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**DOES INCREASED ACCESS TO THE ARTS IN HIGH SCHOOLS IN THE LOS
ANGELES UNIFIED SCHOOL DISTRICT AFFECT GRADUATION RATES?**

by

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**SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FULFILLMENT OF THE
DEGREE OF BACHELOR OF ARTS**

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Abstract

Determining whether the arts are beneficial to a student's education is a widely, and hotly debated topic every year in the United States, with many studies published each year demonstrating the impact that the arts have on various educational outcomes, from increased test scores to higher graduation rates. This paper examines previous research on the efficacy of incentives and how students' participation in extracurricular activities, from sports to the arts, could impact graduation rates. It also develops a model for analyzing the present value of a high school education to a student using a discounted present value analysis and conducts an empirical analysis of 77 high schools in the Los Angeles Unified School District over 4 different school years to determine a relationship between the number of art classes offered and graduation rates. The results of the analysis do not support the hypothesis that an increase in the number of art classes offered per student will increase graduation rates, and actually suggests the opposite.

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Introduction

In 2014, the Los Angeles Unified School District (LAUSD) launched an extensive investigation into the state of the arts at 639 of LAUSD's schools and presented the results of their inquiry in the form of the "Arts Equity Index". This index takes information regarding each school's provided arts instruction, arts resources, arts professional development, Title 1 Status, and Student Equity Index (poverty, foster students, and English language learners) and assigns them a value from 1 to 4 with 1 indicating a school that is grossly underserved in the arts and 4 being a school with a strong arts education. The purpose of this project was to assess the equity of arts funding amongst the schools, but it largely showed how poor arts funding was across the board with 60% of elementary schools and 54% of middle and high schools scoring a 1 or a 2 and only 5 schools achieving the highest score of 4. These results are unsurprising since the total arts education budget was cut almost 75% from before the recession in 2007 to 2012 (about \$78.6 million in 2007-2008 to \$18.6 million in 2012-2013)¹. After the Arts Equity Index was released, LAUSD announced an initiative to improve the category of the schools that were in the bottom half of the index's scale by placing new teachers in the most underserved schools, allocating an additional \$2 million to the arts based upon a school's category, connecting Community Arts Partners with high-need schools, and re-aligning existing arts personnel to provide more equitable arts instruction.

Prior to this investigation, The LAUSD Arts Education Branch put out a report stressing the importance of engaging its students in the arts, particularly since the total

¹Tami Abdollah, "LAUSD Arts Funding Cut 76% in Five Year," *Pass/Fail* (blog), *Southern California Public Radio*, October 10, 2012, <http://www.scpr.org/blogs/education/2012/10/10/10421/laUSD-arts-funding-cut-76-five-years/>

economic output of creative industries in Los Angeles in 2014 totaled nearly 13% of LA County's GDP according to the 2015 Otis Report on the Creative Economy². LAUSD's report cites over 60 studies that collectively demonstrate that students who receive their education in an arts rich environment are more prepared for the workforce, increase their academic success, have higher self-esteem and self-confidence, achieve higher test scores, show increased high school graduation rates, and develop higher success rates in group collaborations³. These studies analyzed whether there was a correlation between individual students' involvement in the arts and their academic success over several years.

There is a plethora of studies published every year that highlight why the arts are important to students, and to society as a whole, citing effects similar to those articulated in LAUSD's report and since there is no shortage of such reports, I am curious about whether providing access to the arts in school is effective in increasing educational attainment at high schools in Los Angeles. Most previous studies look at how individual students' performance is individually affected, whereas I will be looking at whether increasing students' access to the arts, in terms of offering more art classes, has an effect on school wide graduation rates in Los Angeles.

² Kleinhenz et. al., "2015 Otis Report on the Creative Economy of the Los Angeles Region" (paper prepared for Otis College of Art and Design by the Los Angeles County Economic Development Corporation, February 2016) http://laedc.org/wp-content/uploads/2016/05/2015-LA-Region-Creative-Economy-Report-Final_WEB.pdf

³ Jaime Aquino et al., "The Arts Education and Creative Cultural Network Plan" (presented to the Los Angeles Unified School District Board of Education, June 14, 2013). http://achieve.lausd.net/cms/lib08/CA01000043/Centricity/Domain/599/Arts%20Plan%207-3-13c_Board.pdf

The idea that there could be a connection between offering more art classes and increasing graduation rates brings up the question of whether we can incentivize students to attend and graduate from school by offering something that may ease the pain associated with being at school. There is a lot of research on the topic of incentivizing educational outcomes and the results of these studies are far ranging. Studies that focus on incentivizing graduation, and other favorable educational outcomes such as higher test scores and increased attendance, are largely split on whether or not the incentives examined are actually effective. However, most of these studies focus on participation in sports and/or extracurricular activities in general rather than what is offered during school hours. These studies also largely look at individual, student level data whereas I am looking into school wide performance. There is one study, however, that specifically examines the relationship between access to instruction in the arts and graduation rates, although this study simply reveals that there is indeed a connection between low graduation rates and poor access to the arts in New York City high schools, it did not say whether poor access to the arts contributed to lower graduation rates or vice versa. I am more interested in whether providing access to the arts in school is an effective tool for increasing graduation rates since this information can be used to inform future policy recommendations. Looking into the arts specifically is also important since providing arts programs and classes during the school day could be an alternative to other extracurricular activities that may not motivate some students, such as sports.

