

Academic Asset Or Instructor's Indulgence?

The Effect of Arts & Cultural Institutions
on Academic Achievement

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I. Executive Summary

Across the country arts and cultural institutions seek to preserve our past and use it to educate our future. As their exhibits expand these institutions have become treasures in their own rights; places like the Smithsonian Institute are landmarks that attract visitors from around the world. In addition to travelers they also attract school groups. For decades schools have been using “field trips” to museums as a way to supplement their curriculum. But do these trips actually benefit the students or are they a waste of resources? This project aims to evaluate whether these institutions are an asset to academics or an indulgence of instructors that have the resources to visit them.

Public school funding in the United States comes from federal, state, and local sources; the amount allocated to each school is dependent on a number of variables including community wealth and school performance on standardized tests. In recent years funding for education has not been diminishing requiring evaluation of expenditures. This project examines the effects of students visiting arts and cultural institutions, such as museums, on the academic performance of schools. The project compares and contrasts state scores and visitation practices to show how museums may be an expenditure worth keeping in the budget and curriculum of schools.

By examining fixed effects and instrumental variable models, this project found that schools that visit arts and cultural institutions perform significantly higher on state testing in overall academics, in addition to certain skills, such as reading and writing, and specific topics such as social studies, arts and humanities. As a result, this project recommends that the Kentucky Department of Education and public schools throughout the state implement education policy that increases access to museum programming. This recommendation is a solution that accomplishes the goal of improving school performance while not having to implement an untested strategy or curriculum change. A policy implementation like this would also increase the availability of federal grants such as “Race to the Top.”

II. Identification

Across the state resources for education are strained. For example, Lexington-Fayette, a prominent school district within the state, is facing \$20 million budget shortfall leading to staff and programs being re-evaluated for being downsized or cut out completely. The states' main funding program for education, SEEK (Support Educational Excellence in Kentucky) has also reduced funding steadily since 2008; educators are strained to find ways to continue to edify students without losing a significant amount of substance.

Currently, the U.S. Department of Education's budget (FY 2013) is providing \$69.8 billion in discretionary spending to state educational agencies based on different needs and criteria. The U.S. Department of Education budget also includes, "an additional \$12 million for Institute of Education Sciences' research and development and sustained funding for Investing in Innovation." The state would improve its chances of securing these additional federal funds if it could identify and incentivize programs that boosted academic performance in schools across the state. While public finance and education are the subjects of great contention, it behooves policy makers to evaluate all of the resources available to schools and how they are used, given the possibility there are effective, yet underutilized, resources that could address education concerns. An example of one underutilized resource is museums across the state.

Every year there are over 850 million visits to museums in America; 55 million of those are children in school groups. According to the Institute of Museum and Library Services, "Museums provide more than 18 million instructional hours each year for guided tours for students, staff visits to schools,

school outreach through science vans and other traveling exhibits, and professional development for teachers.” Museums also spend more than \$2 billion a year on educational activities, including afterschool and community outreach programs. A typical museum budget allocates two thirds of their budgets to K-12 student education, according to the American Alliance of Museums. Museums have made a well-documented effort to improve education, yet they are still underutilized by public schools.

Albeit the museums efforts to improve education, there are trade-offs that tip the scale in the opposite direction of visitation. Teachers and parents spend hours organizing and chaperoning field trips to these institutions; schools spend resources transporting and feeding the children; the loss of class time that is already in such short supply. It is possible however that these trips to educational institutions such as museums are an innovative next step in the evolution of education rather than a waste of assets already in short supply. It begs the question; does visitation to historical and cultural institutions, such as museums, improve academic achievement enough so that it is no longer considered a waste?

III. Review of Literature

As recorded by the American Alliance of Museums, museums of all types are visited by 850 million Americans per year. To put that in perspective, it is more than the attendance of all major sporting events in the U.S. combined. Museums are popular partly because of their wide accessibility. 17% of museums are located in areas with a population under 20,000. Also, 40% of museums are free to all patrons, and many museums recognize the free and

reduced price lunch program to school children (AAM, 2014). Access to these opportunities is coveted by communities because of the perceived educational benefits.

