

Impact of School Calendar on Academic Performance: A Comparative Study of the Year-Round and Traditional Calendars

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ABSTRACT

Educational provisions enacted at the national level impact states by requiring a priority on improving the academic performance of students. Leaders in educational settings strive to implement changes that will aid in closing achievement gaps and increase academic achievement. The goal of this quantitative study was to determine if differences exist on fifth grade students' performance on reading and mathematics assessments between schools on full-year calendars and schools on traditional 9-month calendars for years 2016-2017, 2017-2018, and 2018-2019. Although statistically significant differences were not found, results inform decision-making pertinent to time allocated for student learning. Results can be considered by district and campus administrators to support and encourage initiatives which focus on designated instructional time to target students' academic needs.

KEYWORDS

Student achievement; academic performance; school calendar; year-round calendar.

INTRODUCTION

Students experience learning loss during extended school breaks, or intersessions (Farbman, 2015). The greatest loss has been observed in mathematics achievement test scores (Stark Education Partnership, 2018). One effort to mitigate the severity of such learning loss is the implementation of the year-round academic calendar. Compared to the traditional academic calendar, which usually includes an extended 10-12 weeks summer break, the year-round calendar allows for the spread of intersessions while maintaining a total of 180 instructional days (Farbman, 2015). School calendars impact the amount of continuous time students spend on learning, which also influences the achievement level that is attained as required through state mandates.

Studies on year-round education calendars' impact on student achievement compared to traditional educational calendars' impact are limited. The Education Commission of the States (ECS) suggested in its 2016 study that research on the academic achievement effect of year-round education has been randomly conducted, with neutral or mixed results (Stark Education Partnership, 2018). Students on extended breaks from school experience an interruption in their learning. In contrast, students with short breaks experience continuous learning.

The success of the public education system in Texas is heavily measured by performance on the State of Texas Assessment of Academic Readiness (STAAR) (Salinas-Vasquez et al., 2020). This quantitative quasi-experimental study sought to determine if differences exist between the academic performance on the fifth-grade reading and mathematics State of Texas Assessments of Academic Readiness (STAAR) assessment at traditional calendar schools, and the academic performance of fifth grade reading and mathematics STAAR performance at year-round calendar schools. The findings of this study benefit schools in making decisions that ensure a focus on students' educational success rate. Additionally, this study contributes to the gap in literature seeking to understanding the year-round educational calendar impact on academic achievement compared to traditional educational calendars.

Research Questions

Two research questions were addressed in this study:

- RQ 1: Is there a statistically significant difference between the academic performance on the Fifth Grade Reading STAAR for schools on year-round educational calendars and traditional educational calendars for the years 2017-2019?
- RQ 2: Is there a statistically significant difference between the academic performance on the Fifth Grade Mathematics STAAR for schools on year-round educational calendars and traditional educational calendars for the years 2017- 2019?

THEORETICAL FRAMEWORK

This study was aligned to Carroll's model of school learning (1963) and the spacing effect. The spacing effect reveals that learning is more effective when information is repeated in spaced out sessions (Dempster, 1988). In fact, learners are able to best recall and retain information in

the future when information has been repeated and spaced out as they learn (Dempster, 1988). The spacing effect relates to year-round calendar schools as learning time and intersessions are spaced out throughout the year. Minimal disturbance to students' learning occurs and the retention of information learned is sustained through continuous learning within implemented proportioned gaps during the year (Dempster, 1988). It is equally important to recognize the positive impact that students' ability to retain information has on academic performance.

According to Carroll (1963), individuals will be successful in learning a given task to the extent that the individual spends on the amount of time needed to learn the task. The year-round educational calendars offer the needed time for additional learning time through different learning opportunities during scheduled school sessions and intersessions (Fogarty, 1996). Time spent on learning does not reflect elapsed time, rather it is the time in which the individual is focused on the learning task and is actively engaged in learning (Carroll, 1963). Furthermore, Carroll (1963) suggests that the amount of time a learner spends actively engaged in learning; and how much time a learner needs to spend in order to learn a task is determined by several factors. Consequently, these factors are regarded as influential when determining the time needed and time actually spent in learning a task to attain different levels of learning success.

