Research on School Attendance and Student Achievement: A Study of Ohio Schools

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There have been many discussions and debates on student achievement in Ohio. The increased accountability expectations by parents and state legislators initiated the use of the statewide Ohio Proficiency Tests, which have set standards for measuring how much students have learned in grades 4, 6, 9, and 12. Even though some of the grade levels for giving the test will soon change, achievement will continue to be monitored and reported to the public through the School District and Building Local Report Cards distributed to students' families annually.

Many factors play a role student achievement, directly and indirectly. Some of those variables can be controlled to a certain degree by students, parents, and educators, i.e., testing climate, and curriculum. Other factors are much more difficult to affect, such as socioeconomic conditions.The objective of this study is for educators to gain knowledge and insight concerning the relationship of student attendance and student achievement. That is, this study will examine school buildings in Ohio housing grades four, six, nine, and twelve, and the results of the Ohio Proficiency Tests taken by students in those grade levels. Student achievement based on those tests will be compared with their attendance averages to see if a positive correlation exists between school attendance and student achievement.

The Ohio Department of Education (2000) reports student attendance performance averages by school district and building on its web site and within the information printed in the Local Report Card sent to parents. A state standard of 93 percent annual attendance average has been established by ODE as the minimum attendance average for each school building. Reviewing school district and school building information from the ODE web site indicates 79 percent of the public schools in Ohio have met or exceeded the state attendance standard during the 1998-99 school year. This benchmark is one of many criteria used to evaluate school district and building performance in the state of Ohio.

Focus of the Study

The research and analysis completed for this study focuses on one variable and its relationship to student achievement: school wide student attendance. It is a variable that is often overlooked or taken for granted as an interesting but meaningless statistic. However, the positive impact of good school attendance on academic achievement may be greater than historically thought (Johnston, 2000, Lamdin, 1996). King (2000) cited attendance as one of the academic performance variables. Along with high school and college GPA, attendance was considered important for adaptive functioning in the cognitive and behavioral realms. According to Kube and Ratigan (1992), student absences from school go beyond personal illness or death in the family. Good weather, vacations, and peer group pressure excuses effect daily attendance averages and student achievement to a greater degree than illnesses and family deaths. In Great Britain, it was noted that school attendance was one of the most important factors associated with progress toward literacy for children in British schools (Tymms, 1996).

Dekalb (1999) notes that student achievement is affected in a negative way by absenteeism. One study of African-American males concluded that of the student's truant from elementary and high school, 75 percent did not graduate (Robins, Ratcliff,1978). Poor attendance averages in school buildings was determined to be one of the factors leading to student test scores much lower than classmates (Barrington, Hendricks, 1989). Coutts (1998) suggests student attendance should be charted and monitored weekly, since high attendance rates are indicators of effective schools.

Research Questions

Student attendance and its relationship to student achievement in Ohio schools will be reviewed using the following research questions:

1. Is there a significant, positive relationship between student attendance and student achievement (school building averages), as measured by the Ohio Proficiency Tests?
2. Is there a statistically significant difference in student achievement between the top ten percent and lowest ten percent of students within public school buildings in Ohio when ranked by all tests passed at the fourth, sixth, ninth, and twelfth grade levels on the Ohio Proficiency Tests?
3. Is there a statistically significant difference in annual student attendance averages between the top ten percent and lowest ten

percent of students within public schools, as measured by all tests passed at the fourth, sixth, ninth, and twelfth grade levels on the Ohio Proficiency Tests?

4. Is there a statistically significant difference in student achievement within large urban district school buildings when ranked by highest and lowest attendance averages?

Methodology

To analyze the relationship between student achievement and the attendance variable, the Pearson's r correlation statistic was utilized. Pearson's r was established for the following:

1. Fourth grade proficiency test averages and building student attendance averages
2. Sixth grade proficiency test averages and building student attendance averages
3. Ninth grade proficiency test averages and building student attendance averages
4. Twelfth grade proficiency test averages and building student attendance averages

Common variances for correlating student attendance and student achievement were established using the coefficient of determination (r^2). This calculation gives a more accurate representation of the variance between school attendance and student achievement of students in the study, than using only Pearson's r exclusively.

