

**Involvement in the Arts and
Human Development:
General Involvement and Intensive Involvement
In Music and Theater Arts**

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INTRODUCTION

This report presents results from our work during the past two years exploring interactions between the arts and human development and achievement. This research enlists the National Educational Longitudinal Survey (NELS:88)¹, a panel study which has followed more than 25,000 students in American secondary schools for 10 years. The work addresses developments for children and adolescents over the period spent between the 8th and 12th grades, i.e. late middle school through high school.

The first phase of the work examines involvement in the arts generally—across all disciplines. The second phase examines the potential importance of sustained involvement in a single discipline, here using instrumental music and the theater arts as case examples. We focus on these two arts disciplines because of related research suggesting links between music and cognitive development and between drama and theater in education and various skill and attitude developments.

Our findings, presented in more detail below, can be summarized in three main sets of observations:

- (1) **Involvement in the arts and academic success.** Positive academic developments for children engaged in the arts are seen at each step in the research—between 8th and 10th grade as well as between 10th and 12th grade. The comparative gains for arts-involved youngsters generally become more pronounced over time. Moreover and more important, these patterns also hold for children from low socio-economic status (SES) backgrounds:²
- (2) **Music and mathematics achievement.** Students who report consistent high levels of involvement in instrumental music over the middle and high

school years show significantly higher levels of mathematics proficiency by grade 12. This observation holds both generally and for low SES students as a subgroup. In addition, absolute differences in measured mathematics proficiency between students consistently involved versus not involved in instrumental music grow significantly over time.

- (3) **Theater arts and human development.** Sustained student involvement in theater arts (acting in plays and musicals, participating in drama clubs, and taking acting lessons) associates with a variety of developments for youth: gains in reading proficiency, gains in self concept and motivation, and higher levels of empathy and tolerance for others. Our analyses of theater arts were undertaken for low SES youth only. Our presumption was that more advantaged youngsters would be more likely to be involved in theater and drama because of attendance at more affluent schools and because of parental ability to afford theater opportunities in the community or private sectors.

We turn first to a brief summary of our initial release of data from this project and then to presentations of some of the important observations from the later research.

I. Initial Findings – Involvement in the Arts Generally and Student Academic Outcomes

In mid 1997 we released a report of the effects of involvement in the visual and performing arts on student achievement in middle and high school. Published in the *Americans for the Arts* monograph series as “Involvement in the Arts and Success in Secondary School,”³ this analysis was based on a multi-year survey of more than 25,000 students sponsored by the United States Department of Education. The sample was created to be representative of the nation’s population of secondary students. Our study

¹ NELS:88 is managed by the National Center for Education Statistics at the Office for Educational Research and Improvement, United States Department of Education. The data and code books are available in various forms on CD Rom media for public use.

² SES, or socioeconomic status, is a measure of family education level, income, and type of job(s) held by parents.

³ James S. Catterall, *Involvement in the Arts and Success in Secondary School*. Washington, DC: Americans for the Arts monograph series, No. 9, 1998.

offered the first reported analysis of information in the NELS:88 survey about student participation in the arts. We used a definition of “involvement in the arts” that gave students credit for taking arts-related classes in or out of school as well as involvement and leadership in school activities such as theater, band, orchestra, chorus, dance, and the visual arts.

Our analyses found substantial and significant differences in achievement and in important attitudes and behaviors between youth highly involved in the arts on the one hand, and those with little or no arts engagement on the other hand. In addition—and more significant from a policy standpoint—the achievement differences between high- and low-arts youth were also significant for economically disadvantaged students. Twenty of the differences we found favoring arts-involved

students were significant at the $p < .001$ level. (This means that the odds of the differences being caused by pure chance were smaller than one in one thousand.) Four differences were significant at the $p < .01$ level. The only difference not significant was performance on the history geography tests for low SES children.

Figure 1 shows some of the key differences we found between students highly involved in the arts and non-involved students, both for all students in the NELS sample and for the low SES quartile respectively. The figure includes both academic measures and also indicators of students’ regard for community service and measures of their television watching habits.

Figure 1 shows consistently more favorable outcomes for students involved in the arts—higher achievement, staying in school, and better attitudes

Figure 1: Comparisons of High Arts vs.Low Arts Students in Grades 8 and 10, All vs Low SES Background

Grade 8 Academic Performance	All Students		Low SES Students	
	High Arts	Low Arts	High Arts	Low Arts
Earning mostly As and Bs in English	79.2%	64.2%	64.5%	56.4%
Scoring in top 2 quartiles on std. tests	66.8%	42.7%	29.5%	24.5%
Dropping out by grade 10	1.4%	4.8%	6.5%	9.4%
Bored in school half or most of the time	42.2%	48.9%	41.0%	46.0%
Grade 10 Academic Performance				
Scoring in top 2 quartiles, Grade 10 Std. Test Composite	72.5%	45.0%	41.4%	24.9%
Scoring in top 2 quartiles in Reading	70.9%	45.1%	43.8%	28.4%
Scoring in top 2 quartiles in History, Citizenship, Geography	70.9%	46.3%	41.6%	28.6%
Grade 10 Attitudes and Behaviors				
Consider community service important or very important	46.6%	33.9%	49.2%	40.7%
Television watching, weekdays				
percentage watching 1 hour or less	28.2%	15.1%	16.4%	13.3%
percentage watching 3 hours or more	20.6%	34.9%	33.6%	42.0%

about school and community. We also see marked differences in television watching habits, where arts involved youngsters watch considerably less.

Both our earlier and present efforts provide evidence that achievement differences favoring youngsters involved in the arts are not simply a matter of parent income and education levels, which do tend to line up with children having more visual and performing arts in their lives. Another result, as we spell out in more detail below, is that consistent involvement in the arts shows up in increased advantages for arts-rich youngsters over time, through 10th grade in our first analyses and through 12th grade in our later studies.

Summarizing early results.

A case for the importance of the arts in the academic lives of middle and early high schoolers was the primary suggestion of our earlier research. The research did not definitively explain the differences shown, nor was it able to attribute student successes unequivocally to the arts. This caution rises in large part because panel studies are not well suited to unambiguous causal modeling. Nonetheless, the differences were striking, and the chief confounding variable, student family background, was reasonably accounted-for in the work.