LITERATURE REVIEW

According to O'Sullivan (2013), a debate has been in existence for years about the makeup of the American school year. Students' ability to sustain academic knowledge, along with the time spent in an educational setting have been a concern. Studies based on the effect school calendars have on student achievement vary in nature. One study focusing on a mandated policy change by a North Carolina district where 22 schools were forced to change to year-round school (YRS) calendars was conducted by McMullen et al. (2015). End-of-year reading and mathematics test scores were used to measure student achievement and a positive impact of year-round calendars for low performing students was found. Additionally, achievement gaps between quantiles did not widen or narrow with the implementation of YRS in mathematics and reading (McMullen, et al., 2015). Ferguson (2000) investigated the performance of 84 fifth and sixth grade students and found that students on traditional-schedules improved significantly over the summer and later in the school year. However, the data also showed that YRE students appear to be more consistent in their achievement than traditional-schedule students (Ferguson, 2000). Additionally, teacher observations included that YRE students were less fatigued and frustrated, and had more stamina during the assessments, which can lead to improving long-term learning (Ferguson, 2000).

Research however has found no definitive or statistically significant differences in reading or mathematics achievement between students attending year-round school and those attending school on a traditional calendar (McMillen, 2001). Shields and Oberg (1999) conducted a comparative study of students' academic performance in elementary traditional

calendar schools with those in a multi-track year-round school utilizing measures of both academic and nonacademic student outcomes. During the six-year study, data reflected that 21% of the scores from traditional schools fell below their predicted range of achievement. In contrast, 4% of the scores from multi-track year-round schools fell below the predicted range (Shields & Oberg, 1999). Further, during the last two years of the study, the authors found that after a stable implementation of both calendars, data demonstrated that traditional schools had 14% of their scores continue to fall below the predicted range, while only 1% of scores for year-round schools did not meet the predicted range. Findings for nonacademic student outcomes suggested both traditional and multi-track calendar schools are similar in social and affective domains (Shields & Oberg, 1999).

A review of the literature revealed a significant gap of current research on the effect of school calendars on student achievement. No studies were found to connect STAAR performance to year-round and traditional calendar schools. This study will contribute by filling in the gap of current research by comparing the academic performance on STAAR reading and mathematics of year-round calendar schools and traditional calendar schools.

METHOD

A quantitative quasi-experimental design was used to address the research questions posed. Determining a cause-and-effect relationship between the independent and dependent variables was the purpose of the chosen design (McMillan & Schumacher, 2010). In addition, the researcher used controlled and experimental groups with partial random assignment to groups (Creswell & Creswell, 2018).

Population and Sample

The population from which the sample was drawn included 1029 school districts in Texas. The sample size was generated through a stratified sampling selection of 7 schools on year-round calendars and 7 schools on traditional calendars with similar school demographics. Similar demographics between schools included the number of students, percent of economically disadvantaged and percent of Emergent Language Learners, mobility rate, and percent of Special Education population. Based on the selection of variables, stratified sampling allows a population to be divided into groups where samples are then drawn (McMillan & Schumacher, 2010). The eligibility criteria for units sampled was from schools on year-round or traditional educational calendars. The targeted sample was limited to 5th grade students that participated in 5th grade reading and mathematics STAAR during 2017, 2018, and 2019 school years. STAAR data that was utilized in this study was specific to three consecutive school years.

Table 1 illustrates the sample groups of this study.

Table 1. *Descriptive Statistics on year-round calendar schools and traditional calendar schools sample groups*

Region Education Service Center (ESC)	Year-Round Calendar Schools	Traditional Calendar Schools	Total
2	5	1	6
16	0	1	1
18	0	1	1
20	1	3	4
Total	6	6	12

Instrument

To compare the academic achievement of 5th grade students between year-round calendar schools and traditional calendar schools, the researcher extracted existing STAAR Reading and Mathematics data from the Texas Education Agency (TEA) website, accountability section. STAAR Reading and STAAR Mathematics scores were accessed from the Texas Academic Performance Reports (TAPR). Three academic years, 2016-2017, 2017-2018, and 2018-2019 were individually extracted for comparison. The researcher extracted TAPR information for each sample in the study by academic year.