Standard measures of central tendency (mean, median, standard deviation) were calculated to analyze the variances between the highest ten percent and lowest ten percent of the fourth, sixth, ninth, and twelfth grade Ohio Proficiency Test - all tests passed averages and attendance average comparisons. The independent *t* test was used to determine if there was a statistically significant difference in the comparisons.

Sampling

All data used for this study were taken directly from the ODE web site. The study is based on the most recent information available to the public (1999 data) for school building proficiency test and attendance averages. School buildings with incomplete data were eliminated from the sample. The total sample of schools for this study was 3,171. The number (N) for each grade level reviewed is based on all school buildings with reported averages for fourth, sixth, ninth, and twelfth grade proficiency test - all tests passed averages, and building attendance

averages. The number (N) of schools analyzed for each grade level follows: fourth grade – 1, 946, sixth grade – 1,292, ninth grade – 711, and twelfth grade – 691.

To address research questions two, three, and four, the highest and lowest proficiency test averages were taken directly from fourth, sixth, ninth, and twelfth grade ODE information, with the N for each sample based on the highest and lowest ten percent of N for the total population. The total population consists of all Ohio public schools with reported data from the ODE web site.

Findings

The initial focus of this research study was to determine if there was a significant, positive relationship between student achievement in Ohio schools, as measured by the Ohio Proficiency Tests, and student attendance, measured by building attendance averages (research question one). Building attendance averages were used instead of grade level averages to more accurately reflect the student attendance pattern or trend for the entire school population. Table 1 displays results of the correlational study for each grade level taking the Ohio Proficiency Test. The correlation coefficient (Pearson's r) measured the strength or degree of the relationship between the two variables, student achievement, as measured by all tests passed averages on the Ohio Proficiency Tests, and student attendance, reflected in annual building attendance averages.

Table 1: Relationship of Student Attendance to Ohio Proficiency Tests by Test Level

	4th	6th	9th	12th
N=	1,946	1,292	711	691
r =	0.57*	0.54*	0.78*	0.55*
r^2 =	0.32	0.29	0.60	0.29

***Statistically significant (p<.01)**

The correlation coefficients for the fourth, sixth, and twelfth grade comparisons show moderate positive relationships between student achievement and student attendance (Schmidt, 1975). With the sample size (N) substantial, the correlations are considered significant at the .01 confidence level (Isaac & Michael, 1990). The ninth grade r was 0.78, the strongest positive relationship of all comparisons.

The coefficient of determination was calculated (r^2) to indicate the percentage of variance held in common by the two variables (Table 1). Results of the fourth grade study indicate that student attendance accounts for 32 percent of the variance held in common with student achievement

results as measured by all tests passed averages on the fourth grade Ohio Proficiency Test. In other words, 32 percent of the variance is related to the same factors. Sixth and twelfth grade results indicate slightly lower variances (29 percent). Analysis of the ninth grade calculations reveal a substantial common variance (60 percent) between student attendance and student achievement.

Table 2: Comparison of Top 10 Percent and Bottom 10 Percent of Students in All School Buildings -- Ohio Proficiency Test - All Test Passed Averages

	4th Grade (N=388)		6th Grade (N=258)		9th Grade (N=142)		12th Grade	
	Top 10%	Bottom 10%	Top 10%	Bottom 10%	Top 10%	Bottom 10%	Top 10%	Bottom 10%
Mean	63.81	4.59	64.44	4.42	89.39	23.70	47.45	37.45
Median	61.90	4.50	61.20	4.30	88.10	23.00	48.50	36.90
SD	8.74	1.99	9.26	2.30	3.99	9.09	14.03	14.38
t ratio	9.70*		2.19*		6.32*		1.68	

***Statistically significant (p <.05)**

The second research question addressed differences between the highest ten percent and lowest ten percent of students in Ohio public schools taking proficiency tests in grades four, six, nine, and twelve. Results of this analysis indicate a statistically significant difference when comparing student achievement at the fourth, sixth, and ninth grade levels (Table 2).

