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An In-Depth Analysis of Students' Academic Retention Abilities in Traditional and Alternative Calendar Schools

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AN IN-DEPTH ANALYSIS OF STUDENTS' ACADEMIC RETENTION ABILITIES
IN TRADITIONAL AND ALTERNATIVE CALENDAR SCHOOLS

A Thesis
Presented to
the Faculty of the Department of Psychology
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In Partial Fulfillment
of the Requirements for the Degree
Specialist in Education

by
Jennifer Lynn Reece
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AN IN-DEPTH ANALYSIS OF STUDENTS' ACADEMIC RETENTION ABILITIES
IN TRADITIONAL AND ALTERNATIVE CALENDAR SCHOOLS

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The adoption of an alternative school calendar is a widely discussed topic in education reform today. The need to help students retain more academic skills after summer vacation is one reason school districts are considering alternative calendars. A recent study by Nofsinger (1999) of elementary students used Curriculum-Based Measurement (CBM) probes to measure academic skills in the Spring and the Fall in both traditional and alternative calendar schools. This present study further analyzed data collected during Nofsinger's (1999) study to determine whether certain groups of students (i.e., high, middle, and low achievers) gained more benefit from traditional or alternative calendars. Further, the researcher compared subsamples of third-grade students with comparable achievement levels to determine if results from an earlier study were valid. Results of an Aptitude Treatment Interaction design analysis revealed that some groups of students attending alternative calendar schools showed higher scores in academic subjects when they returned to school in the Fall than did their traditional calendar counterparts. First grade students showed fewer losses in academic skills due to participation in the alternative calendar than students in third and fifth grades. In the alternative calendar schools students who had higher scores on the Spring measures tended to have higher scores in the Fall than high-achieving students in traditional calendar schools. Results
from the subsample of third-graders with comparable achievement scores on the California Test of Basic Skills lent support to Nofsinger's findings.
Introduction

In 1994, the National Education Commission on Time and Learning submitted a report comparing American education to that of other countries, specifically Japan and Germany. The report found that students in other countries received double the instruction in secondary school academic areas, supplemented the normal instructional time with out-of-school educational activities, and made future success in college or the workplace more contingent upon success in school. American students received 1,460 hours of academic instructional time in their final four years of school, compared to 3,170 hours in Japan, 3,280 hours in France, and 3,528 hours in Germany (National Education Commission on Time and Learning, 1994). The Commission also found that academic time in other countries is not wasted; instructional time is used for instruction and other activities take place at other specified times. This use of instructional time is not always true in the United States, where research has shown that an average of 41% of the school day is devoted to academics.

Despite the Commission's findings, there appears to be little impetus toward extending the American school calendar in terms of hours or days. There has been, however, a rapid growth in the number of public schools implementing alternative calendars (The National Association for Year-Round Education, 1998). The implementation of an alternative calendar is a controversial topic in American education today. Many educators believe that a school calendar with a shorter summer break and more frequent breaks throughout the year will be more beneficial for students than the current calendar. One proposed benefit is that a shorter summer break will decrease the amount of knowledge that students lose over the summer and decrease the amount of review time that is needed at the beginning of the school year. However, very little
research has been conducted to verify that the shortened summer break is effective in reducing the amount of lost knowledge.

The purpose of this thesis is to further evaluate the data collected by Nofsinger (1999). Nofsinger (1999) examined the loss of academic skills that students suffer over the summer vacation and whether the implementation of an alternative calendar is effective in reducing this loss. In this study the data set will be further evaluated to determine which students benefit most from the use of an alternative calendar: low achievers, middle achievers, or high achievers. A subset of the data that contained schools with similar poverty rates and similar scores on the California Test of Basic Skills (CTBS) will also be evaluated to determine if there are differences among more closely matched samples.
Literature Review

Alternative vs Traditional School Calendars

Traditional Calendar

The traditional school calendar used in American public education is one in which school starts in mid to late August and goes until a two to three week break at Christmas. After Christmas break, students attend school until a two to five day spring break, usually in March or April, and school is dismissed for the summer in mid-May. Students are generally at school for 7 hours, 180 days a year (Worsnop, 1996). Historically, this schedule was used because children were needed to help their parents on the farm in the summer.

The present 9-month calendar, under which schools are closed in summer, emerged as the norm when 85% of Americans were involved in agriculture. Today, about 3% of Americans' livelihood is tied to the agricultural cycle, but the school calendar has not changed (Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996, p. 228).

The economy of the United States has changed dramatically in the last 100 years and few children currently work on the farm (Task Force for Restructuring Time and Learning, 1995).

Alternative Calendar

Due to the shifts in the American economy, the summer vacation most American schools implement is no longer necessary today. Alternative calendars, or year-round education, is promoted by some educators as an alternative to the traditional nine-month school calendar. Although it has recently developed as a popular trend in education reform, it is by no means a new idea. In the 1960's, California schools began to
implement alternative calendars. The concept of year-round education was popularized nationwide in the 1990's as a result of research indicating that Americans were falling behind other industrialized countries as regards academic achievement (Worsnop, 1996).

Adopting an alternative or year-round calendar does not imply that students attend school for a full year without breaks. Most students attending schools with the alternative calendar go to school the same number of days as their traditional calendar school counterparts (Worsnop, 1996). The days are merely arranged in different ways. Alternative calendars are proposed as one solution to the problem of low American achievement scores under the assumption than shorter vacations would result in greater retention of material learned before the break; the learning curve would not have time to drop as steeply with shorter vacations from school (Winters, 1994). In addition, valuable instructional time would not be wasted reviewing what has been forgotten over the summer (Task Force on Restructuring Time and Learning, 1995).

Alternative calendar schools actually consist of numerous types of calendars. Kneese (1996) notes two broad variations in calendars. One variation has to do with the learning time; a school calendar could be extended (i.e., more hours or days are added) or the same number of days could be spaced differently over the course of the year. A second broad variation concerns the attendance schedule; all students in single-track schools follow the same schedule while students in multitrack schools are assigned to several tracks on staggered attendance schedules. Multitrack schools are designed to increase capacity.

Within the two broad variations in calendar-types, there are numerous variations (e.g., length of intersessions) that are specific to each individual school district (National Association for Year-Round Education, 1998; Winters, 1994). Two common patterns of alternative calendar education are the 45/15 and 60/20 schedules (Winters, 1994). These are single track schools with variations in the spacing of instructional days. The first number in such a schedule represents the number of days that students, teachers, and staff
are required to attend school while the second number represents the number of days of vacation between each session of school days. To account for the usual 180 total days of school, this plan is repeated three (60/20) or four (45/15) times a school year. The summer vacation is typically extended but is shorter than the traditional 12 to 14 week break common to traditional calendar schools.

Rationale for the use of alternative calendar. A major advantage of alternative calendars is purported to be improved retention of academic skills. "YRE (Year-round Education) advocates contend that shorter, more frequent vacations help minimize the learning loss that often occurs during the 10-week summer break served up by a traditional school calendar" (Worsnop, 1996, p. 436). Supporters believe that...

children learn best when learning is continuous, and a 3 month break is simply too long. The long vacation breaks the rhythm of instruction, leads to forgetting, and requires that a significant amount of time be spent on review of old material when students return to school in the fall (Cooper et al., 1996, p. 228).

Ballinger (1988) suggests that "the extensive reviews most teachers conduct in September and October limit the number of days available for introduction of new material and subsequent mastery of that material" (p. 57). Shorter summer breaks are perceived to be one solution to this problem. Studies examining retention of academic skills over the summer months have been inconclusive, with some studies showing negative results with the alternative calendar, some showing no differences between traditional and alternative calendar schools, and some showing gains with the alternative calendar (Kneese, 1996).

Several benefits of adopting an alternative calendar have been cited in research studies. In addition to decreasing the loss of knowledge, remediation for students who are behind can be offered in a more timely fashion due to the frequent breaks; students who are not making appropriate progress can use time from each break to catch up on material that has not been successfully learned. Because of frequent breaks, teachers and
students report less burnout than those who attend schools with traditional calendars (Winters, 1994). Alternative calendars allow for vacations to be taken at times of the year other than summer and help families to take advantage of various cultural opportunities, such as the World Series or Mardi Gras, offered in the different seasons. Finally, students who rely on the meals provided at school for nutrition and the school personnel for role models and support do not lose out on these important facets of their lives for such a long block of time (Glines, 1995). Services such as free lunch, speech therapy, and counseling are made available to students during more of the year.

