Chapter 2

Cognitive outcomes of multi-arts education

This chapter reviews evidence that multi-arts education is positively associated with some form of non-arts cognition. Studies on "multi-arts" education did not examine the effects of specific art forms, but compared students receiving a wide variety of kinds of arts classes (e.g. visual, music, etc.) to those receiving few or no arts classes. We show that these studies find a positive correlation of multi-arts education and general academic achievement, but that there is no evidence yet to claim that multi-arts education causes this improved academic achievement.

Is multi-arts education positively associated with some form of non-arts cognition? In this chapter we review studies examining "multi-arts" education, comparing students receiving a wide variety of kinds of arts classes (e.g. visual, music, etc.) to those receiving few or no arts classes.

The best research strategy to determine the transfer effects of arts education is to examine specific hypotheses for specific art forms: there is simply no reason to assume that music instruction might have the same kinds of effects as visual arts instruction, for example. Unfortunately, though, many studies do not distinguish among art forms and they instead examine the effects of an arts-rich education in which students experience learning across multiple kinds of arts disciplines. We refer to these studies – which do not attempt to zero in on the effects of learning in a particular art form – as "multi-arts" studies, for lack of a better word.

Many of the multi-arts studies examine programmes in which the arts are integrated with the academic curriculum (see Chapter 1, methods of this report, for a brief discussion of arts integration). Arts integration programmes typically bring in artists who work with teachers on an academic unit. When the artists leave, the teachers, it is hoped, will have acquired the ability to continue arts integrated instruction. Strong claims have been made that the experience of working with artists to develop arts integrated units is a "powerful professional development" experience for teachers (Rabkin and Redmond, 2004, p. 33). According to Aprill and Burnaford (2006), these programmes are characterised by constructivist learning, reflection (teachers and students together analyse their learning and teaching processes and products), multiple modes of assessment, authentic audiences for student work, teacher collaboration, teacher professional development, and parent involvement. These programmes are meant to engage students who are alienated from traditional schooling. Hence, the long-term large goal of such programmes is to "transform teaching across entire schools" (Rabkin and Redmond, 2004, p. 21). According to Aprill and Burnaford, these programmes lead to greater student achievement in academic areas, engagement of student with special needs, student and teacher retention, development of employable work skills, diversity and multicultural education, and teacher professional development.

It is also claimed that when the arts are integrated into an academic subject, the work becomes more authentic and hence students will be more engaged (Rabkin and Redmond, 2004, p. 25). Authentic intellectual work was defined by Newmann, Bryk and Nagoaka (2001, p. 15) as "activity that demands disciplined inquiry into a subject, requires students to digest knowledge thoroughly enough to apply it by themselves to new situations, and sets real-world standards for students' work products." The assumption that any arts integrated curriculum meets this high standard, however, has never been documented in the studies reviewed below: these studies looked for academic improvement outcomes but failed to analyse the nature of the teaching that was occurring within the arts integrated units themselves.

We classified studies under the umbrella of "general academic achievement" if these studies examined verbal and/or mathematical test scores or overall grade point averages.

REAP meta-analyses of multi-arts education and general academic achievement studies

In 2000 Winner and Cooper published a meta-analytic study based on published and unpublished research in English from 1950 through 1998 as part of the Reviewing Education and the Arts Project (REAP). Analyses were performed separately on correlational and experimental studies. Correlational studies assessed academic achievement in students choosing to have more vs. less arts education. These studies cannot match students with high vs. low arts education on all non-art variables and

thus they cannot tell us whether students who did and did not self-select into the arts differed academically prior to studying the arts. No causal conclusions about the effects of the arts can be made from such studies.