In order to address this question, I will first look critically at results of other studies related to the two main themes of incentives for graduation and the effect of increasing access to the arts in schools. After reviewing several studies, I will then outline

an economic model for why providing access to the arts could potentially incentivize students to graduate high school and I will perform my own empirical analysis on whether the number of art classes offered at almost 80 high schools in the Los Angeles Unified School District has any significant effect on a school's graduation rate over four school years.

Literature Review

One of the biggest questions in education research is how to incentivize students to attain certain educational outcomes such as performing well on a test or graduating. While some previous research addresses how increasing access to the arts in secondary school might have an effect on students' performance in school, this thesis aims to investigate whether providing more art classes will provide enough of an incentive to convince students to stay in school through to graduation.

To understand how participation in arts programs may act as an incentive for students to stay in school and graduate, we can look to a large field of study on the effects that a student's participation in sports and other extracurricular activities may have on their educational attainment. There are many studies that look into this topic which will help inform my research, since sports programs and art classes or programs are both activities that students may enjoy participating in. Much of the initial research on the topic focuses on the effect of participation in sports on such things as wages and other long-term labor market outcomes. John M. Barron, Bradley T. Ewing, and Glen R. Waddell use data from the National Longitudinal Survey of Youth and the National

Longitudinal Study of the High School Class of 1972 in order to demonstrate empirically that men who participated in high school sports tended to gain higher educational attainment and have higher wages⁴. They model a student's overall utility given their allocation of time spent on leisure versus time spent participating in athletics and then modeled a student's utility once in the workforce as a function of leisure and income⁵. They found that men who participate in sports are 25-35% more likely to gain higher education achievement and that wages of the men they observed 12.6 years after graduation are 12-32% higher than those who did not participate in sports⁶. Their use of an allocation-of-time model suggests that these results can be partially attributed to the fact that either students with naturally higher academic ability or a greater work ethic (less desire for leisure) will choose to participate in sports, therefore raising the question of whether these students would attain higher labor market outcomes regardless of their participation in sports or not. Their study takes into account socioeconomic factors such as race, parental achievements, and residence within a city, which is already taken care of in my question since I am looking specifically at LA. They rely on data from the National Longitudinal Survey of Youth and the National Longitudinal Study of the High School Class of 1972. This could mean that their results may not be as relevant today since their data is slightly dated. They also only look at male students since athletic participation was far more limited for women in 1972⁷. Finally, the authors examine factors that affect labor market outcomes in the long run whereas I am looking at the more short-term

⁴ John M. Barron, Bradley T. Ewing, Glen R. Waddell, "The Effects of High School Athletic Participation on Education and Labor Market Outcomes", *The Review of Economics and Statistics* 82, no. 3 (2000):

⁵ Barron and Ewing, "The Effects of High School Athletic", 410-411

⁶ Barron and Ewing, "The Effects of High School Athletic", 413-420

⁷ Barron and Ewing, "The Effects of High School Athletic", 412

educational attainment goal of graduation, so I will look to other research that focuses on shorter-term outcomes to help inform my research.

A paper by Stephen Lipscomb addresses several of the flaws in the Barron, Ewing and Waddell paper in relation to my topic. Lipscomb sets out to explore how participation in extracurricular activities would affect students' attainment of a Bachelor's degree and also how participation would affect secondary school test scores. His is one of the first studies to look at more short-term effects of participation in sports in relation to test scores since he argues that short term factors help determine labor market outcomes in the long-run. He finds that involvement in athletics is associated with a two percent increase in math and science test scores, that club participation is associated with a one percent increase in test scores, and that both types of extracurriculars are associated with a 5% increase in Bachelor's degree attainment expectations. He starts his analysis with a data set consisting of 16,305 students from the National Education Longitudinal Study of 1988 that includes two follow up interviews in 1990 and 1992⁸. He uses a fixed effects model to estimate how participation affects learning independent of time-constant factors that could influence both participation and the outcome, which is something that I will also be doing in my analysis⁹. He then goes on to model each scenario of participation (participate all three years, some of the years, only one year, or never). He finds that even after adding unobserved time-varying selection factors such as socioeconomic status and, later, indicators of motivation, his results do not change very much, which he notes is surprising. He also tests for factors

⁸ Stephen Lipscomb, "Secondary school extracurricular involvement and academic achievement: a fixed effects approach," *Economics of Education Review* 26 (2007): 464

⁹ Lipscomb, "Secondary School Extracurricular," 465

such as gender and race but found that they were statistically insignificant and did not change the results¹⁰.

A strength of this paper lies in how he controlled for variables including family situation and living community, which I will unfortunately not be able to account for due to limited access to data on the school wide level. He also controlled for several variables related to measuring motivation such as time spent on work and at school, how much leisure time they enjoy etc., which, again, I will not be able to control for as I am looking at school level data. The paper also addresses the question of immediate educational return on investing time into extracurricular participation which is what my research aims to examine as well. I will not be using similar data or methods, since I only had data available on a school wide level versus individual data which might have been better due to the individual nature of incentives.