Schools in Fort Knox, Kentucky, a school system headed by the Department of Defense, have been using an alternative calendar since 1993. Officials in this district have found less need for review, good remedial help during intersessions, better teacher attitudes, more opportunity for professional development for teachers, more teacher planning time, opportunity for varied family vacations, and more opportunity for maintenance of building and grounds (Task Force on Restructuring Time and Learning, 1995).

A meta-analysis of thirteen studies evaluating the effects of the alternative calendar on academic achievement was conducted by Kneese (1996). It showed that the use of an alternative calendar did have a positive effect on academic achievement, but the overall effect sizes were very small. Seven studies out of thirteen found favorable results for the alternative calendar. Six studies evidenced favorable data for traditional calendar schools. Kneese found that schools operating on a single-track alternative calendar showed greater positive effects than those on a multi-track calendar. Studies that used gain scores as a measure of achievement found that students who attended schools with alternative calendars experienced greater gains in academic achievement than students in traditional calendar schools.

Rationale against alternative calendar. As with most issues, alternative education is not without its shortcomings or its opponents. Glines (1995) reports that around 30
percent of people in a school district will oppose the change and 10 to 15 percent of these people will be violently opposed. Blai (1986, cited in Barrett, 1990) stated that quantity of educational time is not the only important variable; quality instructional time is important, as well. Shorter, more frequent breaks will not result in greater academic achievement unless instructional time is used wisely. Barrett (1990) states:

More is not necessarily better, because other factors come into play, ranging from the quality of the teacher to the quality of the textbooks to the health of the student. Second, time is a commodity that comes in different sizes. The length of the school year, the length of the school week, the length of the school day, the number of minutes diverted to classroom management and lost to instruction, the number of minutes allocated to a particular subject, the amount of homework, the rate of pupil attention and absenteeism - these blocks of time interrelate, and the importance of one of them cannot be analyzed without considering its impact on the others (p. 84).

In terms of short-term memory loss, a case could be made that multiple short breaks are worse for students than one long summer break. It may be difficult for students to concentrate when they are looking forward to breaks from school and it takes time when they come back from a break to review the previously learned material (Worsnop, 1996). Thus, it is also possible that multiple short breaks may be more harmful than one long summer break.

Effects of Summer on the Retention of Knowledge

Several studies investigating the loss of academic achievement over a summer vacation have been conducted in this century. Cooper et al. (1996) report a professor in New York published the first known study on the loss of academic achievement in 1906. Statistical tests were not used with the sample size of seven students, but differences in speed of mathematics operations were found. Students who had shorter summer breaks solved problems more quickly than students who experienced longer summer vacations.
The accuracy of operations remained the same. Cooper et al. (1996) also reported on a 1924 study that examined the difference in losses between children of different ability levels. Those researchers reported that children with lower intelligence levels had greater losses, although no statistical tests were conducted. Other researchers conducted statistical analyses on these data many years later and found general losses for all students in the study (Cooper et al., 1996). In 1925, Patterson and Rensselaer (as cited in Cooper et al., 1996) conducted a study concerning loss in math and reading skills in fourth through eighth graders between Spring and Fall. They found a loss in math scores across the board, and losses in reading comprehension for fourth and fifth graders. Sixth, seventh, and eighth-graders' scores in reading comprehension increased over the summer. Another interesting finding was that while children with lower IQ scores showed gains over the summer, those children with higher IQ scores evidenced losses in their reading scores. However, statistical tests were not used in that study, instead, the number of gains and losses was totaled and compared (Cooper et al., 1996).

A resurgence of interest in the loss of academic skills over the summer vacation began in the 1960's. Contemporary research studies, using more sophisticated statistical analyses, found losses over the summer months for students attending traditional calendar schools in at least some academic areas (Cooper et al., 1996).

Heyns' study in 1978 (as cited in Cooper et al., 1996) focused on the loss of skills during summer break as a function of socioeconomic status and ethnicity. It was found that all students' scores increased when they were in school but that students from poorer, nonwhite families lost more skills during the summer break. In 1981, Ginsburg, Baker, Sweet, and Rosenthal (as cited in Cooper et al., 1996) used data collected from 120,000 students from elementary schools around the country to replicate Heyns' study. These results verified that being in school did increase scores, but they did not show significant differences due to income or race. Both of these studies have limitations in that approximately eight weeks of instructional time occurred between testings, making it
difficult to discern what new material was learned or what knowledge was regained due to instruction between testing times (Cooper et al., 1996).

Cooper et al. (1996) conducted a meta-analysis of 66 studies that examined the changes in academic achievement test scores before and after summer vacation. The studies included in this meta-analysis were conducted in the 1970's, 1980's, and 1990's. Cooper et al. found a general trend of losses over the summer months that were equivalent to one month on a standardized test or one tenth of a standard deviation. Losses in math were greater than losses in reading. It was found that as students' grade levels went up, their scores in reading showed more losses over the summer vacation. Overall findings suggested that "students appear at best to demonstrate no academic growth over summer. At worst, students appear to lose one month of grade-equivalent skills relative to national norms" (Cooper et al., 1996, p. 259). Researchers noted that students in the middle socioeconomic class actually evidenced some gains on reading recognition tests given before and after the summer vacation, while students in the lower socioeconomic class showed losses on these tests. A possible explanation for greater losses in math than in reading was provided. It was hypothesized that children have more opportunity to practice reading skills both at home and at school. Experience in math is more likely to occur in the school setting.

A study conducted by Hartl and Hess (1998) showed losses in spelling and written language for students in a traditional calendar school with a three month summer break. Students who attended an alternative calendar school with a five-week summer break did not experience these losses. Curriculum-based measures were the testing procedures used for that study. Eighty students in grades one through four participated in the study.

Nofsinger (1999) examined retention of academic skills over the summer months with a focus on differences in losses of skills between students who attended alternative calendar schools and students who attended traditional calendar schools. Students in first, third, and fifth grades were participants in the study. Curriculum-Based
Measurement (CBM) probes in math, spelling, written expression, and reading were used as the assessment measures in the study. Data were collected in May just before school was dismissed for the summer. Data were collected again in August, just after students returned to school. Independent samples t-tests were used to find if mean scores between the two groups were equivalent in May. Paired samples t-tests were used to measure whether significant differences in mean scores occurred between May and August in each calendar type.

A summation of Nofsinger's (1999) data produced mean CBM scores per academic subject area, grade level, calendar type, and time of year. A summary table of these findings is presented in Appendix A. Results indicated that in seven of twelve analyses, the alternative calendar students had significantly higher scores in May, indicating that the groups may not have been equivalent with respect to academic skills. When comparing scores from Spring to Fall, Nofsinger (1999) found more significant increases and fewer significant declines in academic skills for students who attended the alternative calendar schools than for students who attended traditional calendar schools. First-graders were most likely to experience significant declines in the traditional calendar, but experienced significant increases in mean scores when enrolled in the alternative calendar school. Students in both calendar groups experienced significant increases in reading.

**Effects on High, Middle, and Low Achievers**

A question of interest related to the use of an alternative calendar is whether certain students benefit more from a shorter summer break. Charles Ballinger, Executive Secretary for the National Association for Alternative Education, believed that students of all ability levels would benefit from attending an alternative calendar school.

A less interrupted flow of instruction throughout the year will certainly enhance the education of the most able students, who learn continuously, whether in or out of school. Likewise, average students are also ill-served by the traditional
calendar because the long review early in the school year is largely wasted time for them. Interestingly, the least able students are not well served by the traditional school calendar either. A summer away from school disrupts the learning pattern required by slower students, who learn best from a continuous cycle of teaching, practice, re-teaching, and practice (Ballinger, 1988, pp. 57-58).

One empirical study, (Heyns, 1978, cited in Cooper et al., 1996) found that high IQ had a positive effect on gains in reading over the summer months. A study conducted by Klibanoff and Haggert (1981, cited in Cooper et al., 1996) found that the achievement level during the school year did not correlate with the achievement changes over in the summer. They did find slightly greater loss in the highest achievers, but the losses were attributed to regression to the mean.

A study conducted at an elementary school in Ohio examined the effects of alternative calendar on at-risk students, or low achievers. These students were matched with other students in their district of the same achievement level who attended traditional calendar schools. Normed and standardized achievement tests were administered to these students. Results did not indicate statistically significant differences between any of the students who attended the alternative calendar school and students in traditional calendar schools (Campbell, 1993, cited in Winters, 1994).