Experimental studies were ones in which two groups were compared, one receiving arts instruction and one not receiving such instruction. These studies usually had a pretest/post-test design. There were two kinds of experimental studies, matched and unmatched. In the matched studies, the two groups were matched prior to the arts experiences. Of these studies we found only two true experimental studies with random assignment to arts vs. control groups; the rest were experimental or quasi-experimental studies in which an intact arts classroom, or an intact arts-integrated classroom, was compared to an equivalent classroom receiving no special arts. The other studies were quasi-experimental ones in which students were not randomly assigned to conditions. Some of these studies attempted to match the ability level of students in the arts and control groups by statistically controlling for pre-existing differences (by covarying pre-existing differences or by analysing gain scores). Some studies lacked a pre-test and based their analyses only on a post-test comparing arts and non-arts groups. However, in most cases researchers attempted to find a comparison group in a similar school and from a similar socio-economic background. Nonetheless we cannot be certain that the groups in the non-randomly assigned studies were equivalent in ability prior to their arts exposure.

Studies were coded as assessing the effects of arts integration vs. arts classes taught as stand-alone classes. However, a clear comparison could not be made between these two kinds of approaches because almost all of the programmes in which the arts were integrated into the academic curriculum also taught the arts as separate disciplines.

For each study Winner and Cooper (2000) calculated one or more effect sizes, using the effect size *r*, as described in Box 2.1. Each effect size calculated was based on a separate sample of participants. Results in the predicted direction (arts group performing better than the control group) were reported as positive; results in the opposite direction were reported as negative.

Correlational studies of multi-arts education and general academic achievement (from REAP)

The first three meta-analyses performed by Winner and Cooper (2000) synthesised correlational studies. These studies compared the academic profile of students who do and do not study the arts either in school or in after school programmes. For example, included in the analyses was James Catterall's study (featured in Box 2.2) reporting that US students who are highly involved in the arts in middle and high school outperform those who are not involved in the arts on a multitude of academic indicators, and this relationship holds even for students in

the lowest SES quartile of the United States (Catterall, 1998; Catterall, Chapleau and Iwanaga, 1999). High arts-involved students earned better grades and test scores than low arts-involved students. The high arts students were also less likely to drop out of high school and they watched fewer hours of television than did the low arts students. Also included in the analyses was Heath's (1998a, 1998b) study showing that at risk students who participate in after-school arts organisations for at least nine hours a week over the course of at least a year are ahead of a random national sample of students on a wide range of academic indicators: their school attendance

Box 2.1. **REAP meta-analyses and effect sizes reported**

A meta-analysis is a quantitative synthesis that relies on "effect sizes." A meta-analysis first identifies a body of similar studies (using the same kind of design, and the same outcome measures), then calculates an effect size for each study, followed by an overall effect size. Statistical tests then determine whether the overall effect size is statistically significant and can be generalised to new studies on the same question.

Effect sizes indicate the strength of the relationship between two variables (e.g. between some form of arts study and some form of non-arts achievement). The REAP analyses used the statistic *r* for its effect sizes, and these could range from -1.0 to +1.0).

An effect size r is a measure of association between two variables and assesses the strength of the relationship between two variables – for example, between arts exposure and academic achievement (Rosenthal, 1991). Thus, an r of +1 would indicate a 100% positive relationship between arts study and non-arts outcome; an r of 0 would indicate no relationship; and an r of -1 would indicate a 100% negative relationship. REAP researchers chose r as their effect size estimate rather than Cohen's d of Glass's delta, for example, because of the greater flexibility of r (Rosenthal, 1991). An effect size r of .10 is considered a small effect; an r of .24 is medium in size, and an r above .37 is a large effect (Cohen, 1988). However, small effects should not be discounted if they measure an outcome we consider important (e.g. if they index a small number of students who stay in school as a result of a treatment). Important effects from medical research are often as low as r = .034 (Steering Committee of the Physicians Health Study Research Group, 1988). As stated by Rosenthal and Rosnow (1991), the relationship between level of statistical significance and effect size can be understood as follows: Significance Test = Effect Size x Study Size. The larger a study's sample size, the more significant the results will be. The same small, moderate, or large effect size could be significant or not depending only on the size of the sample, and this is frequently forgotten in the interpretation of research results.