In a 2008 study, over two hundred fifth graders were tested using three different approaches on the impact a museum visit had on the students' learning. The results showed that students not only learned more information from their visit than in a traditional classroom setting, but they also retained more of the information. These results held constant across intrinsic motivators, such as interest/enjoyment, perceived competence, perceived choice, and pressure/tension (Wilde, 2008). This study gives empirical evidence that there education can be achieved in many different ways, not just standard instruction of subjects. The role of teachers in a tradition classroom setting remains imperative; however, a resource, such as a museum, has been shown to educate students more effective therefore negating a few concerns such as "waste of time" and "coverage of material for testing."

One reason for the effectiveness of museums on student education and retention is that students' are actively involved in their own learning. As Rennie suggests in his study , "...experiences during the museum visit might have enhanced this preservation of knowledge gains (Rennie, 2004)." Such a significant effect on learning suggests that incorporating more museum programming within the curriculum is an innovative way to use an underutilized resource. "Hands on" learning is notably effective in the sciences; studies conducted on students who were given time and instruction in laboratory settings as an extracurricular program provided by a museum saw that, "there were

significant increases in students' interest in science and significant improvements in their problem solving skills at all grade levels (Paris, 1998).”

Moreover, educational benefits are not limited to the classroom. Interactive museum programs not only successfully impacts students after they leave the classroom but also as they pursue careers. L.M. Melber states that, “after participation, students indicated a greater understanding of science careers and an increased desire to explore careers in science. Student questionnaire and illustration analysis identified an increase in participants' content knowledge and understanding of scientific work. Parental questionnaires supported these findings (Melber, 2003).”

These findings supported STEM (science, technology, engineering, mathematics) policies such as the American Competitiveness Initiative, Project Lead the Way, and Race to the Top. Worldwide Americans have fallen behind in education, all the while they is empirical data showing that museums and museum programming to be a viable innovative method for returning the United States back to an educational Mecca that spurred great achievements.

A number of schools have already developed this innovative museum method into their policy by developing new ways to access this museum programming outside the traditional infrastructure.

Many schools in New York are inviting museums to bring exhibits to classrooms rather than students going on traditional field trips. This concept is a result of not only budget cuts in the educational system, but also due to increasing time required in the physical classroom for state exams. Budget cuts have made it difficult for schools to pay for transportation to and from the

museum as well as museum admission. Even though museums do charge for the travel programs, they are cheaper than the costs of a traditional field trip.

A similar policy is used in the Sutton schools outside of Boston, busses cost \$275 per bus, and each grade level requires three buses. The expense of a museum field trip for one grade level is \$825 plus museum admission; however, the cost of the travel program from the Museum of Science called “Animal Adaptations” is only \$280. There’s also been innovation on the Museum’s side by not only physically going to schools to present exhibits, but also by presenting topics via videoconferencing or computer-based learning tools that accompany exhibits. The latter two allow museums to reach more students by saving on transportation costs and other expenses. (Lewin, 2010).

One negative aspect of the travel education program that museum employees from Charleston Museum in South Carolina and the Museum of Science in Boston agree upon is that the “wow” factor of the museum is lost. However, teachers have found the travel program to be advantageous because the programs do not consume the entire day like traditional field trips do, which allows the teachers more time to meet curriculum requirements. Teachers can build relationships with museums that support teaching by having museum curators come to schools and present exhibits that are at the museum to students to enhance the curriculum being taught by the teachers. Another advantage of museums is that museum curators also have expertise and resources that teachers may not have, which allows the students to be exposed to the topic on a deeper level (Vanoverbeke, 2007).

Other states, more demographically similar to Kentucky, have examined this issue and found notable benefits. Jay P. Greene, 21st Century Chair in Education Reform and head of the Department of Education Reform at the University of Arkansas College of Education and Health Professions, who conducted a study on attendance to an art and culture museum in the state, found that, “students who attended a school tour at Crystal Bridges demonstrated stronger critical thinking skills, displayed higher levels of tolerance, had more historical empathy and developed a taste for being a cultural consumer in the future,.” Whereas these results fall in line with other findings on the subject, what he also found was applicable to Kentucky, a state with many rural and Appalachian counties: “We also found that these benefits were much larger, in general, for students from rural areas or high-poverty schools, as well as minority students (Greene, 2013).”