A study conducted by Allinder and Fuchs (1994) used Curriculum-Based Measurement (CBM) math probes to compare levels of performance and trends of progress between students with and without disabilities in traditional calendar schools. Math scores were obtained throughout the school year and before and after breaks. Participants in this study were 128 students in urban schools. Eighty-four of these students had been diagnosed with learning disabilities or emotional-behavioral disabilities while 44 of the students did not have disabilities. Differences in levels of performance before and after the break were obtained using the median scores in each group. Researchers found that students without disabilities performed significantly better before
the break than their performance after the break. Students with disabilities performed at about the same level before and after breaks. Differences in trends of progress were obtained using the split-middle technique (White & Haring, 1980 as cited in Allinder & Fuchs, 1994). Allinder and Fuchs (1994) found that students who were making progress before the break were adversely affected by the break, while students whose scores were declining were not affected by the break.

Problems with Traditional Assessment Measures

Some researchers who have studied the loss of academic skills over the summer months have indicated that the traditional measures used have not been the most accurate indicators of loss of skills (Cooper et al., 1996; Cooper, Charlton, Valentine, & Muhlenbruck, 1999). Norm-referenced tests are the common assessment tools used to measure achievement.

Predictions become more difficult if norm-referenced test scores are employed by evaluators. A gain of one month on grade-level equivalent scales essentially suggests that students have not changed their place in the distribution relative to the norming group. A change of more or less than one month is inherently ambiguous because it must be interpreted against (a) whether the test adjusted upward raw scores that revealed summer loss and (b) the length of the norming interval (typically, mid-fall and mid-spring) relative to the length of the summer testing interval (Cooper et al., 1999, p. 17).

When students leave for summer vacation they are in the last month of their grade, for example, ninth month of third grade. When they return in the Fall the same students will be in the first month of fourth grade. On a norm-referenced test, the norms will have changed for these two groups, even if the amount of knowledge has not (Cooper et al., 1996).

Another problem inherent in the use of norm-referenced tests is that they are not always an accurate measure in the early grades. A student in first grade, for example, can
score only one grade level below his or her educational sample because children in kindergarten are normally the youngest students included in achievement testing norm groups (Cooper et al., 1996).

An alternative assessment procedure that would be a more sensitive measure of academic gains or losses is Curriculum-Based Measurement. Curriculum-Based Measurement scores can be presented in the form of raw scores. The use of raw scores should be beneficial when measuring loss or gains of knowledge over time.

Curriculum-Based Measurement

Curriculum-Based Measurement (CBM) is defined as "the use of standardized and validated short-duration fluency measures of basic skills by special education and general education teachers for the primary purpose of evaluating the effects of their instructional programs" (Shinn, 1995, p. 547). CBM is a technique that has been demonstrated to be effective as a screening device and a tool for evaluating progress. CBM employs a specific type of standardized and validated measurement probes in the areas of reading, spelling, written expression and arithmetic. It assesses only the accuracy and fluency of performance in these four areas.

Curriculum-Based Assessment involves measuring a child's performance on classroom curricular materials on a repeated basis (Shapiro & Derr, 1990). Curriculum-Based Measurement (CBM) is one of the many models of Curriculum-Based Assessment (CBA) and is unique in that CBM is used primarily to monitor student progress (Shapiro & Derr, 1990). It differs from other models of CBA in several ways. One primary difference is that CBM uses standardized administration and scoring methods, rather than teacher-designed procedures (Fuchs & Deno, 1991). CBM testing probes are short and inexpensive to administer. They can be given frequently to assess the progress and students' scores can be compared directly to others in their classroom (Shapiro & Derr, 1990). CBM probes measure both accuracy and fluency in that scores are based on the number of correct answers given in a specified amount of time.
Validity of CBM

CBM is often criticized for assessing a limited sample of skills. The question "Why would a testing strategy place so much emphasis on short-duration fluency measures with such a limited number of different tasks?" has been raised (Shinn, 1995, p. 549). The answer is that CBM is not designed to give a total assessment of skills or to diagnose specific learning problems. CBM is instead designed as a thermometer that shows whether or not a problem exists and is sensitive to very slight improvements or declines. It is designed to assess change (Shinn, 1995). This sensitivity makes CBM very useful in assessing the effectiveness of interventions. The short duration of the tests permits their being administered frequently and amounts of change can be easily determined.

Reading validity studies. CBM has been proven effective in the assessment of basic reading skills. Researchers have found that, for most students, oral reading is a good indicator of general reading ability, even comprehension (Shinn, 1995). CBM measures reading fluency, or "the speed and accuracy with which a reader reads words" (Shinn, Good, Knutson, Tilly, & Collins, 1992, p. 460). Leaders in the field of reading research state that "fluency is one of the principal building blocks on which reading skills are built" (Shinn, 1989, p. 23). These researchers assert that readers who must read very slowly may not have mastered the material, whereas readers who read quickly are more likely to have reading mastery even if they make some errors. Readers who can decode more quickly can apply more attention to comprehension of the material (Shinn, 1989).

Recent studies comparing scores on measures of reading comprehension, question answering, recall, Cloze, oral reading fluency and two subtests of the Stanford Achievement Tests found that oral reading fluency correlated most highly with the criterion measures. The correlation was very high at 0.89 (Shinn, 1989).

Studies to establish criterion-related validity have shown that CBM reading measures correlated highly, 0.70 to 0.95, with performance on standardized, norm-
referenced tests such as the Woodcock Reading Mastery Test and the Peabody Individual Achievement Test (Shapiro, 1990). CBM measures were found to have test-retest reliability ranging between .82 and .97 and parallel forms reliability ranging from .84 to .96. Inter-rater reliability has been found to be extremely high at 0.99 (Shinn, 1989).

Written expression validity studies. CBM Written Expression measures are generally samples of a child's writing that relate to a story starter. The total number of words written, the number of words spelled correctly, and the number of correct word sequences can all be included in a student's score. Measures of Total Words Written and Words Spelled Correctly have been compared to the Test of Written Language and were found to correlate at .81 and .79, respectively (Shinn, 1989). Test-retest reliability for written expression ranged from .42 to .91 for total words written. For words spelled correctly, the test-retest reliability ranged from .46 to .81 and ranged from .51 to .92 for correct letter sequences (Shinn, 1989). In measures of parallel forms reliability, correlations for total words written ranged from .42 to .95. Reliability for words spelled correctly ranged from .41 to .95 and reliability for correct word sequences ranged from .49 to .96. Interrater reliability for all three measures of written expression was .98.

Mathematics validity studies. Studies concerning the validity of CBM mathematics measures have found slightly smaller correlations than those of the other CBM areas. Proposed reasons for this include concerns that the content validity of published measures of math is not that high (Shinn, 1989). Correlations of CBM with the Mathematics Achievement Test ranged from .42 to .54 in a study conducted by Skiba, Magnusson, Marston, and Erikson (1986, cited in Shinn, 1989) which included students in first through sixth grades. Reliability on these measures, however, is quite high. In mixed operation probes, internal consistency, inter-rater reliability, and test-retest reliability were found to be .93.

Spelling validity studies. Curriculum-based spelling probes are designed to measure small changes in spelling. Each letter sequence within a word is counted, so that
the change of just one letter in a word would change a student's score (Shinn, 1989). Studies assessing the validity of CBM spelling measures have found correlations with the Peabody Individual Achievement Test that range from .80 to .94. Correlations with the Stanford Achievement Spelling Subtest range from .80 to .89 (Shinn, 1989). In a study conducted by Shinn in 1981, measures of test-retest reliability range from .80 to .92. In another study, average inter-rater reliability for correct letter sequences was 0.91 (Shinn, 1989).

Purpose of the Study

Nofsinger's (1999) study, concerning the effects of the alternative calendar on retention of learned material over the summer months, found that students who attended alternative calendar schools tended to show more significant increases in math, spelling, written expression, and reading skills and fewer significant decreases than students in traditional calendar schools. However, her results are questionable because the control and experimental groups were matched only on the basis of geographic location and percent of students participating in the free or reduced lunch programs. In addition, students' mean scores in alternative calendar schools were often significantly higher at the time of the initial Spring testing. Thus, the question arose as to whether differences in scores in the Fall were due to the calendars or due to inherent differences in the groups. This study will examine Nofsinger's data again, focusing on a subset of data consisting of students from schools that were similar in both poverty levels (free and reduced lunch) and CTBS scores.