When we report the REAP findings we always report the weighted mean r effect size – and that means the effect sizes are weighted by size of study. We also report the significance of the t- test of the mean Zr, a test that, if significant, tells us that we can generalise the findings to new studies on the same question. Only if this test is significant can we feel confident in concluding that there is indeed a relationship between some form of arts instruction and some non-arts outcome. Whether or not that relationship can be deemed to be causal, of course, depends on whether the design of the studies was correlational or experimental.

is higher, they read more, and they win more academic awards. And we included data from the College Board in the United States revealing that the average SAT scores (standardised tests required for admission to US colleges and universities) of students with four years of arts classes in high school was higher than the scores of those who took no arts courses at all in high school (College Board, 1987-1997).

Three separate meta-analyses synthesising the correlational studies were performed, each on a different academic outcome (composite verbal and quantitative outcomes summed; verbal outcomes; quantitative outcomes).

Table 2.1 lists the studies in the first meta-analysis on composite outcomes. Four of the five effect sizes were in the positive direction and were statistically significant. The mean effect size across studies (weighted by size of sample) was $r = .05$ (equivalent to a d of .10) and this was significantly different from zero. A t-test of the mean Zr proved highly significant, allowing us to generalise our findings to new studies on this question.

We conclude that there is a clear correlation between multi-arts education and composite measures of academic achievement, but we can say nothing here about causality.

Table 2.1. **Five correlational studies linking multi-arts education with composite test scores**

Study	Positive relationship	Mixed, null, or negative relationship
Catterall, Chapleau and Iwanaga (1999)	X	
Dwinell and Hogrebe (1984)	X	
Heath (1998a)	X	
National Center for Education Statistics (1984)	X	
Whitener (1974)		X
Weighted mean	X	

Note: The full results are presented in Table 2.A1.1.

Source: Winner and Cooper (2000)

Table 2.2 lists the eleven studies with verbal outcomes (and this included ten years of the College Board data) used for the second meta-analysis. All 11 effect sizes were in the positive direction and were statistically significant. The average weighted effect size across studies was $r = .19$, equivalent to $d = .39$, which was also highly significant. A t-test of the mean Zr proved highly significant, allowing us to generalise our findings to unseen studies on this question.

We can conclude that there is a clear correlation between multi-arts education and verbal measures of academic achievement, but we can say nothing here about causality.

Table 2.2. **Eleven correlational studies linking multi-arts education with verbal test scores**

Study	Positive relationship	Mixed, null, or negative relationship
Catterall, Chapleau and Iwanaga (1999)	X	
College Board (1988)	X	
College Board (1989)	X	
College Board (1990)	X	
College Board (1991)	X	
College Board (1992)	X	
College Board (1994)	X	
College Board (1995)	X	
College Board (1996)	X	
College Board (1997)	X	
College Board (1998)	X	
Weighted mean	X	

Note: The full results are presented in Table 2.A1.2.

Source: Winner and Cooper (2000).

Table 2.3 lists the eleven studies with math outcomes (and this again included ten years of the College Board data) used for the third meta-analysis. The 11th study was one in which 8th graders who had taken at least two years of arts classes meeting at least four times per week were compared to those with no such arts involvement on a math test.

Table 2.3. **Eleven correlational studies linking multi-arts education with mathematical test scores**

Study	Positive relationship	Mixed, null, or negative relationship
College Board (1988)	X	
College Board (1989)	X	
College Board (1990)	X	
College Board (1991)	X	
College Board (1992)	X	
College Board (1994)	X	
College Board (1995)	X	
College Board (1996)	X	
College Board (1997)	X	
College Board (1998)	X	
Demeter (1986)		X
Weighted mean	X	

Note: The full results are presented in Table 2.A1.3.

Source: Winner and Cooper (2000).

