarten students.

Although these three studies focus on kindergarten classes, none was concerned with junior kindergarten classes. Junior kindergarten<sup>1</sup>, as opposed to senior kindergarten<sup>2</sup>, is not prevalent in many jurisdictions and, as a result, has not been a priority for researchers investigating multi-age and multi-group contexts. In the Canadian province of Ontario, over 300 000 children (190 000 seniors and 140 000 juniors) are either enrolled in junior or senior kindergarten each year (McCain & Mustard, 1999) and moreover nearly 60 per cent of the juniors are educated in multi-age programs (Education Quality and Assessment Office, 2002).

For the first time, a Ministry of Education of Ontario document entitled *A Guide to Effective Instruction in Reading, Kindergarten to Grade Three* (2004), has established reading benchmarks for children leaving the kindergarten program. It is now expected that most children will enter grade one able to read very simple books and write at a basic level. Many kindergarten teachers find it challenging to help senior kindergarten children achieve these goals while still providing appropriate programming for the junior

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<sup>1</sup> Junior kindergarten (JK) students must be 4 years of age by December 31 of their JK year. In other words, they can be as young as 3 years and 8 months or as old as 4 years and 7 months when they commence their schooling in September.

<sup>2</sup> Senior kindergarten (SK) students must have reached 5 years of age by December 31 to enter SK.

kindergarten children in a multi-age classroom. Consequently, some Canadian schools have been exploring implementing single-age programs in the belief that it will assist teachers and their students to meet the new expectations now in place. Nevertheless, there has not been a formal comparison of literacy achievement in the single-age and multi-age classrooms to ascertain whether or not one of these organisational formats results in greater literacy achievement. Thus, the current study's purpose was to examine the literacy achievement of children in both single-age and multi-age classrooms. More specifically, the study was directed at answering the following questions:

Question 1: At the end of the first year of formal education, do children in single-age junior kindergarten classrooms demonstrate differences in early literacy skills when compared with junior kindergarten students in multi-age classrooms?

Question 2: Do children in single-age senior kindergarten classrooms demonstrate differences in literacy achievement when compared with senior kindergarten students in multi-age classrooms?

Question 3: Does classroom teaching experience influence the literacy learning of the kindergarten students?

### Method

Seventy-three children and five teachers in one elementary school participated in the study. Students were in four single-age classes (two junior and two senior) and four multi-age classes. Fifty-three per cent of the students were girls. Three of the teachers taught two classes and the other two teachers each taught one multi-age class. The teachers ranged in experience from neophyte to experienced practitioners, those with less than three years' experience were classified as inexperienced. The other three teachers had been teaching for some time and had accrued several years of kindergarten teaching experience.

The student population was fairly homogeneous drawing from a community with a narrow range of socioeconomic levels. The first language of the majority of children was English and no child in the study was receiving English as a Second Language support. Further, none of the children in the study had been identified as requiring special education services. The selection of the children for the two types of class was random within the limitations of balancing gender.

The six component parts of *An Observation Survey of Early Literacy Achievement* (Clay, 2002) were administered to the senior kindergarten children. These components can be summarised as follows:

- *Letter identification* — intended to determine which alphabetic symbols a child is noticing;
- *Concepts about print* — designed to observe the student's understanding of the conventions of English print;
- *Ready to read word reading task* — constructed to test whether a child can read certain high frequency words;
- *Writing vocabulary test* — designed to tell how fast a child is building control over a basic writing vocabulary;
- *Hearing and recording sounds in words (dictation) task* — the child's understanding of the sound-symbol relationships in English is considered; and,
- *Running record of text level* — used to assess text reading skill.

In addition to Clay's Observation Survey, the Burt Word Reading Test (Gilmore, Croft, & Reid, 1981) was administered to the seniors. It is a test of word recognition and has a test-retest reliability coefficient of approximately 0.95.

Participating senior kindergarten children (21 single-age and 19 multi-age) sat the above tests during the second month of the school year (fall term), providing pre-test data. The same tests were re-administered six months later in the spring term, providing post-test data. The number of instructional days between the pre-test and post-test data gathering points was approximately the same for each child.

During the spring term, participating junior kindergarten children (13 single-age and 20 multi-age) were administered four literacy tests:

- *Letter identification;*
- *Writing vocabulary test;*
- *Modified concepts about print;* and,
- *Test of auditory analysis skills* — constructed as an oral test of word analysis skills (Rosner, 1975).