Data Collection

Data was extracted from existing STAAR Reading and Mathematics data from the TEA website, accountability section. STAAR Reading and STAAR Mathematics scores were accessed from the TAPR. Three academic years, 2016-2017, 2017-2018, and 2018-2019 were individually extracted for comparison. The raw data utilized included only scores for year-round and traditional calendar schools in the study, rather than individual student scores.

Data analysis

In this study an independent-samples t-test statistical procedure was used. The independent-samples t-test statistical procedure was appropriate because of the small number of categorical independent variables that were compared. There was one independent variable (calendar type), with two categories, year-round educational calendars, and traditional educational calendars. The statistical procedure chosen was used to determine if a statistically significant difference existed between the means of the two categories on a continuous dependent variable (Laerd Statistics, 2015). An ordinal measure of the independent variables was implemented. The level of measurement for the independent variables was discrete nominal. Categories of nominal variables are designated a number which stands for the name of the category (Morgan, et al., 2020).

The dependent variables in this study provided a cognitive measurement, the results on Reading and Math STAAR. This measurement accounted for a difference between the academic performances of the independent variables. The level of measurement was a continuous ordinal

level. Variables that vary from low to high are generally distributed as continuous (Morgan, et al., 2020). Computation of variables was not needed, as the sample size from the population provides study limitations, and a sensitive power analysis was utilized.

According to Laerd Statistics (2015), there are six assumptions associated with an independent-samples t-test. One assumption is that the two independent variable categories did not have significant outliers in relation to the variable. Any scores that are small or large compared to the other scores, are considered outliers, and can have a negative effect on statistical test results, influencing the mean and standard deviation for the group (Laered Statistics (2015). In this study a boxplot was created in SPSS Statistics to detect the existence of outliers. The outlier detected had an extreme small score compared to other scores in the group. As a result of testing the assumption of extreme outliers, 6 year-round calendar schools and 6 traditional calendar schools were used in the study to compare their academic achievement.

RESULTS

Although 7 year-round schools and 7-traditional calendar schools were initially identified for study, and initial assessment of the data revealed an extreme outlier. With that outlier removed, the researchers were left with 6 year-round schools and 6 traditional calendar schools.

Research Question 1

RQ 1: Is there a statistically significant difference between the academic performance on Fifth Grade Reading STAAR for schools on year-round educational calendars and the academic performance on Fifth Grade Reading STAAR for schools on traditional educational calendars for the years 2017-2019?

Table 2 illustrates the results of the statistical analysis for research question 1. Results found no statistically significant difference between 5th graders' STAAR 2017 Reading performance for year-round calendar schools (M= 85.17, SD= 6.113) and 5th graders' STAAR 2017 Reading performance for traditional calendar schools (M= 90.83, SD= 6.210). The statistical analysis also revealed no statistically significant difference between 5th graders' STAAR 2018 Reading performance for year-round calendar schools (M= 92.67, SD= 6.113) and 5th graders' STAAR 2018 Reading performance for traditional calendar schools (M=90.83, SD= 9.070). Further, no statistically significant differences was found between 5th graders' STAAR 2019 Reading performance for year-round calendar schools (M=94.00, SD=5.404) and 5th graders' STAAR 2019 Reading performance for traditional calendar schools (M= 92.83, SD= 3.251).

Table 2. Means and Standard Deviations: Student performance on 5th Grade Reading STAAR for schools on year-round and traditional calendars

STAAR Subject/Groups	N	M	SD
STAAR 2017 Reading Year-Round	6	85.17	6.113
STAAR 2017 Reading Traditional	6	90.83	6.210
STAAR 2018 Reading Year-Round	6	92.67	9.070
STAAR 2018 Reading Traditional	6	93.17	3.710
STAAR 2019 Reading Year-Round	6	94.00	5.404
STAAR 2018 Reading Traditional	6	92.83	3.251

An independent-samples t-test was conducted to test the null hypothesis that there was no statistically significant difference between the academic performance on Fifth Grade Reading STAAR for schools on year-round educational calendars and the academic performance on Fifth Grade Reading STAAR for schools on traditional educational calendars ($N=6$) for the years 2017-2019. Data was normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$). The assumption of homogeneity of variances was assessed by Levene's test for equality of variances. Table 3 illustrates the results.

