DOCUMENT RESUME

ED 102 535 CS 001 661

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TITLE Sex, Intelligence, and School Reading Curriculum as Factors Effecting the Retention of Reading Skills of First Grade Subjects.
PUB DATE May 75
NOTE 19p.; Paper presented at the Annual Meeting of the International Reading Association (20th, New York City, May 13-16, 1975)

EDRS PRICE MF-$0.76 HC-$1.58 PLUS POSTAGE
DESCRIPTORS Cognitive Processes; *Curriculum; Grade 1; Intelligence; Reading; *Reading Research; *Reading Skills; *Retention; Sex Differences

ABSTRACT

The purpose of this study was to determine the degree to which first grade subjects retain their reading ability over the summer vacation period. The subjects consisted of 545 first grade children, representing all first graders in nine elementary schools from four northeastern Wisconsin school districts. The subjects were divided into two curriculum categories: those receiving objective-based instruction (designed to give instruction to children when there is a need) and those instructed in the basal reader curricula. To determine the degree of retention, mean spring-fall test scores on standardized tests of all subjects were compared. Sex of subject, intelligence, and school curriculum were also examined to determine whether these variables influenced the ability of subjects to retain overall reading ability or reading skills. The results indicated that there were no significant differences in retention ability between males and females, between the retention scores of subjects in the objective-based program or the basal reader curricula, and between groups in ability to retain information. Significant losses were found on both measures of overall reading ability (vocabulary and comprehension) and nine of the twelve tests measuring specific reading skills. (WR)

Title of Paper: Sex, Intelligence, and School Reading Curriculum as Factors Effecting the Retention of Reading Skills of First Grade Subjects

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## INTRODUCTION

The purpose of this study was to determine the degree to which first-grade subjects retain their reading ability over the summer vacation period. This investigation examined two aspects of reading ability: overall reading ability as measured by a norm-referenced reading test, and specific reading skills as measured by criterion-referenced reading tests. In addition, the data were examined to determine if there were significant retention rate differences between males and females, between above-average, average, and below-average mental ability subjects, and between subjects enrolled in an objective-based reading program versus those in traditional basal reader programs.

Several trends are evident in studies of summer retention of reading ability. First, reading ability has been measured only with standardized silent reading tests and never with criterion-referenced reading tests. While studies using norm-referenced instruments may have provided insights for educators concerned with summative evaluation of reading programs, they provide little guidance for teachers who use criterion-reference reading tests for formative evaluations. The recent appearance and popularity of criterion-referenced reading programs implicitly raises the question of long-term reading skill retention. Secondly, the relationship between intelligence and the retention of reading ability is unclear. While some investigators have measured changes in intelligence scores during the summer vacation, few have used intelligence scores to group subjects according to above-average, average, and below-average mental ability. Finally, the relationship between curricula and retention of reading ability is relatively unknown. This is especially true when examining the ability of subjects to retain reading ability over the summer vacation after being enrolled in either spiral- or objective-based curricula during the school year.

## METHOD

### Subjects

Nine elementary schools from four northeastern Wisconsin school districts were included in the study. Eight of the schools were located in third class cities while the other school was located in a small village.

Subjects for the study were 545 first-grade children. This group represented all first graders in the nine elementary schools. Fewer than one percent of the subjects were American Indian, Oriental, Spanish-American, Negro or other minority groups. Approximately one-half of the subjects were enrolled in schools utilizing the objective-based program in grade one; the other one-half had received instruction in basal reading curricula while in first grade.

### Instruments

Gates-MacGinitie Reading Test

Overall reading ability was measured by the Vocabulary and Comprehension subtests of the Gates-MacGinitie Reading Test, Primary A, Forms 1 and 2. This test is a norm-referenced, standardized reading instrument.

Wisconsin Tests of Reading Skill Development

Specific reading skills were measured by the Wisconsin Tests of Reading Skill Development-Word Attack (WTRSD-WA), Level B, Forms 1 and 2. The Level B battery was selected for administration since, according to the program guidelines, it was most suitable for administering to fast, average, and slow students at the beginning of second grade. Moreover, this battery is primarily designed for pupils who would be reading at the primer or first reader level.