Calculations are based on a one-tailed t test with the level of significance set at $p < .05$. The fourth grade comparison indicates a large variance ($t = 9.70$) in proficiency test - all test passed averages, between the top and bottom ten percent of students. Sixth grade comparisons proved statistically significant ($t = 2.19$), with the top ten percent of the sixth graders averaging over 64 percent passage rate on the proficiency tests. This compares with the bottom ten percent averaging slightly over four percent on the tests. When reviewing the ninth grade results, the t ratio of 6.32 percent was statistically significant at the .05 confidence level. Even though the twelfth grade variances were not as large, the differences are noteworthy.

After comparing the Ohio Proficiency Test - All Tests Passed Averages with the top ten percent and bottom ten percent of each grade level tested, the same comparison was analyzed (research question 3)

using the annual building attendance averages of the same sample groups (ranked by proficiency test scores). The results are tabulated in Table 3. Statistically significant differences in student attendance were found at the fourth, sixth, and twelfth grade levels.

Table 3: Comparison of Annual Student Attendance Averages Based on Top 10 Percent and Bottom 10 Percent of Students in all School Buildings -- Ranked by Ohio Proficiency Test - All Test Passed Averages

	4th Grade		6th Grade (N=258)		9th Grade (N=142)		12th Grade	
	Top 10%	Bottom 10%	Top 10%	Bottom 10%	Top 10%	Bottom 10%	Top 10%	Bottom 10%
Mean	96.46	92.75	96.25	89.58	94.86	82.48	95.92	92.05
Median	96.50	92.80	96.30	91.50	94.96	81.70	95.70	93.10
SD	0.70	2.07	0.82	5.11	1.26	6.21	0.67	4.09
t ratio	7.12*		3.16*		1.38		5.68*	

***Statistically significant (p <.05)**

These results affirm a strong positive relationship between student achievement as measured by the Ohio Proficiency Tests, and annual building attendance averages.

In other words, a statistically significant difference is evident when comparing the top ten percent and bottom ten percent of public schools - based on proficiency test - all tests passed averages at the fourth, sixth, and twelfth grade levels. Specifically, the fourth grade (N=388) results found $t = 7.12$, which was statistically significant ($p < .05$). Students that fell within the top ten percent attendance averaged 96.46 percent on the Ohio Proficiency Tests, compared with students in the bottom ten percent attendance, averaging 92.75 percent on the Ohio Proficiency Tests. Sixth, ninth, and twelfth grade results comparing the top ten percent attendance with the lowest ten percent attendance proved the same.

Not only are proficiency test averages higher, but also the annual attendance averages of the students in school buildings having the higher test averages. Even though the ninth grade differences were not statistically significant, a large variance in attendance rates is very much evident, indicating more frequent attendance at school was synonymous with higher proficiency test averages.

Large Urban School District Findings

The fourth research question addresses student attendance and its relationship to student achievement in the six largest school districts in

Ohio - Cleveland, Cincinnati, Columbus, Dayton, Akron, and Toledo. Six elementary schools from each urban district in the study were chosen. The three highest and the three lowest buildings from each district were compared, based on proficiency test averages. Calculations were analyzed to determine if there is a statistically significant difference in student achievement in larger urban districts when ranked by building annual attendance averages (fourth grade level). Comparisons of the top three and bottom three elementary school buildings (ranked by the Fourth Grade Ohio Proficiency Test - All Tests Passed averages) in each urban district were calculated using the independent *t* test. This comparison was computed to see if students in school buildings with high and low test averages had similar high and low attendance averages. Table 4 lists the results of each within district comparison of the Ohio Proficiency Tests - All Tests Passed averages.