There was homogeneity of variances for Reading STAAR 2017 ($t=-1.593$, $p = .976$) and Reading STAAR 2019 ($t=.453$, $p = .212$), at $p > .05$. Reading STAAR 2018 however violated the assumption of homogeneity of variances ($t=-.125$, $p = .030$), at $p < .05$. There was no statistically significant difference in mean engagement scores between schools on year-round calendars and traditional calendar schools on Reading STAAR, 2017-2019, as $p > .05$. The null hypotheses was retained.

Table 3. *Statistics for Tests of Equality Means and Equality of Variances: 5th Grade Student Performance on Reading STAAR in year-round and traditional calendar schools*

		F	Sig.	T	Sig. (2-tailed)	Df	Mean Diff.
STAAR 2017 Reading	Equal variances assumed	.001	.976	-1.593	.142	10	-5.667
	Equal variances not assumed			-1.593	.142	9.998	-5.667
STAAR 2018 Reading	Equal variances assumed	6.412	.030	-.125	.903	10	-.500
	Equal variances not assumed			-.125	.904	6.628	-.500
STAAR 2019 Reading	Equal variances assumed	1.776	.212	.453	.660	10	1.167
	Equal variances not assumed			.453	.662	8.200	1.167

Research Question 2

RQ 2: Is there a statistically significant difference between the academic performance on Fifth Grade Mathematics STAAR for schools on year-round educational calendars and the academic performance on Fifth Grade Mathematics STAAR for schools on traditional educational calendars for the years 2017-2019.

Table 4 illustrates the results of the statistical analysis for research question 2. The analysis revealed no statistically significant difference between 5th graders' STAAR 2017 Mathematics performance for year-round calendar schools (M= 92.33, SD= 3.45) and 5th graders' STAAR 2017 Mathematics performance for traditional calendar schools (M=95.83, SD= 3.10). The statistical analysis also revealed that no statistically significant difference between 5th graders' STAAR 2018 Mathematics performance for year-round calendar schools (M= 94.83, SD= 5.91) and STAAR 2018 Mathematics performance for traditional calendar schools (M=98.17, SD= 2.312). Further, no statistically significant difference was found between 5th graders' STAAR 2019 Mathematics performance for year-round calendar schools (M= 97.33, SD=2.81) and 5th

graders' STAAR 2019 Mathematics performance for traditional calendar schools (M= 96.33, SD= 1.90).

Table 4. Means and Standard Deviations: Student performance on 5th Grade Mathematics STAAR for schools on year-round and traditional calendar schools

STAAR Subject/Group		N	M	SD
STAAR 2017 Mathematics	Year- Round	6	92.33	3.45
STAAR 2017 Mathematics	Traditional	6	95.83	3.10
STAAR 2018 Mathematics	Year- Round	6	94.83	5.91
STAAR 2018 Mathematics	Traditional	6	98.17	2.312
STAAR 2019 Mathematics	Year- Round	6	97.33	2.81
STAAR 2019 Mathematics	Traditional	6	96.33	1.90

An independent-samples t-test was conducted to test the null hypothesis that there was no statistically significant difference between the academic performance on Fifth Grade Mathematics STAAR for schools on year-round educational calendars and the academic performance on Fifth Grade Mathematics STAAR for schools on traditional educational calendars ($N=6$) for the years 2017-2019. The assumption of homogeneity of variances was assessed by Levene's test for equality of variances. The results are illustrated in Table 5.