The Wisconsin Tests of Reading Skill Development are criterion-referenced and are not standardized. The WTRSD-WA measure the following sight vocabulary, phonic and structural analysis skills:

1. Sight Vocabulary
2. Beginning Consonants
3. Ending Consonants
4. Consonant Blends
5. Rhyming Elements
6. Short Vowels
7. Consonant Digraphs
8. Compound Words
9. Contractions
10. Base Words
11. Plurals
12. Possessives

California Short-Form Test of Mental Maturity

The California Short-Form Test of Mental Maturity, Level 0, consists of seven subtests which purport to measure four factors. The seven subtests are (a) Opposites, (b) Similarities, (c) Analogies, (d) Numberical Values, (e) Number Problems, (f) Verbal Comprehension, and (g) Delayed Recall. The seven subtests are grouped to form four factors: Logical Reasoning, Numerical Reasoning, Verbal Concepts, and Memory. When all four factors are combined, a Total Intelligence score is derived.

## Curricula

Subjects were divided into two curriculum categories; those receiving objective-based instruction while in first grade and those instructed in the basal reader curricula. All students who were grouped for instruction on the basis of test results from the Wisconsin Tests of Reading Skill Development-Word Attack were grouped in the objective-based category. Objective-based instruction is designed to give instruction to children when there is a need. Basically, it

is a framework for instruction based on four points. First, the identification of essential skills is undertaken. The objectives specify a criterial level used to judge adequacy of performance. Third, criterion-referenced assessment exercises are administered to assist teachers in determining which skills have and which have not been mastered. Pupil performance, then, is evaluated with regard to an absolute or criterion referent. Finally, appropriate teaching/learning activities are identified which permit teachers to organize instruction in line with diagnosed student needs.

Students enrolled in schools which did not use the Design and which did not group for class instruction on the basis of Wisconsin Tests of Reading Skill Development-Word Attack or other commercially available diagnostic reading test results were categorized as the basal reader curricula subjects.

## Procedure

All first-grade teachers in the study administered the Wisconsin Tests of Reading Skill Development-Word Attack, Level B, Form 1, the Gates-MacGinitie Reading Test, Primary A, Forms 1 and 2, and the California Short-Form Test of Mental Maturity two weeks prior to school being dismissed for the summer vacation. Testing was conducted in five sittings, one sitting each day of the week. To reduce the chance of a testing order effect, the schools were randomly assigned to three categories, and the tests were administered according to a randomly derived testing schedule.

The fall testing program was similar to the spring testing schedule. Primarily, the major differences were (a) all testing was done by the second-grade teachers, (b) the California-Short Form Test of Mental Maturity was not readministered, and (c) Form 2 of the Wisconsin Tests of Reading Skill Development, Level B, was administered. The fall testing program was conducted the second full week of school in each of the respective districts. Again, the testing order for administer-

ing the tests was derived randomly.

To determine the degree of retention, mean spring-fall test scores of all subjects were compared. This was the dependent variable. Sex of subject, intelligence, and school curriculum were also examined in an attempt to determine whether these three variables influenced the ability of subjects to retain overall reading ability or reading skills. These three factors were considered to be the independent variables. A 2 x 3 x 2 factoral design using the multivariate analysis of variance statistics technique was used to determine whether a relationship existed between the variables.

The hypotheses were:

1. There will be no significant difference between spring and fall Gates-MacGinitie Reading Tests or the Wisconsin Tests of Reading Skill Development reading scores.

2. There will be no significant difference in retention ability between males and females.

3. There will be no significant difference in retention between subjects of above-average, average, and below-average mental ability.

4. There will be no significant difference in retention ability of subjects enrolled in the objective-based reading skills program versus subjects enrolled in the basal reader curricula.

In addition to examining the four hypotheses, answers to the following questions were sought:

1. What is the frequency distribution and range of scores for each of the reading measures?

2. Will there be a change in the percentage of subjects considered to be "masters" of the specific reading skills in the spring compared to those considered "masters" in the fall?