With all the positive reinforcement for museum programming, not all research has been conclusive. In a 2007 study Stephanie Downey stated, “There are undoubtedly other variables that impact student achievement, and each museum-school program exists within its own unique circumstances, making one size fits all impossible (Downey, 2007).” This raises a good point that all museums may not benefit all schools, nor could their visitation be the sole causation of improved performance. As stated by Rennie et al. in their *Science Education* publication, “Research must include the opportunity for collecting data in a longitudinal way, and longitudinal studies require measurement over time, ideally before a visit as well as during and after (Rennie, 2004).” This capstone

will attempt to address these points by compensating for them in its research design.

IV. Research Design

Data

Data for this study was gathered from existing databases and the transcription of site records from several institutions. Provided by the National Center for Education Statistics, data from the Common Core Database (CCD) and Kentucky Department of Education (KDE) was the foundation of the dataset providing information on Kentucky public schools. That data was compared to visitation records kept by arts and cultural institutions across and adjacent to the state.

The NCES database provided information for 241 public high schools in the state of Kentucky over a range of one to nine years (with a mean of 8.1 years). This provides a total of 3,652 observations. Data were collected on thirteen variables. Academic index scores are assigned by the state as a result of state standardized testing (explained in Table 2).

Each of the independent variables was chosen for the insight it might provide in explaining education outputs. The variables are valued at the school level, not by individual class or per student; this provides a more general view of the information. The Teach(er) vector is comprised of the average number of years of experience teachers in the school have and the teacher to pupil ratio for the school. This is used to control for classroom effects. Every school's spending per pupil (in that year) was included to control for school resources; this

addresses the potential issue of schools with more money having better performance. Similarly student to computer ratio is controlled for address the possible technology inequality between schools. The Ethnic(ity) vector is comprised of counts for each schools population of Black, Hispanic, and Asian students. Even though the minority population is a very small proportion of the state's demographics the impact on performance still needs to be controlled for. The remaining vector is School which includes the total enrollment for each school, whether or not the school has a magnet program, and the population of the school district. These control for the size of school. The final variable is the school's percentage of students on free and reduced price lunch as an indicator of poverty within the school.

The explanatory variable of museum visitation is a dummy variable for whether or not the school attended an arts and cultural institution during that year; valued as a 1 for attendance and 0 for no attendance. It does not account for multiple attendances to museums in the same year. Of the 182 arts and cultural institutions within the state 28 were applicable to this study. The reason for the small sample is the majority of institutions do not have educational value or receive visitors because of their designation (i.e. historic homes/sites, local interest). The visitation information was gathered from the remaining 28 institutions including ones within the state such as the museums run by the Kentucky Historical Society and institutions close to the border that were visited by Kentucky schools, such as the Cincinnati Museum Center and National Underground Railroad Freedom Center. The data does not account for visitation of mobile museum programming to schools. Some data had already been

compiled digitally by the institutions, other data was in paper archives that had to be sorted and recorded into STATA. This information consisted of visitation by school group as well as general visitation counts. In some instances institutions had receipts from the free and reduced price lunches they had provided school groups.

Table 1 Independent Variables

museum_yes	Whether or not school visited museum that year.
ave_years_exp	Teacher's average number of years of experience.
spending	School's spending per pupil that year.
Stratio	Teacher to pupil ratio.
st_comp_ratio	Student to computer ratio.
ethb_CCD	School's count of black students.
ethh_CCD	School's count of Hispanic students.
etha_CCD	School's count of Asian students.
total_enroll_CCD	School's total enrollment.
magnet_yes	Whether or not the school has a magnet program.
frpl_pct	School's percentage of students on free/reduced price lunch.
pop10	School district population in 2010.

Table 2 Dependent Variables

idxai	Academic index score
rdai	Reading index score
wrai	Writing index score
ssai	Social Studies index score
ahai	Arts & Humanities index score

Method

The purpose of this project is to model the effect(s) of museum visitation on academic performance. The model used to measure this estimated relationship is:

$$(1) \quad Y_{it} = \beta_1 \text{Museum}_{it} + \beta_2 \text{Teach}_{it} + \beta_3 \text{Spend}_{it} + \beta_4 \text{Ethnic}_{it} + \beta_5 \text{School}_{it} + \varepsilon_i$$

The fixed effects model is set up with the various index scores of academic performance as the dependent variable (Y) and the explanatory variable (Museum) being the schools' attendance to arts and cultural learning centers with all other control variables being held constant. The control variables were the spending per pupil (Spend) and the vectors of teacher information (Teach), student ethnicity (Ethnic), and school demographics (School).