Another highly cited paper on this topic is by Eric Eide and Nick Ronan. They attempt to investigate whether participation has an impact on labor market outcomes such as level of educational attainment and earnings 10 years after graduation¹¹. In this way, this study is very similar to Barron and Ewing's. This study uses Ordinary Least Squares to estimate the effect of participation on the outcomes. They also use Instrumental Variable (IV) methodology to produce many of the results in an attempt to estimate a causal relationship with data that did not come from a controlled experiment, and the IV results were less conclusive. They use students' height at age 16 in their IV approach to account for endogeneity because they hypothesize that height is correlated with

¹⁰ Lipscomb, "Secondary School Extracurricular," 465-471

¹¹ Eric Eide and Nick Ronan, "Is participation in high school athletics an investment or a consumption good? Evidence from high school and beyond," *Economics of Education Review* 20 (2001): 431

participation in sports and uncorrelated with the outcomes they are testing¹². This method is useful in order to estimate the causal effect between sports participation and educational outcomes. The outcomes they are interested in are levels of educational attainment, which I am also looking at, and earnings 10 years after graduation from high school, which they view as a measure of future consumption. They use data from another longitudinal study, High School and Beyond, and they test for a multitude of common factors including location, school characteristics, demographics, parental characteristics, race, and gender¹³. In contrast to earlier studies, the authors found that participation in sports decreased educational attainment for white males but that it increased educational attainment for black males and white females. These mixed results are important because they provide a differing perspective from some of the literature that suggests that participation in sports should increase educational attainment across all tested demographics.

The idea of incentives is one of the cornerstones of economics and these papers, as well as other research not mentioned in depth here, demonstrate the potential efficacy of using extracurricular activities as an incentive to motivate increased educational attainment and outcomes. Many of the studies I look at indicate that higher participation in extracurricular activities could increase educational attainment for at least some groups of students, although it is important to note that many studies are inconclusive for some groups and disagree with results of other studies in other observed groups. However, the studies previously discussed only look at the effect of extracurricular participation in

¹² Eide and Ronan, "Is participation in high school athletics," 432

¹³ Eide and Ronan, "Is participation in high school athletics," 435

sports and other after school activities while I am curious about what effect providing more access to the arts during regular school hours has on increasing educational attainment, i.e. graduation from high school.

One of the first papers that examines the relationship between arts participation, both in and outside of the classroom, and educational success was published by James Catterall in 1998. He analyzes data from a longitudinal study sponsored by the United States Department of education that looked at 25,000 secondary school students in both 8th and 10th grade¹⁴. He first examines students' participation in art classes per week and art related extracurricular activities, and whether or not they attend museums with their families. He finds that between 8th and 10th grade, engagement in the arts in school drops off from about half of the surveyed students attending an art class at least once a week in 8th grade to over half of students not even having taken one art course since entering high school¹⁵. This is an important point to note in regards to my research since I will be focusing solely on how the number of art classes offered in school affects graduation rates. It is also important to note that Catterall breaks down art related extracurricular activities into the categories of band/orchestra, chorus/choir, debate/speech, and drama. This is interesting because students that are involved in debate/speech in classes and outside of school could be more likely to be high achieving and thus could influence these results slightly.

The next section of Catterall's analysis divides students into two groups: high arts involvement and low arts involvement, with students falling into the high arts

¹⁴ James S. Catterall, "Involvement in the Arts and Success in Secondary School", *Americans for the Arts Monographs* 1, no. 9 (1998), 1

¹⁵ James S. Catterall, "Involvement in the Arts", 2

involvement category generally having taken 2-3 arts classes, participated in an arts related extracurricular activity, or having taken lessons outside of school. Students in the low arts involvement category had typically only enrolled in one arts class and had no other involvement with the arts. 8th grade indicators showed that almost 80% of “high arts” students earned mostly A’s and B’s in English, compared to 64% of “low arts” students. The data also showed that about 67% of “high arts” students scored in the top 2 quartiles on standardized tests versus just 43% of “low arts” students¹⁶. This figure becomes even more disparate between high and low arts students when looking at academic performance in 10th grade with about 72.5% “high arts” students scoring in the top 2 quartiles of grade 10 standard test composite and only 45% of “low arts” students achieving scores in the top 2 quartiles¹⁷. However, the author notes that these objective results could simply indicate that a child may come from a more affluent family with the ability to afford private lessons, more resources to transport kids to arts activities, living in more affluent school districts with more prevalent arts programs, and overall more potential encouragement of the arts since other statistics showed that a student is much more likely to have “high arts” involvement if their family is in the highest income quartile and that students with “low arts” involvement are twice as likely to have come from a family with low socio-economic status.¹⁸

Catterall finishes his analysis by examining “arts and the economically disadvantaged student,” in which he performs the same analysis from the previous section but only includes students who fall in the least affluent quartile of the nation’s

¹⁶ James S. Catterall, “Involvement in the Arts”, 3

¹⁷ James S. Catterall, “Involvement in the Arts”, 4

¹⁸ James S. Catterall, “Involvement in the Arts”, 5-6

student population, which reduces the data set from 25,000 students to 6,500¹⁹. The results are essentially the same as the previous findings for the general population, just with a slightly smaller impact all around. This time, for the 8th grade data, around 65% of “high arts” students earn mostly A’s and B’s in English compared to 56.4% of “low arts” students. Also, only 29.5% of “high arts” students were scoring in the top 2 quartiles on standard tests versus 24.5% of “low arts” students doing so. However, the results are slightly more differentiated for students in the 10th grade, with 41.4% of “high arts” students scoring in the top 2 quartiles in the grade 10 standard test composite and only 24.9% of “low arts” students scoring in the top 2 quartiles²⁰. It is especially interesting to my study that the grade 10 results are more significant because a student is more likely to graduate if they have better test scores halfway through their high school education. An analysis of students strictly from a lower economic bracket is important because it helps mitigate any potential outside factors that were not examined that could have contributed to the results, despite attempts to control for such factors. Additionally, in regards to my study of 77 high schools in the Los Angeles Unified School District, the average percentage of students that qualify for free or reduced lunch is 75.9%, which indicates a high number of students in a lower socioeconomic bracket at the schools I am looking at. Therefore, Catterall’s results showing at least a slight advantage in school performance by students who have a higher involvement in the arts in both 8th and 10th grade indicate a potential positive effect in my results as well. Again, this data is from 1988, which is not very current and thus things could have changed drastically since then. However, this

¹⁹ James S. Catterall, “Involvement in the Arts”, 6

²⁰ James S. Catterall, “Involvement in the Arts”, 7

report provides statistics on school performance based on arts participation in and outside of school hours, which had not been analyzed much before this.