3. Will there be a trend toward decreased skill mastery over the summer?

Hypothesis 1: There will be no significant difference between spring and fall Gates-MacGinitie Reading Test or Wisconsin Tests of Reading Skill Development reading scores.

Examination of the data indicated statistically significant losses on both measures of overall reading ability (Vocabulary and Comprehension) and on nine of the twelve tests measuring specific reading skills (See Appendix). The losses were significant at the .0001 level for ei ` measures, the .001 level for two measures, and the .01 level for one measure. Slight gains were found on only two of the remaining three tests. The gains were not significant, however.

On the whole, between nine and fourteen percent of the subjects enrolled in the objective-based curriculum and between nine and nineteen percent of the subjects enrolled in the basal reader curricula needed to be reclassified as "masters" to "nonmasters" in the fall of the school year. Above-average IQ females tended to score the most consistently in terms of maintaining "mastery" scores, regardless of whether they have been enrolled in objective-based or basal reader reading curricula.

Hypothesis 2: There will be no significant difference in retention ability between males and females.

The hypothesis that there would be no significant difference in retention ability between males and females was accepted unequivocally. There were no significant differences in retention ability between sexes on either the norm-referenced or the criterion-referenced tests (See Appendix).

Again, from a pedagogical point of view, it was important to consider whether more males or females need to be reclassified as "masters" or "nonmasters" in the fall of the year. The data indicate no consistent change patterns favoring either sex. While there may be a slight trend for females to be less prone to be re-categorized as "nonmasters," the difference between the sexes amounts to less than five percent in favor of the females.

Hypothesis 3: There will be no significant difference in retention between subjects of above-average, average, and below-average mental ability.

Hypothesis 3 was also accepted, but with two qualifications. First, with the exception of average IQ subjects losing a significant degree (Rhyming Elements, $p=<.01$; Consonant Digraphs, $p=<.05$) more than their more and less intelligent contemporaries, there were no significant differences in ability to retain information between groups (See Appendix).

Hypothesis 4: There will be no significant difference in retention ability of subjects enrolled in the objective-based reading skills program versus subjects enrolled in the basal reader curricula.

There was no statistically significant difference between the retention of scores for subjects in the objective-based curriculum versus those enrolled in sprial-curricula. While there was a slight increase in the mean fall score on the Base Words test for objective-based curriculum subjects, losses were found on the thirteen other measures. Gains were found on three of the tests (Base Words, Plurals, and Possessives) for the basal reader group (See Appendix).

## Conclusions

Four conclusions seem warranted on the basis of the results of this study. The conclusions have implications for both researchers and classroom teachers.

First, there is a significant loss in both overall reading ability scores and specific criterion-referenced reading test scores between the spring and fall of the year. The loss, however, should be examined in light of pedagogical as well as statistical significance. At first, one might be tempted to conclude that all subjects using criterion-referenced reading programs need to be retested on a yearly basis if these programs are to be implemented effectively. Such a

testing program conducted each fall would insure that pupil reading skill records were current and accurate. Classroom teachers using these reading programs, however, are usually not concerned with statistical tests of significance and mean scores of subjects. Instead, they must deal with the operational effectiveness of reading programs on a day-to-day basis. What answers might this study provide then? Perhaps most important is the fact that a relatively minor number of subjects move from the "mastery" category in the spring to the "nonmastery" category in the fall. Generally, only around fifteen percent of all the subjects tested in this study failed to remain classified as "masters" in the fall. In an average classroom of thirty students, this would mean that only about four or five students would need to be retested each fall.

Readers are also reminded that the subjects in this study were relatively young, and probably, since most were only in the beginning stages of learning to read, did not have opportunities for extensive practice in applying the reading skills as, say, a nine- or ten-year-old might have. Perhaps this lack of practice could contribute to the change in ability over the summer. Such claims are only speculative, however, and remain to be tested in other studies.

The results of this study do seem to indicate, then, that some subjects will need to be retested each fall. The number is not great, however. Certainly, it should be of some comfort to learn that fifty percent or more of the subjects do not need to be retested every year. Such an outcome might make a criterion-referenced reading program prohibitively expensive and pragmatically unmanageable.