There are several theoretical rationales for why the arts might matter in the ways suggested. A previous work by the first author explores much of this ground and points to distinct possibilities.⁴ These are grouped into major categories including the various roles that the arts play in promoting cognitive development—from specific relations such as the influence of music on perception and comprehension in mathematics to the more general roles of imagery and representation in cognition. The arts serve to broaden access to meaning by offering ways of thinking and ways of representation consistent with the spectrum of intelligences scattered unevenly across our population—for example, resonating with the multiple and differing intelligences identified by Howard Gardner

at Harvard.⁵ The arts have also shown links to student motivation and engagement in school, attitudes that contribute to academic achievement.⁶ Arts activities also can promote community—advancing shared purpose and team spirit required to perform in an ensemble musical group or dramatic production, or to design and paint an urban mural. With community surely comes empathy and general attachment to the larger values of the school and the adult society which high school students will soon join.

Readers will note that we do not address here anything having to do with achievement in the arts per se, itself an important domain apart from any connections between the arts and more traditional academic success. The NELS: 88 data base shows a marked absence of indicators of achievement in the arts—a problem that should not go unnoticed as future national longitudinal surveys are planned.

Finally, even in the absence of causal attributions yet to be proved, the perspectives we show elicit another reason to promote more involvement in the arts for more youngsters. This is the likely positive peer associations accompanying involvement in the arts. Our analysis of the NELS:88 survey established, for the first time in any comprehensive way, that students involved in the arts are doing better in school than those who are not—for whatever constellation of reasons. Compendia of research on academic achievement going back three decades and more argue that the motivation and success of one's peers has an influence on how a youngster does in school. At very least, even our early comparisons support the contention that rubbing shoulders with

⁴ See Jaye T. Darby and James S. Catterall. *The fourth R: The arts and learning*. Teachers College Record, (1995).

⁵ See Howard Gardner: *Frames of Mind* (New York: Basic Books), 1983; and *The Arts and Human Development* (New York: John Wiley), 1973.

⁶ See Morrison Institute of Public Policy and The National Endowment for the Arts: *Schools, Communities, and the Arts: A Research Compendium*. Tempe, AZ: The Morrison Institute for Public Policy, Arizona State University and the National Endowment for the Arts (1995). Especially summary of report on the National Longitudinal Study of Different Ways of Knowing (The Galef Institute, Los Angeles). See also the monograph reporting evaluations of the Chicago Arts Partnerships in Education, this volume.

arts-involved youngsters in the middle and high school years is typically a smart idea when it comes to choosing friends and activities.

More Recent Findings

Grants to the Imagination Project at UCLA from the GE Fund in September of 1997 and December of 1998 supported extensions of this research. There were three general priorities for the newly-funded work:

One priority was to extend the analyses describing developments up to grade 10 through the balance of high school and beyond. We here report results through grade 12.

A second priority was to begin to conceptualize involvement in the arts in ways that could capture the potential value of “depth” of involvement. Our earlier work relied on measures of involvement that tended to reward widespread involvement over many artistic pursuits; the most “involved” students in our first study were largely those who attached themselves vigorously to several disciplines. There are good reasons, however, to believe that intensive involvement in a single discipline would act differently than scattered attention to diverse artistic endeavors. This is because different effects are touted for different arts disciplines, and depth of involvement in one might be expected to intensify particular effects.

A third priority for the research was to explore possible connections between involvement in music and cognitive development. Much interest has been generated by recent studies in neuroscience linking certain types of music training with positive developments in

cognitive functioning. (We refer here especially to various studies of Gordon Shaw, Frances Rauscher, and others over the past 6 years described below.)

Our first effort to explore the impact of depth of experience in the arts focused on students who reported sustained involvement in instrumental music, blending priorities two and three. Our second effort was to examine students who reported sustained involvement in the theater arts. The theoretical rationales for inquiry aimed at theatre derive largely from a literature focused on theater in education and drama in the classroom produced mainly over several decades of research and scholarly writing in Great Britain.

Extending Analyses of Effects of Involvement in the Arts through Grade 12

Involvement in the Arts as of Grade 12. Before examining outcomes, we first found that levels of student involvement in the arts declined between grades 10 and 12. As of the spring of the senior year, twelfth graders fell off in reported involvement in the arts when compared to grade 10. For example, whereas 22.7 percent of 10th graders reported involvement in band or orchestra and 23.3 percent showed involvement in chorus or choir, fewer than 20 percent showed involvement in any school musical group by grade 12, as shown in Figure 2. Figure 2 also shows that the percentages of students taking out-of-school classes in music, art, or dance also declined markedly between grades 10 and 12. Especially notable is the drop from more than 11 percent to fewer than 3 percent of students taking daily out of school lessons in grade 10 versus grade 12.

Figure 2: Percentages of Students Involved in Arts Related Activities Reported in the NELS:88 Data Base, Grade 12 vs. Grade 10.

Grade 12			Grade 10	
Participates in:	School Music Group	19.5%	Band or Orchestra	22.7%
	School Play/Musical	15.0	Chorus or Choir	23.3%
Takes out-of-school classes in Music, Art, or Dance:			Takes out-of-school classes in Music, Art, or Dance:	
rarely or never		85.9%	rarely or never:	74.2%
less than 1/week		4.2	less than 1/week	5.8
1-2 per week		7.4	1-2 per week	8.6
every day or almost		2.5	every day or almost	11.3

High- Versus Low-Arts Involvement and General Student Performance.

One of our objectives in the latest phase of this research was to extend earlier analyses through grade 12. In Figure 3, we recount key observed differences between high-and low-arts involved students as of grades 8 and 10, and then show differences accruing through grade 12.

As seen in Figure 3, performance differences between arts-involved and non-involved students remained about the same across grade levels in nominal terms—showing up typically as 16 to 18 percentage point differences. For example, the percentage of low-arts students scoring in the top half of the standardized test distribution was 47.5 percent in grade 10, while 65.7 percent of high-arts students scored above the test score

median—an 18.2 percentage point difference at that grade level. At grade 12, the respective figures are 39.3 and 57.4 percent, an 18.1 percentage point difference.

Within the general trends in achievement differences, it can be seen that the relative advantage of involvement in the arts increased appreciably over time. This is shown in the relative sizes of the sub-groups doing well from the arts-involved and non-involved groups respectively, which grow over time. By the 12th grade, the nominal 18 percentage point difference amounts to a 46 percent advantage for the high-arts group where 57.4 percent scored well compared to 39.3 percent from the low-arts group ($57.4/39.3 = 1.46$ or a 46 percent advantage).