There are many studies published each year by various arts foundations emphasizing the importance of the arts on students' education and on society as a whole. However, many of these studies seem to contain an implicit bias that the arts are important since that is overwhelmingly the reported consensus in each of those papers, and because most of the reports are commissioned by a foundation or center connected to the arts in some way. They can still be informative to my research though. One such report done by The Center for Arts Education in 2009 examines almost the exact question that I am looking at in regards to the relationship between the art education that a high school provides and graduation rates, although this report looks at public schools in New York City and also only looks to see if there is a relationship between low graduation rates and a poor arts education and not whether one has an effect over the other²¹. This paper draws an important parallel to my question not only because it looks at the connection between arts education and high school graduation rates, but also because New York is considered a great cultural hub of the United States, just like Los Angeles, and thus makes the lack of art funding in their public schools that much more problematic. The report done by the Los Angeles Arts Education branch on "The Arts Education and Creative Cultural Network Plan" discusses how "creative industries are the second largest [economic] sector in LA and Orange Counties generating \$140 billion in annual sales and receipts, more than \$5.1 billion in state and local taxes, and nearly

²¹ Douglas Israel, "Staying in School: Arts Education and New York City High School Graduation Rates", (a report by The Center for Arts Education, October 2009)

one million in direct and indirect jobs,”²² something that Israel also points out for in regards to New York City’s economy in his report.

Israel’s report analyzes data from over 200 New York City public schools over a two-year period and found that schools in the top third tier of graduation rates offered the most arts resources and access to their students.²³ He looks at the number of certified arts teachers, number of dedicated arts classrooms, number of appropriately equipped arts classrooms, number of arts and cultural partnerships, amount of external funds to support the arts, amount of coursework in the arts, access to multiyear arts sequence, school sponsorship of students’ arts participation, and school sponsorship of arts field trips.²⁴ He also looks at the breakdown of socioeconomic status, race and ethnicity within the schools and found that schools with lower graduation rates tended to have a higher percentage of poor, black and Latino students and that these schools also tended to have the least amount of access to arts education. This seems to mirror the perpetuation of the disparity in arts education for underserved school that the arts equity index in LA attempted to address²⁵. Israel’s report, like my question, looks at data on a school wide level rather than at an individual student level so it is valuable in determining what factors I would ideally like to look at, even though most of this data is not publicly available for schools in the LAUSD so I will not be able to include much of it in my analysis.

²² Aquino et al., “The Arts Education”, 2

²³ Doug Israel, “Staying in School,” 2

²⁴ Doug Israel, “Staying in School,” 10

²⁵ Doug Israel, “Staying in School,” 5

One final aspect of my question that has yet to be investigated thoroughly is whether there is strong, statistical evidence that having a background in the arts affects other areas of productivity. This is unsurprising as it is difficult to examine whether the intangible experience of having an arts education any effect on innovation or future productivity. The idea that educating students in the arts could also be a direct investment in the future productivity of the student is relatively new but a paper published by Rex LaMore et al. in 2013 attempts to demonstrate empirically that arts and crafts are critical to economic innovation. They studied science and technology graduates from Michigan State University Honors College from 1990-1995 and found several key things: that graduates in science, technology, engineering, and mathematics (STEM) subjects are more likely to have higher arts and crafts skills on average, that arts and crafts are significantly correlated with producing inventions and founding new companies, that many of the graduates surveyed believe that their innovation is stimulated by their knowledge of arts and crafts, and that lifelong participation in arts and crafts yields significant impacts for innovators and entrepreneurs²⁶. The paper mentions how the arts contribute to GDP (through museums, galleries, theaters, jobs etc.) and also how research has shown that cultural assets, as many economists refer to it, enhance quality of life and attract highly paid, highly skilled workers and innovators which improves the economy.

The data they used was somewhat flawed because they only obtained responses from 44 STEM majors and all the arts involvement measures were self-reported. They looked at the arts and crafts involvement of MSU STEM Honors College graduates who

²⁶ Rex LaMore et al., "Arts and Crafts: Critical to Economic Innovation", *Economic Development Quarterly* 27 no. 3 (2013): 223-227

had founded companies or produced patents and then aggregated the two into another category that also included graduates who had produced books and published works. They referred to these accomplishments as “creative capital”. They found a statistically significant, positive relationship between reported involvement in various arts and crafts activities and MSU STEM Honors College graduates who had produced creative capital. They discuss some limitations of their paper, including the self-selection bias in the data since the survey was optional to fill out and because these students surveyed are likely to be “scholastically high achievers” who do not represent the general population. In any case, this study helps start the conversation on the contribution of the arts to human capital and indicates that increasing access to the arts from a young age could lead to increased productivity in the future.