Another purpose of this study is to examine differences in loss of knowledge over the summer months among students with high, middle, and low achievement levels. Based on the results of the Spring testing, students will be grouped into high, middle, and low achievement levels. Skill retention over the summer will be examined in each academic area (math, reading, writing, and spelling.) The results of this data analysis should be informative as to which group of students would benefit most from the
adoption of the alternative calendar. This type of data analysis procedure provides a statistical control that accounts for differences in Spring scores, making Fall scores more valid and better to interpret.

**Research Questions**

In this study two aspects of Nofsinger's (1999) data will be evaluated. First, the CBM scores will be re-analyzed through the Analysis of Covariance (ANCOVA) design to determine if participation in the alternative calendar is more beneficial for certain groups (i.e., grade level, calendar type, achievement level). The ANCOVA design model was chosen because the subjects in this study were not chosen randomly nor randomly assigned to groups (Pedhazur, 1982). Nofsinger (1999) found that some mean group scores were not equivalent at the May testing and the ANCOVA analysis is able to alleviate problems by the use of statistical control.

One hypothesis of this study was that high achieving students were not expected to show differences with regard to the calendar they attended in any academic area. Students with low or middle achievement levels in the traditional calendar school should suffer more losses in academic skills than their alternative calendar counterparts. For the purposes of this study, high achievers were defined as students whose CBM scores fell in the top one-third of their grade in each academic subject area. Middle achievers were defined as students whose scores fell in the middle one-third of their grade. Low achievers were students whose scores fell in the bottom one-third of their grade.

To evaluate a second aspect of Nofsinger's (1999) data, the alternative calendar third-grade students were compared with a subsample of traditional calendar school third-grade students who had very similar scores on the California Test of Basic Skills. The hypothesis was that scores in May between groups in the subsample would be statistically equivalent. The gains or losses found from analysis of the subsample mean scores should provide valid data as to whether there are overall differences between the alternative and traditional calendar groups.
Method

Participants

Participants in this study attended three school districts in south-central Kentucky. Two of the three school districts operated on a traditional calendar and had approximately a ten-week summer break. The third district operated on a single track alternative calendar. These students attended school for 45 days, had a 10 day break, attended for another 45 days, had a fifteen day break, attended school for 45 days, had another 10 day break, attended school for another 45 days, and had an eight week summer vacation (Simpson County Board of Education, 1996).

A total of 850 students in first, third, and fifth grades initially participated in this study. Thirty-nine students were excluded because they were not enrolled in the same schools in the Fall. Sixty-two students were excluded due to summer school attendance. This process resulted in a sample of 749 students. Four hundred ninety-eight students attended traditional calendar schools and 251 students attended alternative calendar schools. Seventy-seven percent of students in the traditional calendar schools returned permission slips allowing them to participate in the study. Sixty percent of students in alternative calendar schools returned permission slips allowing them to participate in the study. Sample sizes are presented in Table 1.

In this study, attempts were made to match the schools in terms of geographic location, academic achievement, and socioeconomic status of the students. All schools selected for this study were located in south-central Kentucky. One school district with three schools was chosen as a representative of the alternative calendar. Four schools in two districts were chosen as representative of the traditional calendar. Approximately 40 percent of students in the alternative calendar schools participated in free or reduced
Two traditional calendar schools were chosen because the percentage of students receiving free and reduced lunch was similar to the 40% figure in the alternative calendar district. One school was selected because it had a much lower percentage of students receiving free and reduced lunch (15%) and another school was chosen because the percentage of students receiving free and reduced lunch was much higher (75%).

The degree of academic achievement was based on scores reported from the California Test of Basic Skills, a test administered to all third, sixth, and ninth grade students in Kentucky. The scores used in this study were collected in the Spring of 1997. Interestingly, one traditional calendar school's third-graders were ranked 223 (t-score 53.6) in Kentucky based on these test scores. The alternative calendar school's third-graders were ranked 221 (t-score 53.7). These two schools were used as a subsample for a comparison of closely matched schools. The subsample will be examined as a
replication of Nofsinger's (1999) study in the hope that the two subsample groups will have equivalent Spring scores.

Materials

The assessment tools developed for this study were CBM reading, math, writing, and spelling probes. Each school participating in this study used different curricula. Therefore, curriculum materials that were not used by any of these schools were chosen for the CBM probes.

Reading probes were chosen from the following reading texts: Ruddell, Dillon, and Spache (1978), Ruddell, Reid, and Monson (1978), and Ruddell, Taylor, and Adams (1978). Passages were chosen from the appropriate grade-level texts and were re-typed to appear exactly as they did in the texts (See Appendix B).

Math probes were developed using textbooks by Bitter et al. (1987). Addition and subtraction probes were chosen at random from grade level texts. Thirty problems were presented to first and third-grade students. Twenty-four problems were presented to fifth-grade students (See Appendix B).

Spelling probes were comprised of spelling words from Cook, Esposito, Gabrielson, and Turner (1987) texts. Words were chosen at random from grade level texts. For first grade probes every fourth, eighth, and twelfth word in the review lessons were chosen. For third and fifth grades, every tenth word was chosen (See Appendix B).

For the written expression probes the experimenters generated story starters to be completed by the students. First grade students completed the story "This morning a UFO landed on my playground and ..."; third-graders completed the story "Yesterday a monkey climbed through my window at school and..."; and fifth grade students completed the sentence "This morning a spaceship landed on the playground and...".
Procedures

In measuring the effect of the alternative calendar on learning, the time between instructional periods in each calendar type is the independent variable. The amount of time between test administrations was necessarily different for alternative and traditional calendar schools because the length of the vacation differed. Therefore, students in alternative calendar schools waited 10 weeks between test administrations while students in traditional calendar schools waited 12 weeks. Results of previous studies have been confounded in that it was impossible to determine how much knowledge the students had gained between the Spring testing and the end of school or the beginning of school and the Fall testing. It is important to test the students' learning with as little instructional time taking place as possible. Therefore, the instructional time that occurred between testing intervals was the same in each school system. The students were tested in the Spring no more than one week before the end of their school year. The Fall testing occurred no more than one week after the beginning of school. Results of a meta-analysis of several studies indicated that testing was never conducted on the last day in the Spring or the first day in the Fall (Cooper et al., 1996). Testing on these days would be a logistical problem due to the excitement of the students and the many things that should be accomplished when starting or ending school.

Students were given an informed consent document (See Appendix C) to be signed by their parents and returned to school. Only students whose parent gave consent participated in the study. CBM probes were administered in May and August, 1997 using standardized instructions for all students participating in the study. These procedures can be found in Appendix D. Before administration of any probes, the rewards for returning consent forms, a piece of hard candy or a sticker, were given to the students by their teachers. Probes were administered by a group of school psychology graduate students, including the two investigators, as well as two retired elementary school teachers who were trained in testing procedures.
Math, writing, and spelling probes were administered either in the classroom or in small groups, according to teacher preference. Reading probes were administered individually and student's readings were tape-recorded to later obtain inter-rater reliability data.

After all data were collected, two independent raters scored each probe as a check of inter-rater reliability. At least one of the raters was a School Psychology graduate student. All other raters had been trained in CBM standardized scoring procedures. The number of correct digits was used as the score for math probes. The number of correct letter sequences was the scoring on the spelling probes. For written expression, the number of correct word sequences was used as the score. On the reading probes, the scores were the numbers of words read correctly in one minute. Scoring procedures can be found in Appendix E.

Inter-rater reliability data were obtained by dividing the number of scoring agreements between the two raters by the number of agreements plus disagreements and multiplying by 100 (Hintze, Shapiro, & Lutz, 1994). Inter-rater reliability coefficients are generally considered acceptable if they are above .80 (Alessi & Kaye, 1983). Inter-rater agreement values were obtained for each of the four academic subjects in three grades for both calendar types for the Spring and Fall collection times. The result was a total of 48 inter-rater reliability coefficients. Forty of these coefficients were between .90 and 1.00. Four more coefficients ranged between .80 and .89. Only four coefficients were considered unacceptable and ranged from .67 to .78. Upon any disagreement, the probe was scored on a third occasion and the actual score was determined for perfect agreement between raters.