The model includes index scores from the school's overall academic score as well as specific topics, such as social studies, and specific skills, such as writing. Given the literature, it is expected that students would have increased knowledge and comprehension of topics learned on the trips, therefore the visitation to arts and cultural learning centers should have a positive impact on all of the schools' academic performance scores. The teacher vector is expected to negatively relate to the academic performance as is the spending because of its wide variance throughout the state. Due to the small amount of diversity in the state of Kentucky, the ethnicity vector is expected to have insignificant impact on the academic indexes. The school vector is expected to negatively correlate to the academic performances as a result of the lack of influence it has on classroom time.

The issue with this model alone is the potential endogeneity that exists between academic performance and visitation to arts and cultural institutions. The fixed effects model shows that a relationship exists between the two variables, but, as commonly quoted, correlation doesn't equal causation. Explained another way, it is indistinguishable whether visitation to museums

improves test scores or whether schools that have high test scores visit museums. To adjust for this another model is needed.

The most straight forward way to address for this endogeneity is through an instrumental variable approach. That is to say, the model will show that schools that attend museums have better test scores, not that schools with better test scores attend museums. This will be done by using the school district's population as an instrumental variable. School district population was chosen because it is a very strong predictor of museum visitation for schools but has a very weak correlation to academic performance index scores. This is attributable to the greater resources larger population centers have for sustaining arts and cultural initiatives. Once effects of the other variables are accounted for, the remaining correlation will be the effect of museum visitation on the school index scores.

The main objective of this study is examining the relationship between museum visits and academic performance, but because of the potential endogeneity, an instrumental variables model must be employed. To do this, I estimate the following model:

$$(2) \quad Y_{it} = \beta_1 \text{Museum}_{it} + \beta_2 \text{Teach}_{it} + \beta_3 \text{Spend}_{it} + \beta_4 \text{Ethnic}_{it} + \beta_5 \text{School}_{it} + \varepsilon_{it} + \mu_{it}$$

This model is similar to the fixed effects one with the addition of the instrumental variable. By using school district population as the instrumental variable, because it directly relates to museum visitation but not to academic performance, the study has adjusted for the endogeneity of the dependent and explanatory variables (all others being constant). In this equation (2) the academic index scores are represented by Y; Museum includes the instrumental variable school

district population; the following exogenous variable Teach, Spend, Ethnic, and School remain constant; and ε is the error term.

V. Analysis and Findings

Results

The fixed effects model contained no statistically significant effects of museum attendance on academic achievement in reading, writing, social studies, or arts and humanities (Table 3). The only statistically significant effect was in the overall academic index, though the effect was not of great impact (1.18 coefficient).

Table 3 Regression Results from Fixed Effects Model Estimating Effect of Museum Visits on Academic Achievement

	Academic Index	Reading Index	Writing Index	Social Studies Index	Arts & Humanities Index
Museum Visitation	1.18** (0.509)	0.37 (0.657)	0.636 (0.738)	1.006* (0.622)	0.575 (1.15)

F(11,1948) = 95.08 F(11,1985) = 78.12 F(11,1315) = 19.12 F(11,1985) = 70.47 F(11, 1316) = 39.62
 ***p<0.01; **p<0.05; *p<0.10; estimates are OLS regression coefficients modeling the relationship between index scores and museum attendance.

However when the instrumental variable of population was applied to the model, the results were very different. Every academic index score showed statistical significance results with a high impact (Table 4). The overall academic index showed a 32.4 point improvement to scores which closely correlates with the results of the writing and social studies scores.

The arts and humanities scores for the instrumental variable model is unusually high which is likely due to constraints forced upon the data that are discussed in the limitations section.