The second conclusion reached, based on the results of this study, is that the ability to retain reading skills, as measured by both norm-referenced and criterion-referenced tests, does not differ significantly between first-grade males and females. While teachers are sometimes quick to suggest that the females in

their classes appear to be better readers, the evidence obtained from this study suggests that they are not superior in ability to retain the skill of knowing how to read. The need, then, to test only boys in the fall of the year, does not seem warranted.

The third conclusion relates to how the intelligence of a subject (as measured by a standardized intelligence test) influences the ability to retain information. This investigation revealed that subjects of below-average intelligence did not differ significantly from their more intellectually able peers. A note of caution, however, needs to be stressed here. The size of the below-average IQ group in this study was small. It could well be that more subjects in this group would have influenced the results. Future investigations might want to focus specifically on this below-average IQ group when measuring retention of reading skills.

Finally, while it might be expected that subjects who were enrolled in the criterion-referenced curriculum would be more apt to retain the specific reading skills, when compared with their basal reader curricula peers, this was not the case. The basal reader curricula subjects, in fact, had lower change scores on eight of the fourteen measures. Evidently, the one year enrollment in the criterion-referenced program had little effect on the ability to maintain their previous spring scores.

In conclusion, there appear to be significant losses in reading ability when mean spring and fall reading test scores are subjected to the analysis of variance treatment. When the data are analyzed descriptively, however, there is only a minor change in the percentage of subjects considered "masters" of the specific skills in the spring to "nonmasters" in the fall. About fifteen percent of the first graders in this study changed from the "mastery" to the "non-mastery" category between the spring and fall. Sex of subject, intellectual

ability, and type of school reading curriculum had little bearing on the ability to retain either overall ability, as measured by the Gates-MacGinitie Reading Test, or specific reading skills, as measured by the Wisconsin Tests of Reading Skill Development-Word Attack, Level B.

SUMMARY OF ANALYSIS OF VARIANCE OF CHANGE SCORES

| Variable | df | Mean Squares | Univariate F | P |
|---|---|---|---|---|
| Gates-MacGinitie-Voc. | 1 | 569.91 | 12.98 | <.001 |
| Gates-MacGinitie-Comp. | 1 | 182.14 | 7.59 | <.01 |
| WTRSD-Sight Voc. | 1 | 335.46 | 54.00 | <.0001 |
| WTRSD-Beginning Cons. | 1 | 118.53 | 23.57 | <.0001 |
| WTRSD-Ending Cons. | 1 | 274.16 | 31.27 | <.0001 |
| WTRSD-Cons. Blends | 1 | 373.90 | 35.32 | <.0001 |
| WTRSD-Rhyming Elem. | 1 | 1180.82 | 53.85 | <.0001 |
| WTRSD-Short Vowels | 1 | 126.06 | 20.77 | <.0001 |
| WTRSD-Cons. Digraphs | 1 | 842.91 | 119.84 | <.0001 |
| WTRSD-Compound Words | 1 | 117.30 | 11.80 | <.001 |
| WTRSD-Contractions | 1 | 449.76 | 41.42 | <.0001 |
| WTRSD-Base Words | 1 | 11.96 | 1.23 | NS |
| WTRSD-Plurals | 1 | .46 | .09 | NS |
| WTRSD-Possessives | 1 | 8.36 | .90 | NS |