Model and Data

At the heart of my research question is what would motivate a student to allocate their time to going to school when they could experience a more immediate benefit from increasing their leisure or working. Incentives are at the heart of any question relating to individual decision making since people will only decide to allocate their scarce resources to something if the utility that they gain is greater than the utility that they could get from other uses of their resources. In order to model this, I will be using discounted present value analysis to examine the present value of a high school education. A discounted present value analysis is based on the idea that something is worth more to you in the present than that same thing in the future because humans have

a positive rate of time preference and almost universally tend to avoid a delay of gratification. Therefore, in order to properly determine the current value of something in the future, you must discount that future value back to the present based on your degree of time preference. For this research question, I will be looking at the present value of obtaining a high school education by summing all future expected costs and benefits associated with attending school through to graduation at each year of the students' life starting when they enter high school around age fourteen. The standard discounted present value equation looks like this:

$$Present\ Value = \sum_{t=0}^n \frac{Y_t}{(1 + discount\ rate)^t}$$

Where time, t , starts at $t=0$ when the student first enters high school. Y_t is the future income at time t after graduation or the cost/benefit to the student at year t when they are in school. The discount rate is the students' rate of time preference and it is likely to be very high compared to the average adult's because it is more painful for them to postpone gratification.

For a student at time $t=0$, Y_0 will be very low, and perhaps even negative because the pain of attending high school will probably be higher than any potential benefit that could come from being at school, such as socializing with friends or enjoyment from classes, because they could be spending their time enjoying leisure or maybe even making money at a job outside of school instead. I hypothesize that offering more art classes in school could reduce the cost (pain) associated with attending high school since students could be more likely to enjoy attending school if they enjoy making art, playing music, dancing or partaking in other artistic activities. By increasing a student's

enjoyment of attending school, Y_0 should increase and therefore the present value of attending high school should increase as well. Since this value is being experienced in the present, there is no delayed gratification and therefore its discounted value is the same as its full current value, so improving Y_0 actually has the greatest potential effect. It is also the easiest value to influence, and hopefully improve, through school policies.

One thing to consider in this model is that while you would expect that obtaining a high school diploma would increase future income, Y_t , many students in Los Angeles may have a hard time seeing the effects of earning a high school diploma, particularly if they live in neighborhoods that have high unemployment or high gang activity. According to my analysis of 77 high schools in the Los Angeles Unified School District, on average almost 76% of the students enrolled qualify for free or reduced lunch, which indicates a high level of students that come from socioeconomically disadvantaged backgrounds. Students with low socioeconomic status are more likely to live in neighborhoods with high unemployment and so they could potentially see a lower expected Y_t on average that might even be zero. If they see friends and family members that obtained a high school diploma that still do not have a steady income or job, they might think that there is little to no future benefit of going to high school. If there is also a high cost associated with attending school in the present, then they may decide to drop out. Additionally, if there is a lot of gang activity in a neighborhood then, again, this could mean that future income would be low or zero if there is a higher likelihood of the student ending up in prison, or if there is a high chance that they will not live very long. These potential outcomes would reduce the present value of a high school diploma since the students will see the future income Y_t as very low, if nonexistent, and they could see

their amount of time to live, n , also as very low and thus they will not be earning that much income in the future even if they do hold a job with some income Y_t at some point. A higher likelihood of a shorter lifespan could also increase the rate of time preference even more, thus even further decreasing the present value of earning a diploma.

All of these factors point to an inherently low present value for students in Los Angeles to attend and finish high school, especially in underserved communities, which makes up a large portion of the LAUSD. In order to increase graduation rates, there must be an increase in the present value of obtaining a high school education. Therefore, in this study, I hypothesize that providing more art classes will increase the current value of attending class and completing the coursework associated with graduating since students will want to attend their art classes, and if the present value is higher, then students will have a greater incentive to graduate.

Additionally, receiving an arts education could have the possibility of improving performance in other subjects as well, according to various studies and papers outlined above. There could also be a potential future benefit associated with obtaining exposure to the arts in school that could potentially increase Y_t , as mentioned in the study by Rex LaMoore. Obtaining an arts education in Los Angeles specifically could also provide an added benefit since creative industries make up the majority of economic activity in Los Angeles. Thus, increasing the number of art classes offered in high schools in the LAUSD could also have the potential to increase the future income Y_t , and therefore increase the present value of a high school diploma, thus incentivizing attendance through to graduation.

Much of the previous research on this and similar topics has used regression analysis to determine the relationship between some incentive, such as participation in extracurriculars, and educational attainment or educational outcomes. I will also use regression analysis to examine how increasing the number of art classes offered per student at a high school would affect graduation rates of high schools in the LA Unified School District. The variables I will control for are the racial makeup of each school in terms of percentages of white students, black students, and Hispanic students; socioeconomic status of the students at the high schools using percentage of enrolled students that qualify for the free and reduced lunch program; and then additionally controlling for the number of English, science, foreign language, and health/PE classes offered per student. I will not be able to look at whether gender affects graduation rates, as that data was only available at a district wide level, although it is unlikely that this would have a large effect on graduation rates.

The estimated regression is as follows:

Graduation Rate

$$\begin{aligned}
 &= \beta_0 + \beta_1 \text{FreeLunch} + \beta_2 \text{EngPS} + \beta_4 \text{SciPS} + \beta_6 \text{FLangPS} \\
 &+ \beta_7 \text{ArtPS} + \beta_8 \text{PEPS} + \beta_9 \text{PctHisp} + \beta_{10} \text{PctAsian} + \beta_{11} \text{PctAfrAm} \\
 &+ \beta_{12} \text{PctWhite} + u
 \end{aligned}$$

Where FreeLunch is the percent of students enrolled that qualify for free and reduced lunch, EngPS is the number of English classes offered per student, SciPS is the number of science classes offered per student, FLangPS is the number of foreign language classes offered per student, ArtPS is the number of arts classes offered per student, PEPS is the number of physical education and health classes offered per student, PctHisp is the

percentage of students that are Hispanic, PctAsian is the percentage of students that are Asian, PctAfrAm is the percentage of students that are African American and PctWhite is the percentage of students that are white.