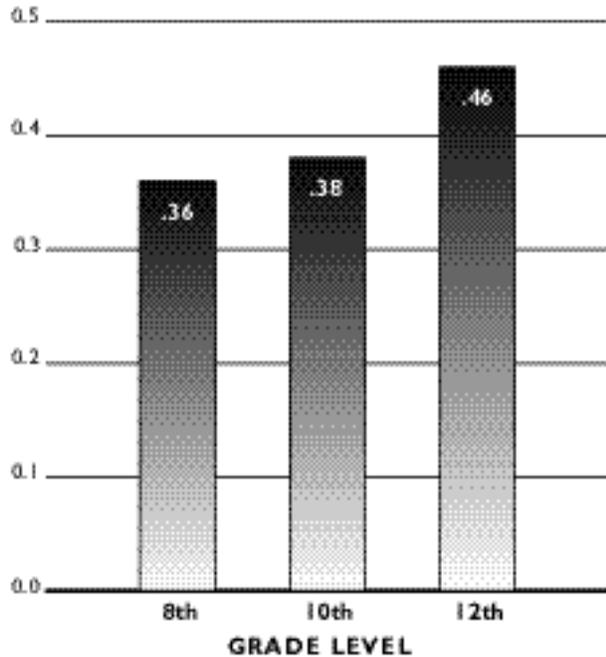
Figure 4 shows what the comparative achievement advantages for involvement in the arts look like over

Figure 3. Involvement in the Arts and Academic Performance

8th Grade		
% in each group	High Involvement	Low Involvement
Earning mostly As and Bs in English	82.6%	67.2%
Top 2 quartiles on std. tests	67.3%	49.6%
Dropping out by grade 10	1.4%	3.7%
Bored in school half or most of time	37.9%	45.9%
10th Grade		
% in each group	High Involvement	Low Involvement
Top 2 quartiles std. tests	65.7%	47.5%
Top 2 quartiles Reading	64.7%	45.4%
Level 2 (high) Reading Proficiency	61.0%	43.5%
Top 2 quartiles History/Geography/Citizenship	62.9%	47.4%
12th Grade		
% in each group	High Involvement	Low Involvement
Top 2 quartiles std tests	57.4%	39.3%
Top 2 quartiles Reading	56.5%	37.7%
Level 2 or 3 (high) Reading Proficiency	58.8%	42.9%
Top 2 quartiles History/Geography/Citizenship	54.6%	39.7%

time for all students; all group differences (except the history/geography test for low SES students) are significant at greater than a 99 percent confidence level. Most remain significant at the .999 confidence level.

Figure 4. Comparative Advantages in Composite Test Scores, High vs.Low Arts, Grades 8 through 12



This general pattern of increasing advantages is replicated for various measures in addition to composite test scores—meaning that high arts youngsters did comparatively better on multiple measures as they passed from grade 8 to grade 12.

Socio-Economic Status and Involvement in the Arts

As shown in Figure 5 below, we continue to find substantial differences in the family income and education levels between our high arts and low arts groups. The probability of being “high arts” remains almost twice as high for students from economically advantaged families, and the probability of low arts involvement is about twice as high if one comes from an economically disadvantaged family.

This is why the following analyses of achievement restricted to low SES students are very important. Not

only are achievement issues typically more profound for children from families with less education and fewer economic resources, but high SES children simply have more opportunities to be involved in the arts. When we compare groups of students by arts involvement only, the differences are more likely to be caused by differences in family background than anything else.

Figure 5: Probability of High vs.Low Arts Involvement by Student SES

Probability of High Arts Involvement	
High SES Quartile	.320
Low SES Quartile	.178
Probability of Low Arts Involvement	
High SES Quartile	.197
Low SES Quartile	.385

Achievement Differences,Low SES Students

Here we begin with our findings concerning grade 8, grade 10, and grade 12 performance differences within the low SES quartile—the fourth of all students at the bottom of the family income and education ladder. This group represents families where parents typically graduated from high school and went no further with their education, as well as families where parents never finished high school.

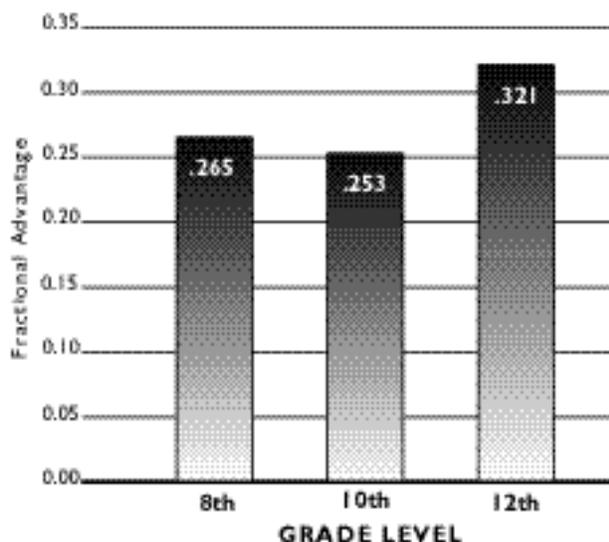
As shown in Figure 6, the patterns shown for low SES students over time bear similarities to those shown for all students. The percentage differences in performance are smaller in nominal terms—for example 8 to 10 percent lower for test scores. But once again, the relative advantage for arts-involved youngsters increases over the middle and high school years, and especially between grades 10 and 12.

Figure 7 on the following page illustrates this pattern for composite standardized test scores where the comparative advantage for high arts, low-SES, youngsters is about 32 percent by grade 12:

Figure 6: Involvement in the Arts and Academic Performance and Attitudes, Low SES Students (Low Parent Education/Income)

8th Grade		
% in each group	High Involvement	Low Involvement
Top 2 quartiles std tests	37.7%	29.8%
Mostly As and Bs in English	71.4%	58.8%
Dropping out by grade 10	3.5%	6.5%
Bored in school half or most of time	32.9%	40.1%
10th Grade		
% in each group	High Involvement	Low Involvement
Top 2 quartiles std tests	35.2%	28.1%
Top 2 quartiles reading	37.3%	28.7%
Level 2 Reading Proficiency	39.6%	29.2%
Top 2 quartiles History/Geography/Citizenship	34.8%	30.4%
12th Grade		
% in each group	High Involvement	Low Involvement
Top 2 quartiles std tests	30.9%	23.4%
Top 2 quartiles reading	32.9%	23.6%
Top 2 quartiles History/Geography/Citizenship	30.7%	25.2%
Level 2 or 3 Reading Proficiency	37.9%	30.4%

Figure 7. Comparative Advantages, High vs. Low Arts, Low SES Students, Grades 8–12, Standardized Test Scores



This concludes our presentation concerning differences between students generally highly involved in the arts as compared to their non-involved peers. The main points of the analysis so far are that arts-involved students do better on many measures, their performance advantages grow over time, and that these two general performance comparisons also hold for low SES children. We will probe these findings in more detail in the discussion concluding this monograph. We turn now to two cases of intensive involvement in specific arts disciplines.