Table 5. *Statistics for Levene's Test for Equality of Variances: 5th Grades Student Performance on Mathematics STAAR in year-round and traditional calendar schools*

		F	Sig.	T	df	Sig. (2-tailed)	Mean Diff.
STAAR 2017 Math	Equal variances assumed	.003	.959	-1.861	10	.092	-3.500
	Equal variances not assumed			-1.861	9.863	.093	-3.500
STAAR 2018 Math	Equal variances assumed	2.367	.155	-1.286	10	.228	-3.33
	Equal variances not assumed			-1.286	6.499	.242	-3.33
STAAR 2019 Math	Equal variances assumed	1.914	.197	.728	10	.484	1.000
	Equal variances not assumed			.728	8.690	.486	1.000

There was a homogeneity of variances for Mathematics STAAR 2017 ($t = -1.86$, $p = .959$), Mathematics STAAR 2018 ($t = -1.286$, $p = .155$), and Reading STAAR 2019 ($t = .728$, $p = .197$). There was no statistically significant difference in mean engagement scores between schools on year-round calendars and traditional calendar schools on Mathematics STAAR, 2017-2019, at $p > .05$. The null hypothesis was retained.

Aggregate Review of Results

Statistically significant differences among the groups were not found. A different prospective was taken when the actual means were considered. Results indicated that in 2017, scores on STAAR Reading were slightly higher for traditional calendar schools ($M = 90.83$, $SD = 6.210$) than for year-round schools ($M = 85.17$, $SD = 6.113$). In this analysis, results also indicated that in 2018, scores for STAAR Reading were slightly higher for traditional calendar schools ($M = 93.17$, $SD = 3.710$) than for year-round schools ($M = 92.67$, $SD = 9.070$). Additionally, results indicated that in 2019, scores on STAAR Reading were higher for year-round calendar schools ($M = 94.00$, $SD = 5.404$) than for traditional calendar schools ($M = 92.83$, $SD = 3.251$). Results indicated that in 2017, scores on STAAR Mathematics were slightly higher for traditional calendar schools ($M = 95.83$, $SD = 3.10$) than for year-round schools ($M = 92.33$, $SD = 3.45$). In this analysis, results also

indicated that in 2018, scores for STAAR Mathematics were slightly higher for traditional calendar schools (M= 98.17, SD= 2.312) than for year-round schools (M= 94.83, SD= 5.91). Additionally, results indicated that in 2019, scores on STAAR Mathematics were higher for year-round calendar schools (97.33, SD= 2.81) than for traditional calendar schools (M=96.33, SD= 1.90). Table 6 displays this information.

Table 6. *Group Statistics: 5th Grade Student Performance on Reading and Mathematics STAAR in year-round calendar schools (YRS) and traditional calendar schools (TCS)*

STAAR Subject/Groups	N	M	SD	Std. Error Mean
STAAR 2017 Reading YRS	6	85.17	6.113	2.496
STAAR 2017 Reading TCS	6	90.83	6.210	2.535
STAAR 2018 Reading YRS	6	92.67	9.070	3.703
STAAR 2018 Reading TCS	6	93.17	3.710	1.515
STAAR 2019 Reading YRS	6	94.00	5.404	2.206
STAAR 2019 Reading TCS	6	92.83	3.251	1.327
STAAR 2017 Math YRS	6	92.33	3.445	1.406
STAAR 2017 Math TCS	6	95.83	3.061	1.249
STAAR 2018 Math YRS	6	94.83	5.913	2.414
STAAR 2018 Math TCS	6	98.17	2.317	.946
STAAR 2019 Math YRS	6	97.33	2.805	1.145
STAAR 2019 Math TCS	6	96.33	1.862	.760

DISCUSSION

Data for this study indicated that there were no statistically significant differences on the Reading and Mathematics STAAR performance between schools on year-round and traditional calendar schools. The statistical analysis revealed no statistically significant difference between 5th graders' STAAR 2017 -2019 Reading performance for year-round calendar schools and 5th graders' STAAR 2017-2019 Reading performance for traditional calendar schools. Further, the statistical analysis also revealed no statistically significant difference between 5th graders' STAAR 2017-2019 Mathematics performance for year-round calendar schools and 5th graders' STAAR 2017-2019 Mathematics performance for traditional calendar schools. Previous academic achievement studies found that year-round calendar schools had higher achievement scores when compared to traditional calendar schools.