**Analysis**

Due to significantly different test scores between groups in the Spring testing, results of Nofsinger's (1999) study were somewhat difficult to interpret. One reason for the significant difference can be attributed to the fact that the subjects could not be
randomly assigned to conditions. The error variance resulting from the lack of random assignment can be minimized through the use of the ANCOVA model.

Analysis of Covariance is a technique that allows one to examine two research questions. First, are the slopes of the regression line (one regression equation per group) equal? If the slopes are significantly different, then an Aptitude Treatment Interaction (ATI) is present. An ATI interaction indicates a treatment effect that is not uniform across levels of the covariate. Stone-Romero and Anderson's (1994) procedure for moderated multiple regression was employed to determine significance of difference between slopes. In cases in which there is no ATI (slopes are not significantly different), then a second issue can be examined--that is, do the lines have the same y-intercept? An examination of the y-intercepts is the statistical test used to answer the question of whether a group difference exists after controlling for scores on the covariate. Finally, Lawshe's (1983, cited in Cascio, 1991) procedure for determining significance of difference in y-intercept terms was employed.

In this study the covariate was the score obtained by students in May. The dependent variable was the August score. The grouping variable was the calendar type, either traditional or alternative. An Aptitude Treatment Interaction (ATI) was expected because students with different levels of achievement were hypothesized to gain varying amounts of benefit from participation in the alternative calendar. Students in the low and middle achievement levels were expected to gain more benefit from attending the alternative calendar schools than high-achievers. The type of calendar employed was not expected to affect the scores of high-achieving students.

In the analysis of a subsample of third-grade students, independent samples t-tests were used to compare initial achievement levels. If the two groups were comparable (i.e., no significant differences between groups), paired samples t-tests were performed to determine if these comparable groups showed significant differences between their scores in the Spring and in the Fall. These procedures are a replication of Nofsinger's (1999)
study; however, the current study used only a subsample of students with very comparable achievement scores.
Results

Analysis of Covariance Results

Data were examined by grade and subject area. Results of the analyses were examined for differences in achievement levels. Separate regression lines were completed and plotted for each group and are displayed in Figures 1-12. Significant differences in slopes generally resulted in two types of regression lines. In one type, the ordinal regression lines, the regression lines began or ended at similar points for the two calendar types. At the opposite end of the X axis, there was a large difference between the scores for the two calendar types. Figures 1, 3, 4, and 10 are examples of this type of slope difference. In other cases of significant differences, regression lines showed a crossed pattern. For example, one group might have higher scores at the y-intercept, then have a flattened slope, while another group might have low scores at the y-intercept, but have a steep slope. Such patterns are referred to as disordinal regression lines and might indicate that achievement level was not a factor in retention in one group, but was a factor in another. Figures 7, 11, and 12 are examples of this type of slope.

At times, differences in slopes were not significant. On these occasions, the regression lines were roughly parallel, suggesting that the calendar types did not affect retention of academic skills for students of different achievement levels. Figures 2, 5, 6, 8, and 9 are examples of these types of slopes. For ease of interpretation of y-intercept differences, adjusted means were calculated for traditional and alternative calendar groups that displayed nonsignificant regression slopes and can be seen in Table 4.

First grade results. In math, Fall scores in both the traditional and alternative calendar groups were very similar for the lower achievers. Middle and high achievers in the alternative calendar group had higher scores in August than their counterparts in the
traditional calendar. The difference in regression slopes (Figure 1) was statistically significant (F=4.5, p<.01). In spelling, differences in regression slopes (Figure 2) were not statistically significant (F=1.0, p>.05). Testing for differences in intercepts revealed a significant difference between the group scores in August, with students in the alternative calendar school having significantly higher scores (p< .001). In written expression, the difference between the slopes of the regression lines (Figure 3) was significant (F=6.0, p<.01). Students in both calendars with lower scores in the Spring had similar scores in the fall. However, Fall scores were higher for middle and high achievers in the alternative calendar school than they were for the traditional calendar middle and high achievers. In reading, the difference between slopes (Figure 4) was significant (F=7.1, p<.01). Low and middle achievers in both calendar types had similar Fall scores, but high-achieving students in the alternative calendar had higher scores in the Fall than high achievers in the traditional calendar.
Figure 1. Regression slopes for first grade math scores.

Note. Maximum obtained score = 36.

Traditional calendar August score = 4.24 + May score X 0.63.
Alternative calendar August score = 4.18 + May score X 0.87.

Figure 2. Regression slopes for first-grade spelling scores

Note. Maximum obtained score = 75.

Traditional calendar August score = 9.60 + May score X 0.78,
Alternative calendar August score = 7.80 + May score X 0.90.
**Figure 3.** Regression slopes for first-grade written expression scores.

**Note.** Maximum obtained score = 32.

Traditional calendar August score = $2.11 + \text{May score} \times 0.48$.

Alternative calendar August score = $2.50 + \text{May score} \times 0.73$.

**First Grade Reading**

**Figure 4.** Regression slopes for first-grade reading.

**Note.** Maximum obtained score = 190.

Traditional calendar August score = $2.50 + \text{May score} \times 0.93$.

Alternative calendar August score = $2.45 + \text{May score} \times 1.10$. 
Third grade results. In the area of math, third-grade students' scores evidenced regression slopes (Figure 5) that were not significantly different (F=0.3, p>.05). Testing for differences in intercepts did not reveal significant differences (p>.05). In spelling, differences in regression slopes (Figure 6) were not significant (F=0.0, p>.05). Testing for intercept differences displayed significant differences in August scores. Students in the alternative calendar displayed significantly higher scores (p<.01). In writing (Figure 7), significant differences were found between slopes of the regression lines (F=4.5, p<.01). Lower achievers in the traditional calendar evidenced lower Fall scores than students of similar achievement level in the alternative calendar. Middle achievers in both groups had very similar scores in the Fall. However, high achievers in the traditional calendar produced higher scores than high achievers in the alternative calendar. In reading, differences in slopes (Figure 8) were not significant (F=0.0, p>.05). Testing for differences in intercepts revealed that the difference between groups in August scores was not statistically significant (p>.05).
Figure 5. Regression slopes for third grade math.

Note. Maximum obtained score = 48.

Traditional calendar August score = 11.61 + May score X 0.56.
Alternative calendar August score = 8.82 + May score X 0.65.

Figure 6. Regression slopes for third grade spelling.

Note. Maximum obtained score = 98.

Traditional calendar August score = 18.8 + May score X 0.78.
Alternative calendar August score = 20.3 + May score X 0.77.
Figure 7. Regression slopes for third grade written expression.

Note. Maximum obtained score = 70.

Traditional calendar August score = 5.81 + May score X 0.76.
Alternative calendar August score = 9.06 + May score X 0.55.

Figure 8. Regression slopes for third grade reading.

Note. Maximum obtained score = 201.

Traditional calendar August score = 10.70 + May score X 0.96.
Alternative calendar August score = 10.48 + May score X 0.94.
Fifth grade results. In math, the difference between the slopes of regression lines (Figure 9) was not significant (F=0.0, p>.05). Testing for differences in intercepts revealed no significant differences in May or August (p>.05). In spelling, lower-achieving students in the traditional calendar had lower scores than low achievers in the alternative calendar. As achievement levels increased, the scores became more similar, with the highest achievers in the traditional calendar actually having slightly greater scores than the highest achievers in the alternative calendar. Middle achievers had very similar scores in both groups. The difference in regression slopes (Figure 10) was significant (F=4.0, p<.01). In writing, the difference between the regression slopes for the traditional and alternative calendar groups (Figure 11) was significant (F=3.3, p<.05). Lower achieving students in the traditional calendar group had higher Fall scores than low achievers in the alternative calendar group. Students in the middle achievement level had very similar scores in both groups. However, high achievers in the alternative calendar had higher scores than high-achieving students in the traditional calendar group. Reading scores indicated an opposite pattern. Low achievers in the traditional calendar group had somewhat lower scores than students of comparable achievement in the alternative calendar group. Students in the middle achievement level had similar scores in both groups. However, high achievers in the traditional calendar group showed higher scores in August than their alternative calendar counterparts. The difference in regression slopes (Figure 12) was significant (F=4.0, p<.01).
Figure 9. Regression slopes for fifth grade math.

Note. Maximum obtained score = 70.

Traditional calendar August score = 6.71 + May score X 0.82.

Alternative calendar August score = 8.41 + May score X 0.82.