Box 2.2. **Multi-arts education is positively correlated with academic performance**

Perhaps the most cited study attempting to make the case that exposure to arts classes in school improves general academic achievement is an analysis of data from the 25 000 students participating in the ten year National Educational Longitudinal Study (NELS) (Catterall, 1998; Catterall, Chapleau and Iwanaga, 1999).

Catterall performed a correlational analysis of level of arts participation in school (as measured by arts classes in school and extra-curricular) and academic achievement as measured by scores on standardised verbal and mathematical tests as well as school grades in academic subjects. Students were followed from 8th to 10th grade and were classified in terms of arts involvement both in and out of school (measured by number of arts courses taken in school and out of school, and attendance at museums). High arts-involved students were ones who had been exposed to the arts since the 8th grade. The top quartile of students in terms of arts involvement was compared to the lowest quartile. Outcome measures were grades, test scores, school dropout, boredom in school, etc. A positive correlation was reported: the more arts exposure, the higher the achievement as measured by grades and test scores. High arts students also performed more community service, watched fewer hours of television, and reported less boredom in school. The same positive relationship held for a sub-analysis of the top and the bottom socio-economic quartile of students (n = 6 500 students). Thus we cannot explain away these findings by saying that children with educated parents of means are offered better schools that have not cut the arts.

This study has been widely misinterpreted as indicating transfer of learning from the arts to academic performance. This is understandable given how this study is often described. For example, in a 2006 report prepared by the National Assembly of State Arts Agencies in the United States the study is described as follows:

Students who participate in arts learning experiences often improve their achievement in other realms of learning and life. In a well-documented national study using a federal database of over 25 000 middle and high school students, researchers from the University of California at Los Angeles found students with high arts involvement performed better on standardised achievement tests than students with low arts involvement. Moreover, the high arts-involved students also watched fewer hours of TV, participated in more community service and reported less boredom in school (Ruppert, 2006).

The above quote does not directly claim causality but it is easy to read it as implying causality. Consider the following non-causal explanations of the association found. It is possible that the kinds of families who value academic achievement also value achievement in the arts, and they pass both of these values on to their children. Catterall also reported a positive correlation between arts exposure and fewer minutes per day of television watching. It is thus also possible that students with an interest in the arts have less interest in television, and the lower TV watching is what induces academic performance.

We cannot know from a correlational study whether the higher academic achievement of children exposed to the arts has anything at all to do with the arts exposure they are getting. Only a study with an experimental design or addressing the direction of causality could show this.

Ten of the 11 effect sizes (all ten of the College Board studies) were in the positive direction and were statistically significant; the 11th study by Demeter (1986) did not yield a significant association. The average weighted effect size across studies was $r = .11$, equivalent to $d = .22$, which was also highly significant. A *t*-test of the mean *Zr* proved highly significant, allowing us to generalise our findings to unseen studies on this question.

We can conclude from the College Board data that there is a clear correlation between arts education and math SAT scores. Again however, no causal conclusions are warranted given the correlational design of the studies.

Plausible non-causal explanations for correlational findings

These three meta-analyses show that students in the United States who choose to study the arts are students who are also high academic achievers. But because the studies on which these meta-analyses were based were correlational in design, they allow no causal inferences. Does art study cause higher scores? Or do those with higher scores take more art? Or, is there a third variable, such as parental involvement that causes both greater arts study and higher test scores? We cannot tell. Unfortunately, however, studies such as these have often been used erroneously to support the claim that studying the arts causes test scores to rise.

One plausible non-causal interpretation of the findings is that high academic achievers (no matter what their socio-economic background) are more likely to choose to study the arts than low academic achievers. This could occur for several reasons. As mentioned earlier, high academic achievers may attend schools strong in both academics and the arts; they may come from families that value both academics and the arts; or they may have high energy and thus have time for – and interest in – both academics and the arts. The fact that they are strong academically means they would have more free time for the arts, and might lead parents to encourage them to use their extra time by studying one or more art forms.