II. Intensive Involvement Within an Arts Discipline. The Cases of Instrumental Music and Drama/Theater.

A new strain of our work, and a departure from our first monograph which adopted a more general orientation to involvement in the arts, is a study of youngsters who exhibit very high levels of involvement within a single arts discipline over the secondary school years. Readers may recall that the analyses reported above were built on a conception of involvement defined as “the more involvement in more arts, the higher the student’s involvement score.” As such, a student who only participated in an orchestra and took music lessons, no matter how intensively, would not have been a high-arts student in our first analyses.

Yet intensive involvement in a single discipline should probably be thought to be even more important developmentally than high levels of more diverse involvement in the arts. This is surely true if specific arts act in specific ways on cognition or other developments. That is an assumption we are comfortable making and could defend at some length. In general, the argument is that different art forms involve different skills and different sorts of human interaction. In short, they impact cognitive and motor processes differently and should be expected to result in different outcomes. We will save a more in-depth discussion of this for another paper.

Involvement in Instrumental Music

Involvement in Instrumental Music and Cognitive Development in Mathematics. We were interested in exploring involvement in music because of accumulated studies over the past 7-8 years suggesting that certain kinds of musical experiences, especially keyboard training, seem to produce effects on cognitive functioning in young children. Other potentially important aspects of the musical experience are learning to read music and to associate musical notation with abstract concepts of time, rhythm, and pitch. These experiences at first glance appear to involve forms of mathematical reasoning—the fractional senses

of different musical notes (whole notes, half notes, and so on), the relative distances of notes within scales, the perfect doubles and halves in the pitch frequencies of octaves, and even the relations among dynamics within a musical passage. For some musical instruments, such as the piano, there is an associated geometry of music that probably reinforces the spatial-temporal reasoning effects noted by Rauscher et al. For other instruments, such as the strings, there are complex linear geometries associated with pitch that bring spatial reasoning to the production of musical sounds and phrases.

What has research on music suggested? While it would appear that the domains of music and mathematics are widely divergent, an increasing number of studies focusing on participation in musical activity and cognitive development in mathematics suggest that the two are closely related. An important skill developed while a child begins the study of music is reading musical notation, the symbol system which represents elements of rhythm and pitch, the fundamental building blocks of music. It is the analysis of music at this basic level which reveals the most obvious connection between music and mathematics (Bahna-James, 1991).

Rhythm, here defined as a numerical pattern of beats occurring over time, is represented by a series of notes ranging from whole notes (usually 1 beat per measure) to quarter notes (4 beats per measure) to eighth, sixteenth and even 32nd and 64th notes. Two fundamental mathematical skills are required in order to understand the time meaning represented in a note: the ability to count beats, which allows for an understanding of the absolute value of a note in a measure, and general fractional or proportional sense, which allows for an understanding of each note type in relation to the other.

A second feature depicted by musical notation is pitch or frequency, which denotes the relative tonal distances between notes within scales, chords, and intervals. These relationships in and of themselves are abstract and difficult to conceptualize; the use of musical instruments such as the violin, clarinet, or piano

helps make these tonal relationships concrete. The keyboard in particular has been singled out in research by Rauscher and Shaw (1997) on spatial-temporal reasoning as a form of reasoning ability postulated to directly affect mathematical understanding. The results from their work show that keyboard training is a more effective intervention on spatial-temporal reasoning skills than singing lessons and computer training and suggest that mastering a musical instrument aids in developing mathematical understanding.

Initial studies correlating the grades of secondary school students in music theory and math classes (Bahna-James, 1991) as well as teacher evaluation of instrumental and scholastic achievement for elementary school students (Klinedinst, 1991) revealed a variety of significant relationships between mathematics achievement and music performance. These included sight-singing and arithmetic, algebra and geometry; pitch and arithmetic; and finally tonal relationships and arithmetic and algebra. The work by Bahna-James (1991) further showed that the correlation between math grades and music theory grades of secondary school students increases when the mathematics being taught is of a more elementary level and the numerical relationships are simple. Some findings provide additional support for the notion that the fundamental components of music are inherently mathematical in nature.

Research by Shaw et al. (Boettcher, Hahn & Shaw, 1994; Grandin, Peterson & Shaw, 1998; Graziano, Shaw & Wright, 1997; Rauscher & Shaw, 1997, Rauscher & Shaw, 1998) drawing in part from the seminal work of Chase & Simon (1973) on how chess experts process information, has suggested that cognition in music, mathematics and complex games are activities driven by pattern recognition and manipulation, and as such are affected by spatial-temporal reasoning ability. Of particular interest is their study (mentioned above) which focuses on the effect of keyboard training on the spatial-temporal reasoning of young children as measured by a series of object assembly tasks. These assembly tasks require matching, classifying, and recognizing similarities and relationships among

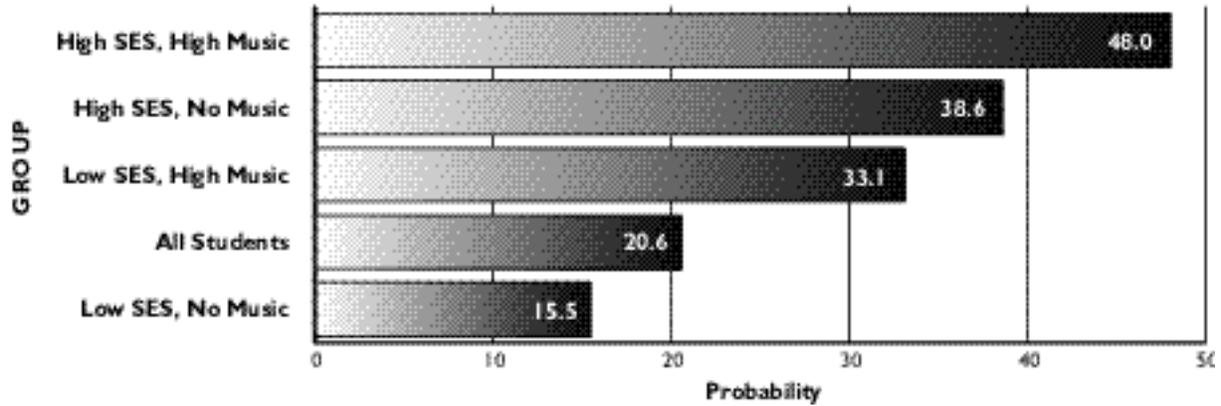
displayed objects. Keyboard training alone (rather than training in singing or simple arithmetic through the use of computer games) had a significant effect on children's ability to classify and recognize similarities and relationships between objects; this provides further evidence for the contention that at the most abstract level, music, like mathematics, requires the ability to recognize patterns and relations.