Figure 10. Regression slopes for fifth grade spelling.

Note. Maximum obtained score = 130.

Traditional calendar August score = 20.87 + May score X 0.81.

Alternative calendar August score = 38.86 + May score X 0.67.
Figure 11. Regression slopes for fifth grade written expression.

Note. Maximum obtained score = 84.

Traditional calendar August score = 16.87 + May score X 0.55.
Alternative calendar August score = 9.84 + May score X 0.71.

Figure 12. Regression slopes for fifth grade reading.

Note. Maximum obtained score = 220.

Traditional calendar August score = 8.15 + May score X 0.98.
Alternative calendar August score = 23.72 + May score X 0.84.
Summary of Analysis of Covariance

Table 2 presents a summary of the results of the Analysis of Covariance (ANCOVA). Through the ANCOVA, the slopes of regression lines were examined for students in each grade and in each academic subject area. If a group of students in one calendar was shown to have significantly better scores than the other group of students, the type of calendar that was beneficial is indicated in the table. If no significant differences were found, ND, or no difference, is indicated in the table.

Table 2

Types of Students Benefitting from Traditional or Alternative Calendar Instruction

<table>
<thead>
<tr>
<th>Grade</th>
<th>Low Achievers</th>
<th>Middle Achievers</th>
<th>High Achievers</th>
<th>Math</th>
<th>Spelling</th>
<th>Reading</th>
<th>Written Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ND</td>
<td>Alt.</td>
<td>ND</td>
<td>ND</td>
<td>Alt.</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>Trad.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ND</td>
<td>Alt.</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alt.</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>Trad.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>Trad.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* ND= No Difference; Alt. means support for the alternative calendar; Trad. means support for the traditional calendar. Conclusions are drawn from significant slope differences and significant differences in the y-intercept.
Table 3 provides a summary of the adjusted means for August scores. August means were adjusted to account for differences in May scores. When means were adjusted, the difference in August scores between the alternative and traditional calendar decreased in most areas.

Table 3

Adjusted Means for Subjects with Non-Significant Differences in Regression Slopes

<table>
<thead>
<tr>
<th>Grade</th>
<th></th>
<th>Obtained Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1: Spelling</td>
<td>Traditional</td>
<td>57.10</td>
<td>57.92</td>
</tr>
<tr>
<td></td>
<td>Alternative</td>
<td>65.36</td>
<td>63.39</td>
</tr>
<tr>
<td>Grade 3: Math</td>
<td>Traditional</td>
<td>24.83</td>
<td>25.70</td>
</tr>
<tr>
<td></td>
<td>Alternative</td>
<td>26.80</td>
<td>25.30</td>
</tr>
<tr>
<td>Grade 3: Spelling</td>
<td>Traditional</td>
<td>81.41</td>
<td>83.28</td>
</tr>
<tr>
<td></td>
<td>Alternative</td>
<td>86.05</td>
<td>83.94</td>
</tr>
<tr>
<td>Grade 3: Reading</td>
<td>Traditional</td>
<td>96.83</td>
<td>101.26</td>
</tr>
<tr>
<td></td>
<td>Alternative</td>
<td>105.91</td>
<td>98.91</td>
</tr>
<tr>
<td>Grade 5: Math</td>
<td>Traditional</td>
<td>31.53</td>
<td>30.92</td>
</tr>
<tr>
<td></td>
<td>Alternative</td>
<td>31.54</td>
<td>32.74</td>
</tr>
</tbody>
</table>
Subsample Analysis of Third-Grade Students with Comparable Achievement Levels

Scores from the third grade alternative calendar school and from a subsample of third graders from a traditional calendar school were compared due to some questions in Nofsinger's (1999) study of whether traditional and alternative groups had equivalent achievement levels. In the present study, Independent samples t-tests were used following intial testing (conducted in the spring of the school year) to find if scores were similar in each subject area. Significant differences were not found in math, spelling, or reading. Students in the alternative calendar were found to have significantly higher written expression scores in May (p<.05).

To determine the effects of alternative and traditional school calendars on retention of academic skills over the summer months, a comparison was made between the initial testing (at the end of the school year in May) and the follow-up testing (at the beginning of the following school year in August) in four academic subject areas. Overall results, summarized in Table 4, suggested that attendance in an alternative calendar school did not significantly benefit these third-grade students in their retention of academic skills. Scores in math and spelling did not change significantly over the summer for either group of students. In writing, students' scores in the traditional calendar did not change significantly, while students in the alternative calendar school experienced a significant decrease in scores. In reading, students in both calendar schools experienced significant gains in scores over the summer.
Table 4

Mean Scores from a Subsample of Third-Grade Students with Comparable Achievement Levels

<table>
<thead>
<tr>
<th></th>
<th>Traditional</th>
<th>May</th>
<th>(SD)</th>
<th>August</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math (CD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional a</td>
<td></td>
<td>29.68</td>
<td>(10.63)</td>
<td>27.45</td>
<td>(9.25)</td>
</tr>
<tr>
<td>Alternative b</td>
<td></td>
<td>27.64</td>
<td>(10.26)</td>
<td>26.80</td>
<td>(9.63)</td>
</tr>
<tr>
<td>Spelling (CLS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td></td>
<td>83.52</td>
<td>(10.61)</td>
<td>82.27</td>
<td>(10.71)</td>
</tr>
<tr>
<td>Alternative</td>
<td></td>
<td>86.05</td>
<td>(12.61)</td>
<td>86.15</td>
<td>(11.33)</td>
</tr>
<tr>
<td>Written Expression (CWS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td></td>
<td>23.55</td>
<td>(10.50)</td>
<td>24.91</td>
<td>(11.62)</td>
</tr>
<tr>
<td>Alternative</td>
<td></td>
<td>27.81</td>
<td>(12.81)*</td>
<td>24.36**</td>
<td>(12.74)</td>
</tr>
<tr>
<td>Reading (WRC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td></td>
<td>92.70</td>
<td>(37.99)</td>
<td>99.04**</td>
<td>(36.62)</td>
</tr>
<tr>
<td>Alternative</td>
<td></td>
<td>101.39</td>
<td>(34.20)</td>
<td>105.91**</td>
<td>(36.46)</td>
</tr>
</tbody>
</table>

**Note.** CD = Correct Digits; CLS = Correct Letter Sequences; CWS = Correct Word Sequences; WRC = Words Read Correctly.

a \( n = 47 \)

b \( n = 97 \)

*p < .05.

**p < .01.
Discussion

The adoption of an alternative school calendar has been a controversial topic in education for some years. One of the proposed benefits of attending a school with an alternative calendar is increased retention of academic skills due to a shorter summer break. Nofsinger (1999) examined this issue and found that the alternative calendar was beneficial to students in some grades and in some academic subject areas. However, mean scores between groups were not always statistically equivalent upon initial testing.

The present study was conducted for two purposes. First, an Aptitude Treatment Interaction design was utilized to negate the differences in initial scores and determine more directly the effects of the alternative calendar. Further, differences in retention between high, middle, and low-achieving students were evaluated using the Aptitude Treatment Interaction design. Finally, a subsample of alternative and traditional calendar students' scores that were thought to be equivalent upon initial testing were analyzed using Nofsinger's (1999) data analysis procedures to analyze the effects of the calendar.

Analysis of Covariance

Results of grade level and academic subject analyses using the Aptitude Treatment Interaction design showed more support for the alternative calendar. Students who participated in the alternative calendar had more instances of significantly higher scores in the Fall than students in traditional calendar schools. Overall, the alternative calendar was favored in 16 instances while the traditional calendar was favored in only three instances. For 17 subgroups no significant differences were found between Fall scores for either calendar.

Consistent with Nofsinger's analysis, support for the alternative calendar was most apparent with first-graders. First-graders with middle to high academic achievement in
the alternative calendar school had significantly higher Fall scores in all academic subjects. The types of skills measured with CBM probes provide one explanation for this occurrence. The CBM probes measured basic skills in the four academic subject areas. First-grade students would be likely to have less sustained mastery of basic skills than older students and might be more likely to forget their basic skills over time without instruction.

Results concerning benefits for high or low achievers varied based on grade and academic subject area. In half the cases, the type of calendar had no effect on the Fall scores of low achievers. In first grade, low achievers benefitted from attending the alternative calendar school in the area of spelling. In third grade, low achievers benefitted from the alternative calendar in spelling and reading. In fifth grade, low achievers benefitted from attending traditional calendar schools in written expression. Low achievers in fifth grade benefitted from the alternative calendar in spelling and reading. These results provide little support for the hypothesis that low achievers would benefit more from instruction in the alternative calendar, since instances of benefits from the alternative calendar equal instances of no differences of benefits from the traditional calendar.