DIFFERENCE IN MEAN SPRING AND FALL TEST SCORES BY SEX, IQ, AND SCHOOL READING CURRICULUM CATEGORIES

| Variable | Sex | | Intelligence | | | Curriculum | |
|---|---|---|---|---|---|---|---|
| | Males (N=153) | Females (N=158) | Below-Ave. (N=10) | Ave. (N=138) | Above-Ave. (N=163) | Basal Reader (N=51) | Objective-Based (N=260) |
| Gates-MacGinitie-Voc. | -1.84 | - .89 | - .40 | -1.69 | -1.13 | - .84 | -1.45 |
| Gates-MacGinitie-Comp. | -1.57 | .01 | - .70 | - .88 | - .67 | - .02 | - .91 |
| WTRSD-Sight Voc. | -1.41 | - .68 | -1.30 | -1.28 | - .82 | - .45 | -1.15 |
| WTRSD-Beginning Cons. | - .54 | - .70 | .20 | - .70 | - .60 | - .14 | - .71 |
| WTRSD-Ending Cons. | -1.09 | - .80 | -2.30 | - .99 | - .82 | -1.18 | - .89 |
| WTRSD-Cons. Blends | -1.30 | - .90 | -3.00 | -1.17 | - .92 | - .43 | -1.23 |
| WTRSD-Rhyming Elem. | -2.25 | -1.65 | -1.90 | -3.01** | -1.05 | -1.57 | -2.02 |
| WTRSD-Short Vowels | - .73 | - .54 | .70 | - .57 | - .77 | - .90 | - .58 |
| WTRSD-Cons. Digraphs | -1.80 | -1.5 | .00 | -2.02* | -1.42 | -1.49 | -1.68 |
| WTRSD-Compound Words | - .73 | - .51 | -1.20 | - .99 | - .26 | - .31 | - .67 |
| WTRSD-Contractions | -1.43 | - .98 | - .30 | -1.46 | -1.04 | -1.27 | -1.19 |
| WTRSD-Base Words | - .21 | .59 | 2.00 | - .10 | .33 | .88 | .06 |
| WTRSD-Plurals | - .10 | .02 | -1.00 | .00 | - .01 | .22 | - .09 |
| WTRSD-Possessives | .29 | .04 | -1.10 | .09 | .31 | 1.37 | - .07 |

*p<.05
**p<.01

SUMMARY OF ANALYSIS OF VARIANCE:

SEX

| Variable | df | Mean Squares | Univariate F | P |
|---|---|---|---|---|
| Gates-MacGinitie-Voc. | 1 | 56.40 | 1.28 | NS |
| Gates-MacGinitie-Comp. | 1 | 191.29 | 7.98 | NS |
| WTRSD-Sight Voc. | 1 | 37.19 | 5.99 | NS |
| WTRSD-Beginning Cons. | 1 | 3.97 | .79 | NS |
| WTRSD-Ending Cons. | 1 | 9.72 | 1.11 | NS |
| WTRSD-Cons. Blends | 1 | 17.47 | 1.65 | NS |
| WTRSD-Rhyming Elem. | 1 | 13.62 | .62 | NS |
| WTRSD-Short Vowels | 1 | 1.59 | .26 | NS |
| WTRSD-Cons. Digraphs | 1 | 1.85 | .26 | NS |
| WTRSD-Compound Words | 1 | 2.53 | .26 | NS |
| WTRSD-Contractions | 1 | 10.67 | .98 | NS |
| WTRSD-Base Words | 1 | 33.76 | 3.47 | NS |
| WTRSD-Plurals | 1 | 2.16 | .42 | NS |
| WTRSD-Possessives | 1 | 4.35 | .47 | NS |

SUMMARY OF ANALYSIS OF VARIANCE:

INTELLIGENCE

| Variable | df | Mean Squares | Univariate F | P |
|---|---|---|---|---|
| Gates-MacGinitie-Voc. | 2 | 9.39 | .21 | NS |
| Gates-MacGinitie-Comp. | 2 | .90 | .04 | NS |
| WTRSD-Sight Voc. | 2 | 5.55 | .89 | NS |
| WTRSD-Beginning Cons. | 2 | 5.36 | 1.07 | NS |
| WTRSD-Ending Cons. | 2 | 13.28 | 1.51 | NS |
| WTRSD-Cons. Blends | 2 | 20.57 | 1.94 | NS |
| WTRSD-Rhyming Elem. | 2 | 133.86 | 6.10 | <.01 |
| WTRSD-Short Vowels | 2 | 9.18 | 1.51 | NS |
| WTRSD-Cons. Digraphs | 2 | 25.18 | 3.58 | <.05 |
| WTRSD-Compound Words | 2 | 19.27 | 1.94 | NS |
| WTRSD-Contractions | 2 | 8.50 | .78 | NS |
| WTRSD-Base Words | 2 | 17.67 | 1.81 | NS |
| WTRSD-Plurals | 2 | 4.94 | .96 | NS |
| WTRSD-Possessives | 2 | 5.22 | .56 | NS |