Intensive Music Involvement in NELS:88. We here report our explorations of differences shown by students who were heavily involved in instrumental music throughout the first three panels of the NELS:88 survey—8th, 10th and 12th grades. We add a word of caution at this point. Some of the studies discussed above were studies of music experiences in their natural state and their associations with spatial-temporal reasoning or mathematics-related learning. These were generally situations where there was no intention in the curriculum to bolster math-related skills; the researchers simply wondered if increased skills related to mathematics were a serendipitous byproduct of the music experience. Other studies were launched with the expressed intention of producing and tracking connections between learning in both the musical and mathematical domains. Both types of studies have found connections between music and mathematics cognition. Our work focuses on apparently serendipitous associations between reported involvement in instrumental music and reports of growth in mathematics proficiency for students.

The following chart shows one early result of our work. We examined the probability that students in different groups—differing mainly by involvement in instrumental music—would attain the highest levels of mathematics proficiency on the 12th grade tests used in the NELS:88 study. We also differentiated our analyses by family income and education levels, or SES.

In Figure 8 below, it can be seen that the overall probability of scoring high in mathematics (that is, the probability of such performance among all 12th grade students) is about 21 percent. These students score at Levels 4 and 5 on the NELS:88 mathematics test, performance levels indicative of strong success through

Figure 8. Probability of Highest Math Proficiency (Levels 4 or 5), Grade 12, By Group—SES and Consistent High vs. No Involvement in Band/Orchestra



at least three years of high school mathematics. From this baseline, the comparisons become quite interesting. First, all high SES students in our “high” and “no music” groups do better in mathematics than the average student. Second, within groups, students concentrating in instrumental music do substantially better in mathematics than those with no involvement in music. And third, low SES students with high involvement in music do better than the average student at attaining high levels of mathematics proficiency. The performance distribution for extremely low levels of mathematics proficiency, Level 1 and below, is a mirror opposite to the one shown in Figure 8.

Do math skills grow over time with involvement in instrumental music?

The NELS:88 data base allows for comparisons over time, an important feature in the creation of

arguments addressing the causes of observed differences between or among groups of interest. Here we observe how music-involved students compared with their non-music peers as of 8th grade and revisit the exact same students again in grade 12. Figure 9 shows performance level distributions for grade 8 groups of interest, including overall average scores, averages for all low SES students, averages of all low SES students with no music involvement, and low SES students with high involvement in orchestra and/or band. The levels shown refer to successively higher levels of proficiency, and they are scaled by specific skills and knowledge of test takers. (The NELS:88 test used here are criterion-referenced exams, like the tests used for the National Assessment of Educational Progress.) Their purpose is to gauge skill development against standards of performance and not to place students on some national norm scale. Level 3 would be

Figure 9: Math Proficiency Scores at Grade 8, Percentages Scoring at Each Level

Math Proficiency Scores	Average N = 14,915	Average-Low SES N = 7,052	No Music-Low SES N = 1,216	Orch/Band-Low SES N = 260
Below 1	15.3	20.8	16.4	10.8
Level 1	34.7	41.1	42.1	36.9
Level 2	20.3	17.8	19.7	20.4
Level 3	19.0	8.6	10.7	21.2

Figure 10. Math Proficiency Scores at Grade 12, Percentages Scoring at Each Level

Math Proficiency Scores	Average N=14,915	Average-Low SES N=7,052	No Music-Low SES N=1,216	Orch/Band-Low SES N=260
Below 1	4.7	6.4	5.3	1.9
Level 1	14.8	20.9	22.8	12.7
Level 2	8.9	10.5	13.1	13.5
Level 3	15.6	14.6	21.1	20.8
Level 4	18.3	10.9	14.5	30.4
Level 5	3.0	.9	1.0	2.7

considered high-performing at grade 8; Levels 4 and 5 would be considered high-performing at grade 12.)

In Figure 9, it can be seen that twice as many low SES 8th graders in Band and/or Orchestra score at high levels in mathematics as did low SES 8th graders with no reported involvement in instrumental music—21.2 percent versus only 10.7 percent. For grade 8, the percentages of low SES students who would eventually show consistently high involvement in orchestra/band show math scores lower the average student, with about 10.8 percent of music-involved students scoring very low (below Level 1) and 15.3 percent of all students scoring as poorly. By grade 12, the differentials increasingly favor students heavily involved in instrumental music, especially the percentages of students performing at the highest levels (levels 4 and 5).

Through summing percentages shown in Figure 10 for students performing at levels 4 and 5, we see that thirty three percent of high-music/low SES students test at high levels of mathematics proficiency. This 33.1 percent should be compared to only 21.3 percent for “all” students, and only 15.5 percent of no-music, low SES students who score at high levels in mathematics by grade 12.

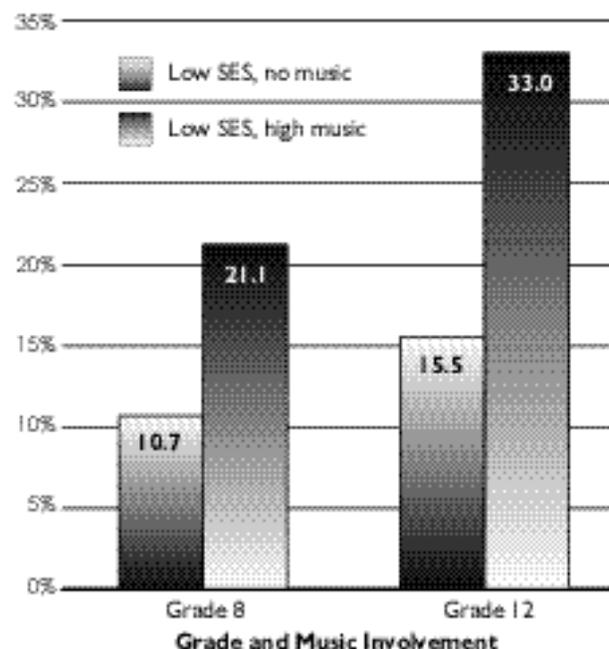
A most significant dynamic underlies the data in Figure 10. As of 8th grade, low SES, high-music youngsters perform on a par with the average student—about 21 percent at high math proficiency versus 19 percent for the average student. By 12th grade, the high performing gap between low SES, high-music

students and the average student has grown to about 33 percent versus 21 percent.