Table 4 Regression Results from Instrumental Variable on Academic

Achievement

	Academic Index	Reading Index	Writing Index	Social Studies Index	Arts & Humanities Index
Museum Visitation	32.392*** (9.651)	60.322*** (18.339)	31.195*** (12.375)	28.655*** (10.76)	99.65*** (32.915)

F(11,1942) = 32.72 F(11,1979) = 15.68 F(11,1309) = 8.73 F(11,1979) = 35.3 F(11, 1310) = 6.68
 ***p<0.01; **p<0.05; *p<0.10; estimates are OLS regression coefficients modeling the relationship between index scores and museum attendance.

The original hypothesis of a direct positive relationship between museum visitation and high academic achievement was not backed by the first model but having controlled for the endogeneity using the school district population as an expected predictor of visitation shows estimates that show the hypothesis correct.

Limitations

There limitations to this study are mainly categorized in two ways, limitations to the design and limitations to the data. The limitations to the design both stem from the schools examined. First the research only examines public schools. Even though private schools are independent of curriculum standards and testing, the generalizability of education benefits from museum attendance is limited since a private school sample is not available. The second design limitation is the school level focused upon. Public high schools were chosen for this study due to the availability and diversity of testing data on them. However,

many arts and cultural institutions have programming geared toward specific age groups that are younger than high schools. Attendance to these programs is higher by school but not significantly by student. Third, the design is set on the school level. Due to data availability the study can't track individual students or classes in their attendance. Therefore the attendance to museums is generalized to the whole school when it is unlikely that the entire school population attended.

The limitations to the data start with the incomplete records of visitation. Institutions all keep records of attendance differently; some do not keep records at all. Places like the National Underground Railroad Freedom Center, keep digital records of visitation, whereas the Kentucky Historical Society keeps paper copies of the reservation request; the Duncan Center only has teachers sign a log book. These inconsistencies make it difficult to account for one hundred percent of the visitation throughout the state. Another limitation to the data is it does not compensate for the differences in museum breadth or size. Some institutions, like the Civil War Museum of the Western Theatre in Bardstown, have very specific exhibits that, while highly informative, focus on only one obscure subject area which is not necessarily applicable to material found on standardized tests.

The only other additional limitation is the museum system within the state of Kentucky. Across the state, institutions have taken part in preserving and educating youth on arts and cultural interests, but the range of these institutions is limited. There are very few institutions that focus on subjects such as science and mathematics, most Kentucky museum institutions skew towards history and

other social studies. Though the experience of the visit is not diminished by the subject of the museum, the return on standardized testing might be.

VI. Conclusion

Discussion

The results of this project show that there are substantial benefits to utilizing programming provided by arts and cultural institutions for academic achievement. A sensible policy to address increased education performance expectations in Kentucky is to implement more museums' resources via either traditional field trips or mobile programming, such as the Kentucky Historical Society's HistoryMobile, without needing additional funds. In addition to the academic benefit to schools, it also provides the state increased access to federal resources through programs such as Race to the Top. Programs like Race to the Top offer grants to, "...states that are creating the conditions for education innovation and reform. (ed.gov, 2014)" The nature of creating policy around these institutions that help secure this additional funding would give Kentucky the added economic benefit to the academic one.

Whereas the analysis and empirical evidence indicate a benefit to schools visiting museums, it does not explain the value of additional visits. Schools that visit museums score higher than schools that do not, but it can not be shown in this research that visiting multiple museums during the school year improves performance further.

Recommendations

The Kentucky Board of Education should develop a policy initiative that incorporates the arts and cultural institutions and the programs they offer within

the curriculum. By creating this policy initiative, the Kentucky Board of Education can apply for additional federal grants (i.e. Race to the Top) receiving more funds to continue increases in performance and prepare students not only to pass standardized tests but also promote career development. Federal grant funding such as Race to the Top would independently sustain the policy initiative to assist schools with accessing arts and cultural institutions and the programs. Academic achievement would improve without any increased monetary contributions from the state or reallocation of current funds.

Kentucky school districts from all over the state would reap many academic benefits of accessing museums and their programming. The ability to access museums from different parts of the United States through mobile programs would be a significant addition to the Kentucky education program; not only providing access to the “hands on” activities approach to education but access to subjects not available through Kentucky institutions. This study highly recommends expansion of visitation to schools that do not currently attend museums. The prospect of improving education achievement without increasing the resource burden already shouldered by education should be an idea policy makers can rally behind easily.

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