I did not include number of math classes per student, or the number of social studies/humanities classes per student because when I initially ran the regression, the results were very insignificant for every variable so I decided to look at whether some of these initial variables had high collinearity. I found that EngPS was highly correlated with MathPS at 0.871, that SciPS was also rather highly correlated with EngPS at 0.7864 and that it was even more highly correlated with MathPS at 0.8451. I also found that SSPS was fairly highly correlated with EngPS at 0.7957, with MathPS at 0.8099 and with SciPS at 0.8248. Because of this, I decided to remove MathPS and SSPS since they were the most correlated with other variables and because math is seen as similar to science and the social sciences are seen as similar to English. I also found the correlations of just the number of classes offered in each subject with each other and with the total number of students enrolled in each school and found that the total number of students variable was highly correlated at close to or above 0.8 for NumEng, NumMath, NumSci, and NumSci as well, so that is why I decided to use the per student measure of the classes in my regression and leave out total number of students since that was then accounted for in the rest of my variables.

I will this regression once to account for fixed effects and once with random effects, accounting for heteroskedasticity in both regressions with robust standard errors. Fixed effects are factors that remain constant each year and are specifically related to each school that are unobservable like environment, quality of teachers etc. I am doing

this because I am looking at panel data, since I am observing the same 77 schools over four different years, and with panel data it is a good idea to attempt to control for any factors that might be specific to individual schools that you cannot account for with other variables in the regression.

The data that I use all comes from the California Department of Education. They report yearly data on demographics, classes, school performance, graduation rates, and many other areas of education that is current through the 2014-2015 school year. To create my data set, I initially downloaded a detailed list of all the schools in LAUSD and started by eliminating all schools that did not go through grade 12 since those schools would not have graduation data. I then decided to remove charter schools from my list because they have different funding and different oversight. I also removed special education schools, which are specifically for students with special needs and learning disabilities; home/hospital schools which are schools that visit students at home or in hospitals; opportunity schools, which are schools for students with unique situations that may not be able to succeed in a traditional schooling environment; and continuation high schools, which are schools that are designed for students at risk of not graduating on time. I removed these schools because they all have a different population of students that could have many other factors contributing to their graduation rates. Additionally, some schools were closed, restructured, or created within the four years that I am examining and so I decided to remove those schools as well to create a consistent sample of all the same schools.

After narrowing down to 77 high schools in LAUSD, I looked at four school years of data on the graduation rates for each high school from the 2011-2012 school year

to the 2014-2015 school year. My data comes from the California Department of Education's (CDE's) "Data Quest" website which is taken from the California Longitudinal Pupil Achievement Data System (CALPADS). The graduation data set is "Cohort Outcome Data" for the class graduating in the year specified where the "cohort" is the students observed in that graduating class. The "cohort" is determined by taking the number of students who enter 9th grade for the first time in the initial year of the 4-years adjusted cohort that could potentially graduate in four years. The cohort is then adjusted each year by adding students who later transfer in to the school and subtracting students who transfer out, emigrate, or die. Students who dropout still remain in the cohort as do students who do not graduate in 4 years. The "cohort graduation rate" comes from this data set.

I also want to look at whether the racial makeup of enrolled students at each school affects graduation rates so I will be using data from CDE's Educational Demographics Unit and getting the percentage of White, Hispanic or Latino, Asian, African American students enrolled by taking the number of students listed in each group and dividing it by the total number of students enrolled that school year. Additionally, I am looking at a variable for the percentage of students at each school who qualify for free and reduced lunch, as this is a good proxy for the distribution of socioeconomic status of the school's population. This data is also found from the CDE under their Data Reporting Office. Unfortunately, I was unable to find the gender breakdown of each school so I did not include that as a variable in my analysis.

Finally, I looked at another data set from CDE's Educational Demographics Office that gave the number of classes offered in each subject for each school. This data

set reports the number of classes offered in English, math, science, social science/humanities, foreign language, health/PE, and art classes so I will control for those classes as variables as well. I also want these numbers to be in terms of the number of classes offered per student so that I can control for school size, so I am taking the number of classes offered in each subject and dividing it by the number of students enrolled in each school that year. I did this for each school in each year. As mentioned above, I had to remove the number of math classes offered per student and the number of social science classes offered per student since they were both highly correlated with other class variables and with each other.