The teachers completed a questionnaire that identified teaching experience, additional training, available classroom resources, and timetabling of literacy instruction. Additionally, observation of activities in the classrooms, informal interviews, and conversations with each teacher provided further information regarding literacy instruction in the kindergartens.

### Results

The pre-and post-test correlations for the senior kindergarten students were positive and significant ( $N=40$ ,  $p<.01$ , 2-tailed) for the seven measures used. These correlations ranged from .46 (Concepts about print) to .84 (Running record of text level). These results indicate that the fall (or initial) measure is a good predictor of the spring score.

The correlations of the four measures administered to the junior kindergarten students were positive and significant ( $N=33$ ,  $p<.001$ , 2-tailed). These correlations ranged from .50 to .66. An examination of the means revealed that the juniors attending multi-age classes performed slightly better than those juniors attending single-age classes. However, to test statistically for this result pattern a MANOVA was used to simultaneously compare the test means found in each of the two class types. The MANOVA found a significance level of .31 ( $F=1.25$ ,  $df=4$ ), confirming that class type did not affect the overall literacy test results.

Multiple regression analyses were completed to determine whether or not the class type also made a difference to overall test performance for the seniors. In each case the independent variables were the class type and the fall score for the specific test, while the dependent variable was the spring score for the same test. The results of these analyses are presented in Table 1 and show that class type basically had no significant effect on the post-test results after controlling for the relevant pre-test measure. There was, however, one exception that being 'Concepts about print'.

Table 1  
*Effects of class type on the seven reading measures for seniors*

Dependent Variable	$R^2$ Change for Pre-test	$R^2$ Change for Class Type	Total $R^2$ Change
Letter identification	.559	.000	.559
Concepts about print	.212	.098*	.310
Ready to read word reading task	.537	.014	.551
Writing vocabulary test	.446	.006	.452
Hearing and recording sounds in words (dictation) task	.490	.020	.510
Running record of text level	.707	.017	.724
Burt Word Reading Test	.546	.000	.546

\* ( $p < .027$ , multi-age performing better than single-age)

Multiple regression analyses were also completed to detect whether or not the teacher's classroom experience also made a difference to the overall test performance of the seniors. In each case the independent variables were the teacher experience (a dichotomous measure) and the fall score for the specific test while the dependent variable was the spring score for the same test. The results of these analyses are displayed in Table 2 and indicate that the teacher effect is small with the exception of 'Hearing and recording sounds in words (dictation) task', which approached significance.

Table 2  
*Effects of classroom experience on the seven reading measures for seniors*

Dependent Variable	$R^2$ Change for Pre-test	$R^2$ Change for Experience Category	Total $R^2$ Change
Letter identification	.559	.006	.565
Concepts about print	.212	.010	.222
Ready to read word reading task	.537	.026	.563
Writing vocabulary test	.446	.013	.459
Hearing and recording sounds in words (dictation) task	.490	.050*	.540
Running record of text level	.707	.007	.714
Burt Word Reading Test	.546	.000	.546

\* ( $p = .052$ , inexperienced teachers performing better than experienced teachers)

Taken together, the analysis of data obtained from the questionnaires, observations, interviews, and conversations revealed the following points:

1. the kindergarten program is very well resourced;
2. the teachers felt that their respective kindergarten classrooms were appropriately resourced;
3. all teachers used the same modified form of Jolly Phonics for their programming;
4. all teachers relied heavily on whole group instruction; and,
5. some teachers focused more on cumulative writing activities whilst others gave more attention to guided and/or shared reading.

## Discussion

Three research questions were posed for response. In the following section answers to the first two questions are given. The findings of the study showed that class type had no significant effect on the overall literacy achievement of junior kindergarten children as measured by four tests. Furthermore, the results generally demonstrated that class type had no significant effect on the overall literacy achievement of senior kindergarten children as measured by seven literacy tests. Consequently, it can be concluded that children in single-age junior or senior kindergarten classrooms do not demonstrate differences in early literacy skills when compared with juniors and seniors in multi-age classrooms. This conclusion lends support to the findings of Veenman (1995) and Wilkinson and Hamilton (2003) and also at least partly fills a void in the literature pertaining to kindergarten-aged children and achievement in different class groupings.