SUMMARY OF ANALYSIS OF VARIANCE:

CURRICULUM

| Variable | df | Mean Squares | Univariate F | P |
|---|---|---|---|---|
| Gates-MacGinitie-Voc. | 2 | 55.47 | 1.26 | NS |
| Gates-MacGinitie-Comp. | 2 | .95 | .04 | NS |
| WTRSD-Sight Voc. | 2 | 6.20 | 1.00 | NS |
| WTRSD-Beginning Cons. | 2 | .67 | .14 | NS |
| WTRSD-Ending Cons. | 2 | 3.04 | .35 | NS |
| WTRSD-Cons. Blends | 2 | 8.68 | .82 | NS |
| WTRSD-Rhyming Elem. | 2 | 53.44 | 2.44 | NS |
| WTRSD-Short Vowels | 2 | 3.74 | .62 | NS |
| WTRSD-Cons. Digraphs | 2 | .91 | .13 | NS |
| WTRSD-Compound Words | 2 | 8.64 | .87 | NS |
| WTRSD-Contractions | 2 | 13.99 | 1.29 | NS |
| WTRSD-Base Words | 2 | .89 | .09 | NS |
| WTRSD-Plurals | 2 | 2.58 | .50 | NS |
| WTRSD-Possessives | 2 | 5.35 | .58 | NS |

## SUMMARY

This study was designed to assess the effect the summer vacation period has on the reading ability of first-grade subjects, as measured by norm- and criterion-referenced reading tests. The data were anlyzed to determine if sex of subject, IQ, or type of school reading curriculum were related to the ability to retain overall reading ability or specific reading skills.

### Method

Subjects in the study were 311 first-grade pupils enrolled in nine northeastern Wisconsin elementary schools. Approximately one-half of the subjects were enrolled in an objective-based reading program while the remaining subjects were enrolled in basal reader curricula.

All subjects were administered the Gates-MacGinitie Reading Test, Primary A, and the Wisconsin Tests of Reading Skill Development-Word Attack, Level B, two weeks prior to and two weeks after the summer vacation period. In addition, the California Short-Form Test of Mental Maturity was administered to all subjects during the spring testing sessions. Subjects with IQ scores which fell within the third or seventh stanines were not included in the data analysis. A multiple analysis of variance statistical treatment was used to analyze the data. Retention of reading scores between the spring and fall was the dependent variable; sex of subject, intelligence, and type of school reading curriculum were the independent variables.

### Conclusions and Implications

Statistically significant differences were found between the mean spring and fall test scores on eleven of the fourteen measures. Sex of subject and type of school reading curriculum were not significantly related to ability to retain reading skills. Intelligence of subjects was found to be related to retention ability on only two of the measures.

Fifteen percent of the subjects changed from being considered "masters" of the specific reading skills in the spring to being classified as "nonmasters" in the fall. Achieving a score of eighty percent or better on any of the specific skill tests was the criterion for mastery.

It was concluded that even though statistically significant losses occurred on most of the tests, the most meaningful measure of change was the difference between the percentage of subjects considered to have mastered the skills in the spring versus the percentage in the fall. The fifteen percent change between the two times was not considered great enough to suggest massive schoolwide retesting of all subjects in criterion-referenced reading programs. Instead, retesting of subjects might be done on the basis of teacher subjective judgment, thereby reducing considerably, the cost and time necessary to implement such a reading program.

In conclusion then, sex of subject, intellectual ability, and type of school reading curriculum do not appear to be important variables related to the retention of overall reading ability and specific reading skills. While significant losses were found on eleven of the fourteen measures, when the data were examined in terms of percentage of subjects considered to have mastered the skills in the spring and fall, only fifteen percent of the subjects needed to be recategorized.