One explanation for the similarity in many scores regardless of calendar type for low achievers might be that these students did not have as strong a grasp on the material in May. Thus, time (over the summer) is not a crucial variable for these students. A few more weeks off did not affect these students' retention of academic skills. Low-achieving third and fifth-graders, who were more likely to have a grasp on basic skills, did seem to be more positively affected by attending the alternative calendar school in some subject areas.

Fall scores for students at the middle achievement level did not seem to be affected by the type of calendar their schools implemented in the majority of cases (7 of 12). Again, this lack of effect does not provide support for the hypothesis that students in
low and middle achievement levels should benefit from the alternative calendar. First
grade students in the middle achievement level who attended the alternative calendar
school did have higher scores than traditional calendar students in all academic areas.
Again, first-grade students would be expected to experience more loss of academic skills
in a few weeks time. These students might have a lesser grasp on basic skills and might
be more likely to forget the skills. Third-graders in the middle achievement level
experienced benefits from the alternative calendar only in the area of spelling. Fifth-
graders in the middle achievement level did not show differences between groups.

Similar to low-achieving students, high-achievers showed benefits from attending
the alternative calendar in 6 of 12 subgroup analyses. High-achieving first-graders in the
alternative calendar had higher scores in the Fall than their traditional calendar
counterparts in all subject areas. High-achieving third-grade students benefitted from
alternative calendar in the area fo spelling. Fifth-grade high achievers showed benefits
from the alternative calendar in the area of written expression. The only benefits for high
achievers in the traditional calendar were in third-grade written expression and fifth-grade
reading. The hypothesis of no significant differences in scores for high achievers in both
calendars gained mixed support. In 4 of the 12 subgroup analyses, no significant
differences were found between calendar types. In half the subgroup analyses high
achievers benefitted from the alternative calendar. In 2 of the 12 subgroup analyses, high
achievers benefitted from the traditional calendar.

Overall, students gained benefits from attending the alternative calendar schools
in 16 of 36 subgroup analyses. Favorable evidence for the traditional calendar was found
in three subgroup analyses. The suggestion is that while the alternative calendar may not
be successful in aiding student retention of academic skills in all cases, it is rarely
detrimental to the retention of skills. The hypothesis that some groups of students would
benefit more from participation in the alternative calendar did not gain support. Low and
middle achievers each benefitted from the alternative calendar in 5 of 12 subgroup
analyses. High achievers gained benefit from the alternative calendar in 6 of the 12 subgroup analyses. Thus, low, middle, and high achieving students seemed to benefit equally from participation in the alternative calendar.

**Subsample of Third-Grade Students With Comparable Achievement Levels**

In this study, a subsample of students from the traditional calendar whose scores were thought to be comparable to alternative calendar students was chosen. Scores in three academic areas were equivalent between groups at the initial testing in May. Students in the alternative calendar continued to evidence significantly higher May scores in written expression than traditional calendar students, consistent with Nofsinger's findings. Thus, contrary to the research hypothesis, the groups did not have equivalent scores in all academic areas. Results of analyses conducted on this subsample of students duplicated Nofsinger's (1999) findings for third-grade students. Nofsinger's (1999) results indicated that reading and math scores did not change significantly from spring to fall regardless of calendar type. Third-grade students in the alternative calendar school experienced a significant decline in written expression scores from spring to fall. No significant difference was found in written expression scores for traditional calendar students. Students in both calendars experienced significant gains in reading skills from spring to fall. The current analysis found that even when students' scores were similar at the initial testing, changes from spring to fall were equivalent to changes in Nofsinger's (1999) study. These results provide support for most of Nofsinger's findings due to the fact that results of paired sample t-tests were equivalent in both studies. Written expression scores in May remained significantly different between groups, suggesting that the skills in that area were not equally developed. Care should be taken in interpreting the results of the written expression probes. However, these results are contradictory to the findings of the Aptitude Treatment Interaction Analyses, when significant differences were found for third-grade student scores.
Limitations

It is important to discuss the limitations of this study. One limitation lies in the way the CBM probes were implemented. CBM is designed to employ multiple probes in each academic subject area. These probes should be administered frequently to monitor progress and determine if instruction is appropriate. CBM probes should also assess a student's particular curriculum. In this study, only single probes in each academic subject area were administered. Also, because each school, and in some cases individual classrooms, used different curricula, CBM probes uncommon to all students were developed. Administering multiple probes and creating equivalent CBM probes that reflected the different curricula would provide data that more accurately reflects students' skills, but would be difficult with regard to time-constraints.

Another limitation of this study is that it provides no evidence as to how the alternative calendar will affect student scores over a number of years. This study was conducted after the first year that the alternative calendar schools had used the calendar. This study does not allow us to know if students in the alternative calendar will be able to build on the retention of academic skills and have higher scores in the future or if multiple breaks will be detrimental to students in the alternative calendar.

A third limitation of this study is that the type of alternative calendar implemented in the selected school (45/15), as well as many other schools in Kentucky, is not a drastic departure from the traditional calendar. The students in the alternative calendar attended one extra week of school in the spring and one extra week in the fall. Many school districts in other states employ the 60/20 alternative calendar type, which leads to longer breaks throughout the year and a shorter break in the summer. Differences in scores from schools that use this 60/20 type of calendar versus a traditional calendar would likely be more pronounced. Therefore, the results of this study might not be applicable to school districts that use a 60/20 calendar or some other type of alternative calendar that includes a summer break that is shorter than the two-week difference involved in this study.
The necessary use of permission slips adds a potential confound to the study. It is likely that students who are less responsible or have more difficulty in school might not return permission at the rate of higher achieving students. Because of the lower return rate of permission slips in the alternative calendar school, the range of student abilities might be more restricted and the sample might not be as representative of the population of those schools.

Although no significant history effects, such as home schooling over the summer or summer enrichment programs, were identified in any of the participating school districts, it is difficult to know what types of experiences students had over the summer. It is always possible that events in the summer could affect retention of academic skills.

A final limitation is that the primary investigator of the study was a participant in data collection. Although this was logistically imperative in this study, this practice is not recommended for the fear that the investigator will influence outcomes during data collection.

**Future Research**

Although some support is given for the alternative calendar in this study, it is important to determine the effects of the alternative calendar's multiple breaks throughout the year on student learning. It is undetermined if the short breaks are helpful or detrimental to students' performance. Also, determining the amount of time students actually need to recover the lost academic skills after returning to school in the Fall would be useful for program planning.

Longitudinal studies of alternative calendar use would provide insight into whether students using that calendar are able to better build their academic skills over time. Testing at the end of a later year would be helpful in deciding this issue. Additionally, the use of multiple CBM probes designed specifically for each curricula might give a more valid assessment of students' skills.
References


Appendix A

Changes in Mean CBM Scores from May to August in Traditional and Alternative Calendar Schools
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Note. CD = Correct Digits; CLS = Correct Letter Sequences; CWS = Correct Word Sequences; WRC = Words Read Correctly

*p < .05.     **p < .01.     ***p < .001.
Appendix B

Curriculum-Based Measurement Probes
Upside Down Amy

"What are you doing?" Mother said.
"I am looking at the world upside down," Amy said.
"It's fun."
"Very good," said Mother.
"When you stand up, we will go skating."

Amy got on her feet.
"I like skating," she said.

Just then mother had a call.

After the call, Mother said, "Come here, Amy.
That was my editor. He needs a story right away.
We cannot go skating until after I write the story."

"I will help you write your story," Amy said.
"I am glad you want to help," Mother said.
"But can you write?"

"No," said Amy. "So I will go back and stand on my head."

After a time Amy said, "Mother, what is your story about?"

"A monkey," said Mother. "This monkey likes to do tricks.
He likes to race from tree to tree.
He likes to jump around.
Now I have to think of one other trick for him to do.
It has to be a good trick."

Mother worked on the story.
Pigs and Pirates

Once a long, long time ago, when pirates sailed the seas, three Greek boys lived on an island in the blue Aegean Sea. Their names were Milo, Jason, and Alexander. They earned their daily bread and cheese by tending the pigs of a wealthy prince. Each day the boys sang because they were so happy.