Although class type had little differential effect on literacy skills for seniors, the literacy achievement demonstrated by the students in the fall was highly correlated with the literacy achievement in the spring. Not only were the correlations significant at the .01 level in each case, but the average proportion of shared variance between each pre-test and its corresponding post-test was .5. This suggests that children's literacy skills in the spring of the senior kindergarten year are largely determined by their existing skills at the beginning of the school year. The multiple regression analysis for each fall and spring test consistently showed that the significant independent variables were the fall test scores and not class type. The one exception to this was seen in the 'Concepts about print' test. Not only did this test have a lower correlation between pre-test and post-test scores ( $R^2=.212$ ) than the other tests, but it also yielded a significant difference in favour of multi-age classrooms. The lower correlation may have been due to the strong focus on choral reading and oral language in the junior kindergarten period, which contrasted with the emphasis on reading skills in the senior kindergarten classrooms. Nevertheless, class type was responsible for a 9.8% change in the variance explained of the spring test scores. Since all these children were in multi-age junior kindergartens they would have had similar first years. It would be interesting to see if a similar variation is seen in the following spring amongst children who will have had two years of single or multi-age instruction.

Observations indicated that 'Concepts about print' knowledge tended to be taught somewhat less explicitly leading to poor understanding by some of the students. As well, the teachers had not progressed as far as they might (for example, none of the teachers had discussed commas with the students and little attention had been paid to quotation marks). As a result, the students had fewer opportunities to add to their knowledge base over the senior kindergarten year. Clay (2002) contends that some of the test's items are quite sophisticated and may not be seen displayed by many children until age seven. Thus there may have been an age-related ceiling for some children.

The strong predictive ability of fall scores underlines the importance of early and ongoing assessment of kindergarten children. If a child is seen, early, to be lacking or struggling in literacy acquisition then additional instruction or support could be undertaken quickly; particularly by using procedures above and beyond those normally applied in the regular classroom. While this will not solve all issues for young children it may reduce the numbers who have further difficulty in future grades. It is easier to close the gap when it is narrower.

Very significant correlations were found between the various tests for both junior and senior kindergarten children. In fact, the senior kindergarten results match the work

of Clay (2002) who found high correlations between all the Observation Survey tasks. These correlations suggest the interconnectedness of the different literacy skills and the reciprocity of skills for literacy learners. This highlights the need to provide balanced literacy programming in the classroom that addresses all aspects of literacy and does not emphasise one skill or approach to the detriment of others. It is particularly important when struggling students are considered. The weakest students tended to be weak in all areas. This is important for teachers working with low achieving students and underscores the importance of avoiding item knowledge instruction focusing on only some skills (e.g., letter knowledge).

Letter knowledge is a major emphasis in most kindergarten programs and knowledge of letters and sounds is an essential part of literacy development. In this study the scores for junior and senior kindergarten children showed that the students were learning letters effectively in all the classes (regardless of organisation) and the overall means were similar to those reported by Clay (2002). This suggests that the teachers have provided appropriate instruction in this area of literacy development. It is also an area that is thoroughly taught and frequently assessed by the teachers so that ongoing modification of instruction or additional support is more likely.

The teachers in the study had varying levels of experience both as teachers per se and as kindergarten teachers. However, it was evident that teacher experience was not a significant factor in literacy achievement amongst the senior kindergarten students (refer to Research Question 3). This conclusion was supported by the multiple regression analyses and the analysis of the qualitative data based on resourcing, literacy organisation, and timetabling. It is possible that some differences based on teacher experience or knowledge might have been mitigated by other factors e.g., strong mentoring relationships between experienced and inexperienced staff members.

Two caveats are in need of reporting. First, the sample sizes and the sample groups in this study were modest and the data should be considered with this in mind. Therefore, any conclusions or suggestions should be treated as tentative. Second, students in the senior kindergarten classes were in multi-age classes in junior kindergarten. Even though no significant differences were found at the end of junior kindergarten, it is possible that over a two-year kindergarten program multi-age or single-age programming may be more advantageous.

Further study is deemed necessary to test the generalisability of the findings. Future research might also profit from controlling for other factors such as instructional time and/or considering student affective development as well as literacy achievement as a dependent variable.

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