Figure 11 shows how the absolute performance gaps between the low SES students involved in music versus low SES non-music youth have grown considerably between grades 8 and 12.

Figure 11 shows math proficiency developments for low SES youngsters in perspective. In the NELS sample, there were 260 low SES students who qualified

Figure 11. Percentages of Students Scoring High Math Proficiency, by involvement level in instrumental music, Low SES



as intensively involved in instrumental music over the span of grades 8 through 12. As of the 8th grade, these 260 students were outperforming the 1,216 low SES students with no music involvement in mathematics; about 20 versus 10 percent scored at the highest levels of the mathematics proficiency scale. By grade 12, these same 260 students were outperforming all low SES no-music students by a considerably larger margin—about 33 percent were at the highest levels of mathematics performance versus only 15 percent for their non-music peers.

Involvement in Theater

We turn here to another exploration of intensive involvement in a single artistic discipline, in this case the theater arts.

Our interest in the theater arts grows from a history of scholarship exploring the meaning and importance of theater and drama in education over the past three decades. The central figures are number of prominent university faculty in Great Britain. The United Kingdom has been the setting for a substantial Theater in Education (or TIE) movement during this time.⁷ TIE refers to theatrical companies taking up residencies of varying duration at schools, usually bringing productions designed to provoke thought and discussion of important themes, as well as to entertain. There are also numerous devotees of “drama in education” in England, including many of the nation’s elementary school teachers. This term refers to the use of drama in the classroom for various purposes—learning about history, conflict resolution, learning about oneself, learning stagecraft, learning acting, and so on.⁸ Drama in education is formally recognized as a curricular tool in the current National Curriculum in Britain, although neither drama nor theater are required subjects. University teacher education faculties maintain lectureships and even a professorship or two in drama in

education, so that teachers in training can learn to use dramatic forms in their future classrooms. Britain also boasts a remarkable individual, Dorothy Heathcote, who has become a legendary teacher trainer through a non-stop series of teacher workshops and residencies that have not slowed for 40 years, even as she enters her mid-70s. Ms. Heathcote advocates that teachers get into roles, along with their students, as they teach. She usually presents her workshops in role to make her points.

In surveying what is known about the impact of theater and drama on children, Tony Jackson from the University of Manchester identifies “change of understanding” as the general purpose. He goes on to emphasize that the changes of understanding can be about both form and content in theater. Children learn about the art form as well as about other ends related to personal or social development. Among the latter, Jackson enumerates learning about, “...group interaction, discipline, language usage, self esteem, and movement skills.”⁹ Heathcote reminds us also that drama provides situations where we can or must put ourselves into the place of another; thus empathy for others is a possible or even likely outcome of the dramatic experience.¹⁰

The strength of evidence for specific impacts of theater and drama claimed by these and other scholars tends to be weak. Drama and theater are complex events with many possible effects. Even if it were feasible to design studies looking for the impact of theater experience on such things as actor self esteem or language facility, objections by artists about taking so narrow a view of the experience would likely interfere. In any event, what we tend most to benefit from is the accumulation of case studies¹¹, and the informed observations of senior scholars who have been attached to TIE or drama in education and who have come to

⁷ See Jackson, Tony, *Learning Through Theater: new perspectives on theater in education*. Second edition. London: Routledge, 1993.

⁸ See Bolton, Gavin, *Drama as Education: an argument for placing drama at the center of the curriculum*. Longman, 1984.

⁹ Jackson, op. cit, p. 44.

¹⁰ O’Neill and Johnson, op.cit. p. 129.

¹¹ Tony Jackson. *Learning Through Theater: Essays and Casebooks on Theater in Education*. Manchester: Manchester University, 1980. Also Dorothy Heathcote, *Drama and Learning*, Chapter in O’Neill and Johnson, op.cit. pp. 90-102.

their own understanding through the gradual acquisition of research and professional knowledge.

We turn in a moment to our exploration of developments for middle and high-schoolers intensively involved in theater and drama. But we should begin by noting that the theater in education experiences on which we focus are not strictly those of central interest to scholars of drama and theater in education in the UK. The students in our study identified through NELS:88 data as intensively involved in theater are those who have attended a drama class once per week or more as of 8th grade, participated in a drama club as of 8th grade, taken drama coursework in grade 10, and participated in a school play or musical in grades 10 and 12,—or at least most of the above. Officers of these organizations were assigned extra “credit” toward intense involvement.

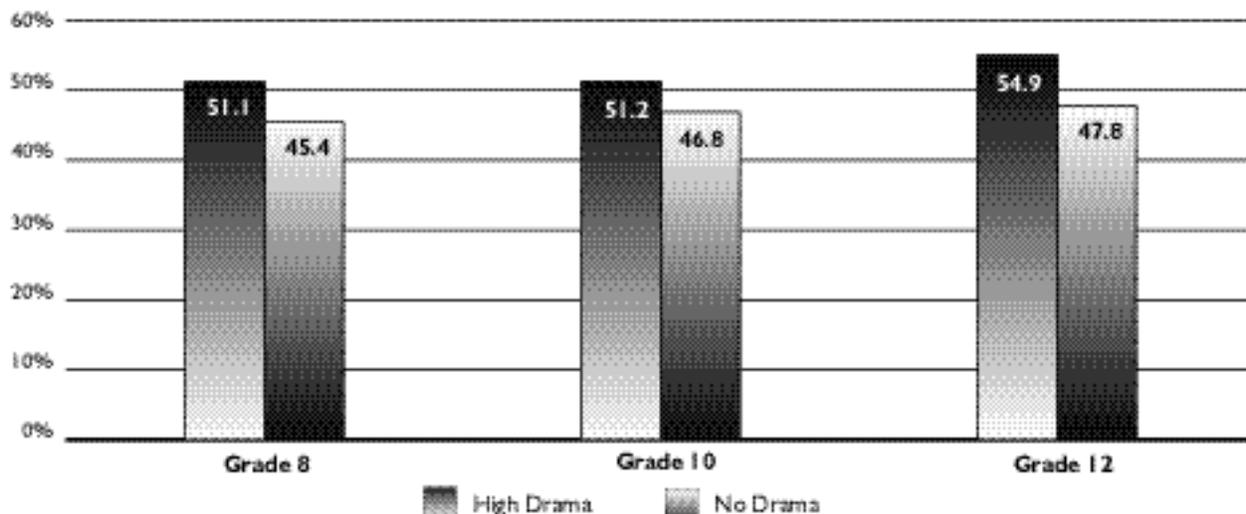
As such, our drama and theater students were not necessarily associated with TIE (formal theater groups in residence on campus) or with drama in education (the use of dramatic forms in the individual classroom for various curricular purposes). These are the kingpins of drama and theater in education in Britain and the experiences generating our hypotheses for