The findings indicate that for four of the six urban districts studied, a statistically significant difference occurred in student achievement within the top and bottom three schools in each district (Cincinnati, Columbus, Dayton, Toledo). Cleveland and Akron comparisons were not statistically significant, but the results indicate a substantial variance in scores. Mean test scores, as reported in Table 4, vary from district to district, with Toledo having the highest test averages in the top three schools (52.93), and Dayton having the lowest (10.56). The greatest difference in school comparisons was found in the Toledo schools, where the top three and bottom three schools varied over 40 percent in test averages. The independent *t* test was used again to determine if the same school buildings ranked by Ohio Proficiency Test - All Tests Passed performance, had a statistically significant difference in their annual attendance averages (Table 5). The Cincinnati, Dayton, Akron, and Toledo schools compared within their districts had statistically significant annual building attendance averages. The top three schools in each of those districts, ranked by proficiency test score averages, also had higher attendance averages. Even though the comparison of schools in Cleveland and Columbus were statistically insignificant, the top three schools proficiency test scores and attendance averages were substantially higher than the bottom three schools.

Table 6 shows the results of the comparison of all eighteen urban schools combined, for the Fourth Grade Ohio Proficiency Test - All Tests Passed averages and annual building student attendance averages. Calculations of the independent *t* test indicate a statistically significant

difference in the Ohio Proficiency Test - all test passed averages (t =-4.89) when comparing the top eighteen schools and bottom eighteen schools of

Table 4: Comparison of Top 3 and Bottom 3 Schools Within Each Large Urban District -- Fourth Grade Ohio Proficiency Test - All Test Passed Averages

	Cleveland		Cincinnati		Columbus		Dayton		Akron		Toledo	
	Top 3	Low 3	Top 3	Low 3	Top 3	Low 3	Top 3	Low 3	Top 3	Low 3	Top 3	Low 3
Mean	24.53	15.73	27.33	2.60	38.73	3.73	10.56	2.93	35.66	10.10	52.93	12.0
SD	8.08	7.99	3.19	1.55	1.94	3.54	2.73	0.28	23.02	5.16	12.59	8.17
t ratio	1.09		-9.85*		-24.13*		-11.80*		-1.53		-3.85*	

***Statistically significant (p <.01)**

Table 5: Comparison of Top 3 and Bottom 3 Schools Within Each Large Urban District -- Annual Building Attendance Averages

	Cleveland		Cincinnati		Columbus		Dayton		Akron		Toledo	
	Top 3	Low 3	Top 3	Low 3	Top 3	Low 3	Top 3	Low 3	Top 3	Low 3	Top 3	Low 3
Mean	95.66	88.90	95.60	88.63	96.13	89.60	94.16	87.83	95.70	91.13	96.46	91.5
SD	0.28	0.08	0.60	0.89	0.52	0.41	0.60	0.60	0.82	0.36	0.01	0.33
t ratio	2.27		-12.23*		2.50		-11.10*		-7.18*		-20.41*	

***Statistically significant (p <.05)**

Table 6: Comparison of Top 18 and Bottom 18 Schools From Six Large Urban Districts -- 4th Grade Ohio Proficiency Test - All Tests Passed Averages and Annual Building Attendance Averages

Proficiency	All Tests Passed AveragesAll		Annual Building Attendance Averages	
	Top 18 Schools	Bottom 18 Schools	Top 18 Schools	Bottom 18 Schools
Mean	31.62	7.86	95.62	89.61
SD	18.67	7.23	0.74	1.41

t ratio	-4.89*	-15.81*

***Statistically significant (p <.05)**

the four urban school districts combined. There was also a statistically significant difference in the annual building attendance averages (t =-15.81) between the top eighteen and bottom eighteen schools, as ranked by the Ohio Proficiency Test - all tests passed averages.