Results

Descriptive Statistics:

VARIABLE	MEAN	STANDARD DEVIATION
Graduation Rate	0.819	0.098
Total Students	1,596	864.4
Free and Reduced Lunch Percentage	0.759	0.122
Number of English Classes Offered/Student	0.483	0.017
Number of Math Classes Offered/Student	0.384	0.014
Number of Science Classes Offered/Student	0.028	0.010
Number of Social Science Classes Offered/Student	0.028	0.012
Number of Foreign Language Classes Offered/Student	0.014	0.007
Number of Art Classes Offered/Student	0.016	0.010
Number of PE Classes Offered/Student	0.011	0.010
Percentage Hispanic	0.773	0.196
Percentage Asian	0.035	0.054
Percentage African American	0.091	0.135
Percentage White	0.066	0.091
Percentage Other	0.038	0.054

My descriptive statistics show that on average, the graduation rate is close to 82%, which seems pretty high but according to the National Center for Educational Statistics, the average graduation rate of public high schools in the United States was about 82% in school year 2013-2014²⁷, so this is in line with the national average. These statistics also show that, on average there are about 5 English classes offered for every 100 students, about 3 science classes offered per 100 students, about 1 to 2 foreign language classes offered per 100 students, about 1 to 2 art classes offered per 100 students, and about 1 PE class offered per 100 students. There are also, on average, about 1,596 students enrolled at each school. Finally, it is interesting to note from these statistics that, on average, these schools are made up of a large majority of Hispanic students with an average of about 77% of the student population being Hispanic.

Estimated Regression Model

The results are as follows, with Model 1 being the results with random effects, and the fixed effects column of results accounting for unobservable factors unique to each school, such as quality of teachers or characteristics of the neighborhood in which the school is located. Both regression results are run with robustness checks to account for heteroskedasticity.

VARIABLES	(1) Model 1	(2) Fixed Effects
ArtPS	-0.0795 (0.532)	-0.510 (0.622)
FreeLunch	0.0600* (0.0311)	0.0268 (0.0287)
PctHisp	-0.274	-0.0340

²⁷Public High School Graduation Rates, *National Center for Education Statistics* (May 2016)
http://nces.ed.gov/programs/coe/indicator_coi.asp

	(0.170)	(0.213)
PctAsian	-0.0321	-0.200
	(0.236)	(0.363)
PctAfrAm	-0.268	-0.287
	(0.186)	(0.241)
PctWhite	-0.0767	-0.131
	(0.185)	(0.241)
EngPS	-0.128	0.691*
	(0.447)	(0.396)
SciPS	-0.214	0.327
	(0.941)	(1.049)
FLangPS	1.191	-0.274
	(0.925)	(1.011)
PEPS	-0.164	-0.397
	(0.325)	(0.317)
Constant	1.014***	0.840***
	(0.163)	(0.200)
Observations	308	308
R-squared		0.045
Number of Schools	77	77
School FE		YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For the Random Effects, the only P-Value that was statistically significant at the 10% level was the Free and Reduced lunch variable. Interestingly, this was also the only variable that was positive in the whole regression. This seemed slightly surprising since I was using Free and Reduced lunch as a proxy for socioeconomic status of the students in the school, so I was expecting that having more students with a low socioeconomic status would have a negative effect on graduation rates. However, this could mean that the free and reduced lunch program in the LAUSD is an effective policy compared to the other factors that I am looking at.

In accounting for fixed effects between each school, the only variable that was significant at the 10% level was the number of English classes offered per student. This

means that for each additional English class added per 100 students, the graduation rate would be expected to increase by 0.691% on average, which is a relatively small amount in the grand scheme of things but it is also the variable of all the classes offered per student variables that had highest magnitude in my results. The R-squared value in this regression is also exceptionally low, at just 4.5% which means that there are likely many other variables that affect graduation rates that I did not include.

Despite every other variable being statistically insignificant for both regressions, I still want to analyze the coefficients of some of the variables and I will be focusing on the fixed effects regression since this is likely to account for factors related to each individual school that I was unable to control for and thus is likely slightly more accurate.

Interestingly, except for percent of students qualifying for free or reduced lunch and the number of English and science classes offered per student, all of the other variables have negative coefficients, which is surprising since I hypothesized that increasing the number of art classes would increase the graduation rate, not decrease it. However, we can see from the regression that if the number of art classes per student were to increase by 1 for every 100 students, then this would only decrease the graduation rate by 0.510%, which is not large. The coefficients of the other classes offered per student are even smaller in magnitude than that of the art classes per student, except for number of English classes offered per student, so adding one additional class in those subjects per 100 students would only slightly decrease graduation rates as well.

In regards to race, the results show that a 1% increase of the percentage of Hispanic students at a school would reduce the graduation rate by about 3.4% which seems like a lot compared to the magnitudes of many of the other variables, but it is not

nearly as high as the effect of the other races. Increasing the percentage of Asian students by 1% would decrease the graduation rate by almost 20% according to these results and increasing the percentage of white students by 1% would decrease the graduation rate by about 13% which both seem odd given previous results for these races in other studies, but this could be due to the fact that there is, on average, a very low percentage of White and Asian students at these 77 high schools. Additionally, increasing the percentage of African American students by 1% would decrease the graduation rate by almost 30%, according to these results.

Finally, it is interesting to see that the coefficient for free and reduced lunch is positive, albeit fairly small. The results say that if the percentage of students that qualify for free or reduced lunch increases by 1%, then the graduation rate will increase by 2.7% which, as I mentioned above, is somewhat contradictory to most education literature that proposes that lower socioeconomic status will generally decrease educational outcomes such as graduation rates. Again, though, this could indicate that the program that offers free or reduced lunch to students with a lower socioeconomic status is an effective way to increase graduation rates.

Conclusion

Thus far, I have looked at whether offering more art classes in high school incentivizes students to graduate. I initially modeled this relationship using a discounted present value analysis by analyzing the perceived current value of a high school education in terms of the current costs and benefits associated with attending school for

the purpose of obtaining value, future income, from this effort in the future. These costs/benefits and future values get discounted back to the present based on the rate of time preference of students and then summed from the time that a student enters high school through the end of their life to come up with some present value of a high school education. From there, I hypothesized that providing more art classes would increase the present value of attending school through to graduation by increasing the current benefit of attending school with the thought that increasing the present value of attending school through to graduation would provide a greater incentive to graduate.