this exploration. Our interest centered on whether or not some of the claimed benefits of drama and theater from across the Atlantic show up in the NELS:88 data.

Theater and Language Skills. NELS:88 does not contain a measure of spoken language skills, but the data do track the development of reading proficiency over each survey year. We examined the progression of reading skills for two groups of low SES students beginning in grade 8. One group had no involvement in theater, and the other group was highly involved in theater. (This group consisted of the 285 highest theater-involved, low SES students in the entire NELS:88 sample.)

The pattern in the reading proficiency data is fairly clear. The involved students outscored the non-involved students as of 8th grade; both groups gain skill as they proceed through high school; and the difference favoring students involved in theater grows steadily to where nearly 20 percent more are reading at high proficiency by grade 12. (The advantage was only 9 percent back in grade 8.) This seems reasonable in that students involved in drama and theater, according to our definition of intensive involvement,

Figure 12. Percentages of Students above median academic self concept by grade, Hi Dramatic Arts Involvement vs. no involvement; all low SES



probably spend time reading and learning lines as actors, and possibly reading to carry out research on characters and their settings. In any case, theater is a language-rich environment and actively engages students with issues of language.

Theater and Self Concept. Because the English researchers list self esteem as a corollary of engagement with drama and theater, we examined the progression of a general self-concept measure in NELS:88 over grades 8 through 12 and compared our theater-involved to non-involved low SES students. Figure 12 shows that the “high drama” group maintained a small edge in self concept throughout the longitudinal study. Both groups gain over the four years involved, and a slightly bigger gap favoring those intensively involved in theater opened up by grade 12. (By grade 12, the difference shown in Figure 12 became significant ($p < .058$)).

Involvement in theater and empathy and tolerance. Dorothy Heathcote reminded us that a dramatic experience is an opportunity to put oneself into another’s shoes. This is true when taking on a role; it is also true when, as a character in role, one labors to understand how another character encountered on stage has conceptualized and enacted his or her role, or to comprehend how his or her character is understood by others. Theater is loaded with potential opportunities to interact with students to whom one might not gravitate in the ordinary course of school life, including students from other economic strata and other racial groups. This holds both for interactions in role and for interactions with other members of the cast as a play or scene or improvisation is developed.

We found two indicators related to “tolerance” and “empathy” in NELS:88 and show the results on the following pages. Once again, we are comparing low SES students, one group with no involvement in theater and the other with high involvement over all of the high school years.

Race relations. The first indicator is shown in Figure 13. This reflects student responses to the

question, “Are students friendly with other racial groups?” Students involved in theater are more likely than all 12th graders to say yes to this question, by 27 percent to 20 percent. This difference may be an effect of involvement in theater. It also may be an artifact of unknown differences in schools attended by students where theater programs are offered. For other unknown reasons, relations among racial groups may be more positive at the schools of our high-theater involvement students. This difference is not statistically significant, in part an artifact of the small low-SES, high-theater sample.

A similar perspective is shown in Figure 14 on the following page. Here students at grade 10 were asked if it was OK to make a racist remark. About 40 percent more “no-drama” students felt that making such a remark would be OK, where only about 12 percent of high theater students thought the same, and about 17 percent of no theater students agreed. In this case, the advantage favoring high-theater students is statistically significant ($p < .05$).

Figure 13: Are students friendly with other racial groups? Students in lowest 2 SES quartiles.

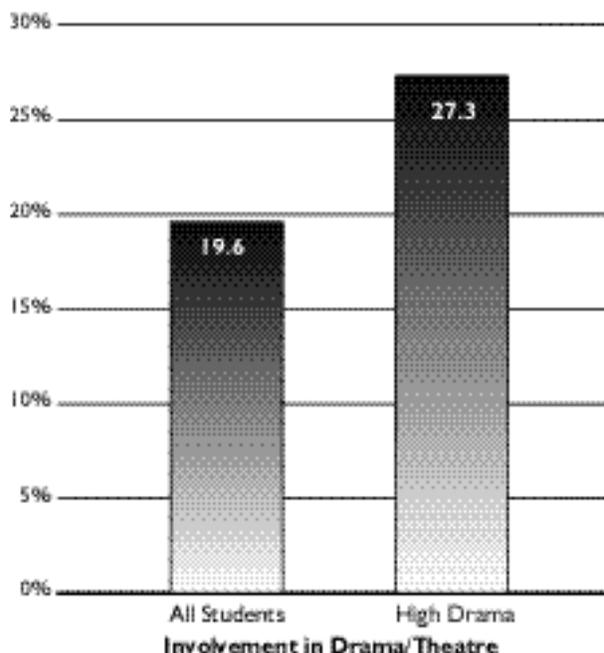
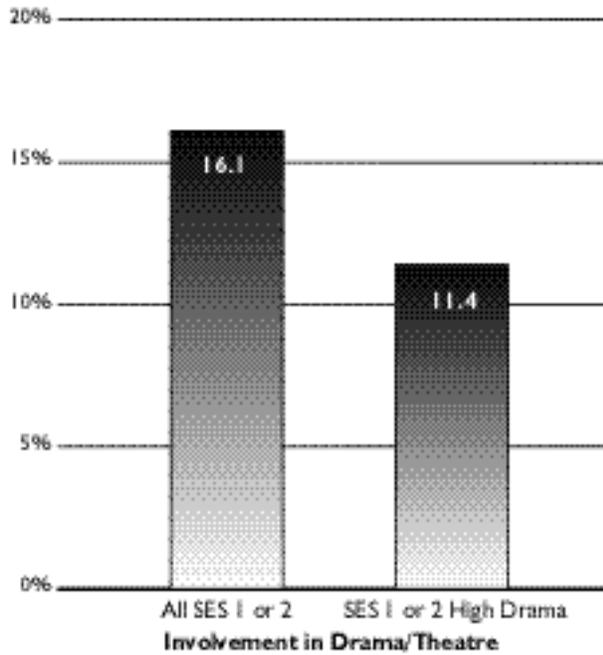


Figure 14. Percentage of 10th Graders feel it's OK to make Racist Remark



As with the data bearing on students “getting along” with others of different races (Figure 13), what is shown in Figure 14 may indicate an effect of involvement in theater and it may also be influenced by unknown school differences.