Oh, they had work enough, that is true, for the pigs were forever running away. But, still, most of the hours in the long sunny days were free for play, with trees to climb and races to run and the salty sea to swim in.

Once a week, the prince's ship came sailing in to bring fresh food for the boys. The ship took back two or three of the fattest pigs. On this day, each of the boys was given a shiny silver coin for his work.

The boys had found that the pigs were very clever. And so, they spent time each day teaching tricks to three of the cleverest pigs. Milo taught one pig to walk backward on his hind legs. Jason trained the second pig to dance a jig. And Alexander trained the third pig to lie down and play dead.

There was one trick that all the pigs on the island knew. They had learned to run to the sandy side of the island when the boys blew three high notes on their pipes. The pigs had learned this trick very well because every time they ran to answer the pipe call, they found a
Why People Wear Masks

Why do you wear a mask on Halloween?
"To fool people."
"To make people guess who."
"To make others laugh."

Why do actors sometimes wear masks on the stage and on the TV?
"To help them look like and act like a character in the play."

Why do firefighters wear gas masks?
"To protect them when they enter a building filled with smoke."

These then are some of the reasons why people wear masks: (1) for disguise or hide identity; (2) to transform, or change, a personality, to make one person more like another person, animal, or spirit; (3) to protect a wearer against harm. Some ancient peoples also tried to preserve a personality by placing a mask upon the face of a dead person. This was to help his or her soul travel to the afterlife.

We wear masks at Halloween, or on the stage, or in a parade for fun. But people throughout the world have worn them, and sometimes still wear them, for very serious reasons. These reasons and the masks themselves are interesting.

No one knows exactly when or where or why human beings first covered their faces with masks. But we are sure that people have been doing it for a long, long time. Perhaps they first wore masks to disguise themselves.

A picture, found on the walls of the cave near southern France, shows humans wearing animal skins and animal heads. This picture may have been painted 50,000 years ago, and the people may have
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5. open
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Appendix C

Informed Consent Document
Informed Consent Document

Project Title: "The Effects of the Alternative School Calendar on Remembering Learned Material."

Investigators: Christy Nofsinger and Jennifer Reece, Western Kentucky University Department of Psychology, (502) 745-2695.

All first, third, and fifth graders in Simpson County Elementary Schools, Horse Branch, Beaver Dam, Happy Valley, and South Green Elementary Schools are being asked to participate in a project conducted through Western Kentucky University. These schools and the university require that you give your signed agreement for your child to participate in this project.

After reviewing the description of the project below, please sign the attached consent form, indicating whether or not you consent to your child's participation in this project. Please return the signed consent form to your child's teacher. You may keep this description.

The purpose of this project is to determine whether the alternative calendar is effective in helping students remember what they learned before summer break. To determine this, students will be asked to complete math, spelling, reading, and written expression exercises. This process will take approximately fifteen minutes. These will be administered in May, August, and October of 1997. The children will be advised that their performance on these tests will have no impact on their grades in their classes. Therefore, there should be no discomfort or risks to your child.

Children will not receive any special benefits for their participation. However, they will be rewarded by the examiner for returning the signed consent form. Results of these tests will be kept confidential.

Refusal to participate in this study will have no effect on any future services you may be entitled to from your child's school or the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.
Consent Form

I consent for my child, ________________________________, to participate in the study entitled "The Effects of the Alternative School Calendar on Remembering Learned Material."

_________________________________________   __________
Signature of Parent                           Date

I choose not to consent for my child, ________________________________, to participate in the study entitled, "The Effects of the Alternative School Calendar on Remembering Learned Material."

_________________________________________   __________
Signature of Parent                           Date
Appendix D
Administration Procedures
Directions for 1 minute Administration of Reading Passages

Materials:
1. Unnumbered copy of passage (student copy)
2. Numbered copy of passage (examiner copy)
3. Stopwatch
4. Tape recorder

Directions:
1. Place the unnumbered copy in front of the student.
2. Place the numbered copy in front of you, but shielded so the student cannot see what you record.
3. Say these specific directions to the student:
   "When I say 'begin,' start reading aloud at the top of this page. Read across the page (DEMONSTRATE BY POINTING). Try to read each word. If you come to a word you don't know, I'll tell it to you. Be sure to do your best reading. Are there any questions?" (Pause)
4. Say "Begin" and start your stopwatch. If the student fails to say the first word of the passage after 3 seconds, say the word and mark it as incorrect.
5. Follow along on your copy. Put a slash (/) through words read incorrectly (according to scoring procedures.)
6. If a student stops or struggles with a word for 3 seconds, tell the student the word and mark it as incorrect.
7. At the end of 1 minute, place a bracket after the last word and say, "Stop."
8. Repeat the procedures for the next probe.
Directions for 2-Minute Administration of Math

1. Provide the student with the math probe. Place the probe face down on the desk in front of the student. When everyone has a pencil and is ready, have them turn the paper over and put their names at the top. It may be best to have the students turn the paper back over while you give the directions.

2. Say these specific directions to the student:

"The sheets on your desk are math facts. All of the problems are addition or subtraction facts.

When I say 'begin,' start answering the problems. Begin with the first problem and work across the page. Then go to the next row. If you cannot answer the problem, mark an 'X' through it and go to the next one. Are there any questions?"

3. Say "Begin" and start timing.

4. At the end of two minutes say, "Stop. Put your pencils down."

5. Collect the papers.
Directions for Spelling Administration

1. Provide the students with the sheets of paper numbered 1 to 17. Have them put their names at the top.

2. Say these directions to the students:
   "I am going to read some words to you. I want you to spell the words on the sheet in front of you. Write the first word on the first line, the second word on the second line, and so on. When I say the next word, write it down, even if you haven't finished the last one. You will receive credit for each correct letter written. Are there any questions? Let's begin."

3. Say each word twice. Use homonyms in a sentence.

4. Say a new word every ten seconds.
Directions for 3-Minute Administration of Written Expression

Materials:
1. Story Starter
2. Lined paper for student responses
3. Stop watch

Directions:
1. Select an appropriate story starter.
2. Provide the student with a pencil and a piece of lined paper.
3. Say these specific directions to the students:

"You are going to write a story. First I will read a sentence and then you will write a story about what happens next. You will have 1 minute to think about what you will write and 3 minutes to write your story. Remember to do your best work. If you don't know how to spell a word, you should guess. Are there any questions? Put down your pencils and listen."

"For the next minute, think about ... (insert story starter)."

4. After reading the story starter, begin your stopwatch and allow 1 minute for the students to "think." (Monitor students so they do not begin writing.) After 30 seconds say: "You should be thinking about... (insert story starter)."

5. At the end of 1 minute, say "Now begin writing." Restart your stopwatch.

6. Monitor students' attention to the task. Encourage students to work only if they are looking around or talking.

7. After 90 seconds say, "You should be writing about...(insert story starter)."

8. At the end of 3 minutes say, "Stop. Put your pencils down."

9. Collect the papers from the students.
Appendix E

Scoring Procedures
Math
The number of correct digits (CD) was obtained by counting the number of correctly
written digits in the students' response to each math problem during a two-minute
interval. For example:

\[
\begin{array}{c}
800 \\
-642 \\
158 \text{ (3CD)}
\end{array}
\quad \begin{array}{c}
800 \\
-642 \\
256 \text{ (1CD)}
\end{array}
\]

Spelling
A correct letter sequence (CLS) is a pair of letters (or spaces) correctly sequenced within
a word, where a word is dictated every 7 to 10 seconds. For scoring, each CLS is marked
with a caret (^). For example:

top
\wedge t \wedge o \wedge p \wedge \text{(4 CLS)}
top
\wedge st \wedge o \wedge p \wedge \text{(3 CLS)}

Written Expression
A correct word sequence (CWS) is two adjacent writing units (words and punctuation)
that are acceptable within the context of what is written within a three minute time
interval. A caret (^) is used to mark each unit of a correct writing sequence. There is an
implied space at the beginning of the first sentence. For example:
The sky was blue.
\wedge \text{The } \wedge \text{sky} \wedge \text{was} \wedge \text{blue} \wedge \text{. (5 CWS)}
The sky was blue.
\wedge \text{The} \wedge \text{sky waz blew. (2 CWS)}

Reading
A word read correctly (WRC) is a word that the student reads correctly from the reading
probe in a 1-minute interval.