The Significance of School Attendance

When reviewing the school attendance percentages in this study, it is helpful to have a better understanding of the relevance of absenteeism, as denoted by instructional time loss during the school year. Table 7 shows annual school attendance averages and the equivalent instructional hours for attendance and absenteeism. This example is based on a school housing 400 students with five academic instructional hours per day for 180 school days.

Table 7: Annual Attendance Average Rates: Instructional Time Loss (Example: School Housing 400 Students, 5 Hours Per Day Instructional Time)

Attendance Average Rate (%)	Instructional Hours Per School Year	Instructional Hours of Absence Per School Year
100	360,000	0
99	356,400	3,600
98	352,800	7,200
97	349,200	10,800
96	345,600	14,400
95	342,000	18,000
94	338,400	21,600
93	334,800	25,200
92	331,200	28,800
91	327,600	32,400
90	324,000	36,000
89	320,400	39,600
88	316,800	43,200
87	313,200	46,800
86	309,600	50,400
85	306,000	54,000

In the 1999 school year, public school buildings in Ohio had attendance average rates spanning 85 to 99 percent. The majority fell within the lower to mid-90 percent average; the ODE standard being 93 percent for acceptable accountability standards (as specified on the Local Report Card). There were 731 school buildings with attendance rates below 93 percent. Schools with exceptional attendance rates were 97 percent and above. However, some school buildings fell well below the 90 percent average.

Table 7 reveals student learning time loss as yearly attendance rates go down. A one-percent attendance drop annually accounts for 3,600 less total instructional hours. Substantial loss of student learning time in all academic subjects is apparent as attendance rates drop toward 90 percent. There were 205 school buildings in the 1999 data below the 90 percent mark. Ninety-one buildings reported attendance rates below the 85 percent standard, indicating a cumulative yearly loss of student learning time in excess of 54,000 instructional hours per building.

Conclusions

This study suggests there is a statistically significant relationship between student attendance and student achievement in Ohio at the fourth, sixth, ninth, and twelfth grade levels. The correlation of student attendance and student achievement is moderate to strong, with the most significant relationship occurring at the ninth grade level, when comparing attendance and achievement rates. There could be several reasons for this greater correlation at the ninth grade level. However, the academic standards and expectations at this grade level are high, and attending school on a regular basis is certainly a factor in this. The results of the study also indicate significant differences when comparing student attendance averages and student achievement of elementary school buildings within large urban districts.

A comparison of annual attendance rates elaborates the significance of student learning time loss per school year. School districts may want to consider incentives for improving attendance rates -- thus leading to more instructional hours per school year for students. Districts currently enjoying high student attendance averages should be contacted to see if there are specific programs and incentives for improving student attendance. Even though there are many variables (some uncontrollable by school officials) affecting student attendance throughout all school buildings in Ohio, positive and exceptional student attendance efforts should be revealed and considered for school buildings with attendance concerns and problems.

Borland and Howsen (1998) indicate the attendance-achievement relationship warrants further examination. There are many avenues for further study. Researchers should consider a survey study of school personnel and their opinions concerning the causes of student absenteeism. This compiled and reported information may lead to suggestions for dealing with the problems of poor student attendance and its relationship to student achievement. Some evidence already exists that infers attendance is higher in smaller schools (Cotton, 1996). A follow-up study should be considered to see if student achievement is greater in those schools, and if attendance was a factor. Districts and individual school buildings with exceptional student attendance could be contacted to establish case studies revealing their positive attempts in improving student attendance rates. A study of parental attitudes toward student attendance at school may be useful information for research.

There are other variables that could be the focus of continued analysis, such as student socioeconomic status, aptitude and their relationship to school attendance patterns and student achievement. Student age, perceived relationships with teachers, and perceived value of attending school are other variables to consider for student attendance/student achievement research.

This overview study of school attendance and its relationship to student achievement provides an initial forum for discussion, debate, and further research. Continued studies may provide additional information that may lead to strategies for improving student attendance and academic achievement.

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