Discussion

The kinds of comparisons and analyses shown above are sure to provoke several kinds of questions surrounding the meaning of the data and the approach we took to examining and displaying the figures. In this concluding section, we attempt to anticipate some of these questions and also to suggest the implications of what we report.

Are our conceptions of the arts too concerned with non-arts outcomes? The purpose of this research was to examine some of the non-arts outcomes of engagement in the arts. Because we chose this purpose does not mean that we do not recognize or value the myriad goals that education in and involvement in the arts serve. Certainly involvement in the broad spec-

trum of arts captured in our more general assessment will mean many things to students that we did not set out to capture. Not the least of these are skills in the various arts themselves, competencies as critics of art forms, aesthetic awarenesses, cultural understandings, appreciations valuable in their own right, and new-found powers and joys to see and express.

Our analysis of involvement in instrumental music captured a sense of this activity that is clearly not an intentional part of music instruction or participation for many. It just happens that research is suggesting links between music and mathematics reasoning that we took the opportunity to explore. A larger case for instrumentality connected to theater and drama has been articulated in the writings and research of English scholars, and we explored a handful of such possibilities through NELS:88 data.

So yes, this analysis is concerned with non-arts outcomes of the arts in education. For now, we save research on the arts-related goals of arts education and participation in the arts for other scholars and to us, for a future date.

What can be said about causation in this analysis?

Establishing causation in education and social science research is difficult. The essential question that should be aimed at this type of work is what evidence supports contentions that involvement in the arts, or music, or theater “caused” the differences in groups reported above.

Any convictions that causation is involved depend mainly on three elements of the research—sound theory, supportive evidence, and ruling out rival explanations. First is the presence of a sound theory consistent with explanations that the arts should matter. In the case of all three of our analyses, we built our instincts around previous research suggestive of causal propositions. The strength of the case is perhaps most developed in the instance of music and mathematics-related cognitive development. Incidental benefits of theater have been argued and studied in the UK for decades. The general effects of broad involvement in the arts are supported most by research that has shown that children are more

engaged and cognitively involved in school when the arts are part of, or integrated into, the curriculum.¹²

A second element is observational data supporting the causal theory. If one cannot find an empirical link between participation in the arts and specific outcomes, it is difficult to argue that the arts are causing anything. A version of this argument is that one cannot support causation without significant correlation. The tables above illustrate correlations between arts participation and various outcomes, some quite strong.

The third element is the elimination of rival hypotheses. This is first carried out by trying to make comparison groups as similar as possible, with the only remaining difference being, in our case, intensive arts participation or none. We pursued this by restricting our groups to low SES students, so that differences in family background would not be driving observed differences. We also tend to eliminate rival hypotheses by observing changes over time for the same students. In all three sections of the work, advantages favoring arts—involved students appear to grow over time, which strengthens the sense of causal ordering—first arts immersion, then developmental effects.

A rival hypothesis we have not ruled out is that, systematically, the more arts-involved students attended more effective schools over middle and high school. To be truly preemptive, a “better school” explanation would have to hold for all three of our main comparison frames (general arts involvement, music involvement, and theater involvement). These comparisons were constructed differently, showed arts advantages on many different outcomes, and involved different students and different schools. An overriding better school explanation is not likely.

What are the implications of this research? This paper presents observations from a large-scale data base of U.S. secondary school students suggesting positive associations between involvement in various

arts and academic and social outcomes. The work supports strong suggestions, but is not definitive. No one study ever decides issues in this sort of research. Our knowledge base grows incrementally with the accumulation of consistent studies, and with the accumulation of professional knowledge by educators, school leaders, parents, students, and in this case artists involved in the schools.

The main implication of this work is that the arts appear to matter when it comes to a variety of non-arts outcomes, some of them intended and some not. The advantages accruing to arts involvement show up as both a general relationship, as well as in relations between specific art forms such as instrumental music and theater and specific developments for youngsters.

In addition, although not the main theme of this paper, our data support long-held concerns that access to the arts is inequitably distributed in our society. Students from poor and less educated families are much more likely to record low levels of participation in the arts during the middle and high school years; affluent youngsters are much more likely to show high, rather than low engagement the arts. If our analysis is reasonable, the arts do matter—not only as worthwhile experiences in their own right for reasons not addressed here, but also as instruments of cognitive growth and development and as agents of motivation for school success. In this light, unfair access to the arts for our children brings consequences of major importance to our society.

Finally, this work also suggests the value of future research. One important stream would be to follow the NELS:88 sample into young adulthood to explore sustaining effects. Another is the promise of more up close and controlled research that could further test our findings. Traditionally, the strongest research approach is the use of randomized studies. But random assignment to involvement in the arts is problematic when the issue is long term, natural engagement with the arts—the topic our research is concerned with. Also, long term deprivation in the arts, implied when enlisting purposeful control groups

¹² See chapter in this volume on the evaluation of the Chicago Arts Partnerships in Education for discussions and evidence concerning integration of the arts into the academic curriculum.

to study the importance of the arts, is probably unethical and could be considered potentially harmful to children.

Productive approaches to additional research may include phenomenological studies that probe the meanings of art experiences to individual children or educators. Studies may include up-close longitudinal studies of students heavily involved in music or theater (or other art disciplines) at the single or multiple-school level to explore changes over time. Studies should include school-level or larger scale studies of initiatives attempting to bring arts integration to the curriculum.¹³ Knowledge will grow at the intersection of multiple and diverse studies of what the arts mean for human development.

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¹³ The Imagination Project is currently conducting such an investigation—the 6th and 7th year evaluations of the Chicago Arts Partnerships in Education. See summary report in this volume.