While this study did not find major differences between the academic performance of year-round calendar schools and traditional calendar schools, it is evident that there is ground for additional research. Major differences may not exist between year-round and traditional calendar schools. Additional research would provide an insight into what instructional opportunities are implemented in year-round and traditional calendar schools, which are impacting or not impacting their students level of academic achievement.

This study was aligned to Carroll's model of learning (1963) and the spacing effect. According to Carroll (1963), individuals will be successful in learning a given task to the extent that the individual spends on the amount of time needed to learn the task. The year-round educational calendars offer the needed time for additional learning time (Fogarty, 1996). Previous academic achievement studies (Ferguson, 2000; Shields & Oberg, 1999; McMullen, et al., 2015), found that year-round calendar schools had higher achievement scores when compared to traditional calendar schools. The results of this study however contradict those findings and Carroll's assertion, where the results did not favor a year-round calendar over the traditional school calendar. In fact, the results of this study indicate that traditional calendar schools performed slightly higher than year-round calendar schools on the Reading and Mathematics 2017 STAAR.

Carroll (1963) also asserted that opportunity and quality of instruction are factors of time spent in learning based on external conditions that contribute to the success of learning. These factors could possibly explain the academic achievement on Reading and Mathematics STAAR results for year-round calendar schools and traditional year-round schools for 2017-2019 years included in this study. The quality of instructional strategies utilized by teachers, the established instructional programs, and the pace of the instruction provided could have possibly been aligned to the needs of students. Thus, if time alone determined by instructional calendars does not impact results, additional research is warranted.

Limitations and Recommendations

The sample size from the population provided limitations to the study. Additionally, the conclusions are potentially limited to Texas schools considering the state's specific curriculum and accountability guidelines.

This study was designed in response to the lack of literature concerning the impact of school calendar type on student achievement scores. The results of this study indicated no statistically significant difference between schools on year-round calendars and schools on traditional calendars. Future research is recommended using data within a 3-5 year continuous time span. This would provide future researchers with a base-line knowledge of the schools, before proceeding to a deeper level of research. Additionally, it is recommended that future studies consider collecting data on different student populations. These populations include Emergent English Learners, Special Education, and the Gifted and Talented within year-round calendar schools and traditional calendar schools. This would assist in determining if the academic achievement of different student populations, correlates with the overall academic performance of their school.

Future research should also consider the type of enrichment and tutorial programs that are available to students in both types of calendar schools. These findings would verify how time is allocated for students' learning opportunities. In addition, future considerations for research is to investigate daily instructional schedules and yearly academic calendars. These recommendations would allow researchers to view different educational settings through different lenses and gather data on how achievement scores are or are not impacted by calendar type, thus, providing information to entities that influence educational settings.

A final recommendation for future research would be a larger scale study where a key variable would be instructional days. In this study, in the state of Texas, schools operate on a calendar of 180 instructional days whether via year-round instructional calendar or traditional calendar. The results of this analysis found no statistically significant difference between the two calendars in this state. The fact that both calendars have the same number of instructional days may have influenced the results. Thus, the researcher recommends that future studies seek to determine if differences exist in students' achievement scores between schools with varying number of instructional days. A larger scale study, that uses a common metric between states, could facilitate policy implications if differences are found based on the number of instructional days, rather than by calendar type.

CONCLUSION

The priority of improving the academic performance of students has been stipulated through educational provisions, enacted at the national level and impacting states. Education administrators and policy makers must continue to strive to implement changes that support closing achievement gaps and increase academic achievement (Strunc, 2020). The design of school calendars in different studies have mixed findings about the impact relation to academic

achievement. Although there was no significance difference on STAAR results for schools on both types of calendars, results from this study can be considered by district and campus administrators to support and encourage initiatives which focus on designated instructional time to target students' academic needs. Specific consideration should be focused on campus student demographics, educational programs, daily schedules, and yearly school calendars, all of which contribute to the intentional planning of how time is or can be utilized to impact student achievement.

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