I tested this hypothesis by running a regression on panel data from 77 schools over four years testing for certain variables that could potentially affect graduation rates, using the number of art classes offered per student as my independent variable and then controlling for other variables such as race, socioeconomic status, and the effect of the number of classes offered per student for other subjects. I looked at both random and fixed effects and I found only one significant result in the fixed effects regression, the number of English classes offered per student, and largely found that many of the variables that I used as controls in my regression, as well as the independent variable of number of art classes per student, would have a negative effect on graduation rates. These results contradict my hypothesis, although several of the other results seem odd considering results from other research on education, such as the fact that increasing the percentage of white and Asian students would decrease graduation rates by a large magnitude, or that increasing the free and reduced lunch percentage by 1% would lead to an increase in graduation rates.

One reason that I could have obtained such seemingly odd results could be due to the limited amount of variables that I had access to for high schools in the LAUSD and this can be seen by my low R-squared value. I was unable to control for gender, which was a limitation on the variables meant to control for demographics, although there may not have been a large effect anyway. I also was not able to obtain information about the location of the high schools and the socioeconomic status in the area surrounding the high school, which could have impacted, or at least better explained, what causes a change in graduation rates. In terms of school specific variables that could affect graduation rates, there are a multitude of unobservable variables that are not feasible to include because they are difficult to measure, such as the quality of teachers and of the administration, the comfort of the environment, gang activity and involvement in the school and surrounding neighborhood etc. I attempted to control for some of these differing qualities between schools with my fixed effects regression but that does not necessarily capture all of the potential contributing factors.

Another issue in my analysis is that here are many other variables that might have been able to better account for participation and access to the arts in high school that were just not available for me to include on a school wide level for the high schools that I was examining. Other arts related variables that I wish I had been able to look at are number of art teachers, quality of the classrooms, the amount and quality of arts supplies, number of instruments supplied, district funding for arts programs, additional funding received for arts programs and more. There was also no data on extracurricular activities which may be even more of an incentive for attending school since most of the previous studies I looked to were largely focused on participation in activities outside of school. One

study in particular notes a drop-off in participation in arts classes after entering high school while participation in extracurriculars stay relatively the same in high school which, if true, means that there could just generally be low participation in arts classes in high school despite the amount of classes that are offered. Additionally, I may not have examined enough years to fully capture trends in how increasing the number of art classes offered could increase graduation rates since there could be largely no change in this value over a short period of time or also potentially because the number fluctuated too much over that period of time that it was hard to capture the entire effect.

I used methods similar to those used by several studies that were looking at the correlation between a high school student's participation in an extracurricular activity and various educational outcomes such as graduation, test scores, educational attainment and others. A few of these studies also found fairly inconclusive results but some of the results that were more significant could have been due to the source of the data that they used. Most of those studies used longitudinal data from a large collection of individual students that were observed over several years of their high school careers and sometimes even in years beyond high school. The data that I used was only on a school wide level, which could affect my analysis of whether providing art classes acts as an incentive since incentives are largely individual and it is harder to capture how effective an incentive may be on an aggregated, school wide basis.

My results are also interesting in comparison to the study of New York City public school graduation rates and access to an arts education because the results from that study indicated a positive relationship between increased arts education access and graduation rates while this comparable study in a culturally, demographically similar city

did not find a positive relationship. Again, some of this could be due to the measures used by the study in New York City, which had access to data on the number of arts teachers, dedicated arts classrooms, equipment in arts classrooms, arts and cultural partnerships with high schools, external funds supporting the arts, coursework offered in the arts, access to a multiyear arts sequence, and school sponsorship of student arts participation whereas I only examined the number of arts classes offered per student. However, there could also be some differences in access to the arts in New York City since the city is much more geographically smaller and thus it may be easier to support, and transport, students wishing to gain exposure to the arts, versus in Los Angeles which is very spread out and with a large portion of the cultural arts activity happening only in a few specific locales that may be difficult to access.

Even though my results were unexpected, they are still important. Assuming that the regression results are somewhat accurate and that the variables that I used do affect the graduation rates by some amount in the same direction that my results showed, then the fact that the coefficient in front of the number of art classes offered per student was negative, although somewhat low, could have huge policy implications for LAUSD, which launched a large investigation into the state of arts education in the district in 2013. They reportedly increased and redistributed funding, implemented new policies to increase the number of art teachers in schools with poor arts representation, among other things. These policies use resources, and therefore if these results are even somewhat indicative of the relationship between higher access to arts and graduation, then some of these new redistribution policies and the increased funding could be a bit of a waste, or at least not have as great of an effect as the district would hope. However, there could also

have been other policies implemented during the same time period that minimized the effectiveness of the art funding allocations, such as other budget redistributions or perhaps altering graduation requirements such that students may not be taking as many art classes as before despite how many may be offered.

Overall, the results of this thesis, while not what expected, are still in alignment with results from other studies previously outlined, and thus the importance that gets placed on the arts each year by reports from many different foundations for the arts could be overstated since they are likely looking to find that result. Or perhaps the importance of the arts is not overstated, just misrepresented as beneficial to measurable and attainable educational outcomes such as graduation, when perhaps providing more access to the arts in school could have more immeasurable outcomes such as increasing a student's happiness or fostering a greater sense of community, both of which are still important.

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