One piece of evidence for the "high energy" hypothesis comes from Heath (1998a). Heath's study included not only students involved in after-school arts organisations, but also those involved in sports and community service organisations. Heath allowed Winner and Hetland (2000) access to her unpublished data so that the art students' likelihood of winning an academic award could be compared to the sports students. Both arts and sports groups were significantly more likely to win an academic award than a random national sample of students, but the arts group was no more likely to do so than the sports students. The finding that both intensively involved sports and arts students did well academically is consistent with (though does not prove) the possibility that these are highly motivated students to begin with. Perhaps the drive factor is what impels these students both to involve themselves in an after school activity in a serious way as well as to do well in school. It is also possible that these students learn to become motivated from their after school organisations and this then transfers to school work.

Additional support for the high energy hypothesis comes from a comparison pointed out by Eisner (2002). He compared the SAT advantage of students taking four vs. one year of arts to that of students taking four vs. one year of an elective academic subject such as science or a foreign language. Students who specialised in any subject, whether arts or an academic elective, all had higher SAT scores than those who had only one year in that subject (with academic specialisation yielding a far greater advantage than arts specialisation). Students who specialise or focus might have higher energy than those who do not, and this higher drive could account for their higher academic achievement. It is also possible, however, that the very process of sticking to something (whether art or an academic subject) leads to better academic performance in other areas.

Another reason for the strong correlation found between arts study and SAT scores could be that in the United States, the highest achievers study the arts in order to enhance their chances of admission to selective colleges. It should be noted, in this regard, that the academic profile of students choosing to take the arts has risen consistently over the last decade. Vaughn and Winner (2000) plotted the relationship between SAT score and taking four years of arts in high school (compared to taking no arts) and found that this relationship grew stronger each year from 1988 to 1999. As our most selective colleges become more competitive each year, students may feel they need to build resumes showing strength in a non-academic area such as an art form.

Winner and Cooper (2000) reasoned that even if self-selection (high achievers choosing to study arts) explains the correlation in the United States, there might still be some causal force at work. Might it not be that once high achievers self-select into the arts, the arts then foster cognitive skills which translate into even higher academic performance? Winner and Cooper tested this hypothesis by examining the data in Catterall's (1998) study described in Box 2.2. Catterall reported longitudinal data on students who self-selected into the arts in 8th grade and remained highly involved in the arts through the 12th grade. If both factors were at work, one would expect the effect sizes showing the strength of the relationship between arts involvement and academic performance to rise over the years. But no change was found. This finding fails to support the view that the arts are causing the academic achievement of these students to be higher than that of students relatively uninvolved in the arts.

Experimental studies of multi-arts education and general academic achievement (from REAP)

While the correlational studies, and the meta-analyses synthesising them, do not permit causal inferences, studies with an experimental design do allow such inferences. We examined two bodies of quasi-experimental and experimental studies (only two were experimental) testing the causal claim that when students study the arts, their academic achievement rises. These studies compared academic performance before and after studying the arts. Typically these studies examined students at the elementary school level who had studied the arts for a year and who

studied the arts both as separate disciplines and as integrated into the academic curriculum. The academic growth of these students was then compared to the growth of similar students not exposed to any special arts programme.

Winner and Cooper (2000) found 24 studies testing the hypothesis that verbal skills improve as a consequence of studying the arts, and 15 studies testing the hypothesis that mathematics skills improve. Table 2.4 lists the 24 studies with verbal outcomes, and these yield a very mixed picture, with many studies yielding either a tiny positive effect or a negative effect (and a negative effect means that the students studying the arts performed worse than those not studying the arts).

Table 2.4. **Twenty-four quasi-experimental and experimental studies linking arts education with verbal test scores**

Study	Positive relationship	Mixed, null, or negative relationship
Ashbacher and Herman (1991)		X
Baum and Owen (1997)		X
Brock (1991a)		X
Brock (1991a)		X
Brock (1991a)	X	
Brock (1991a)		X
Brock (1991a)		X
Brock (1991a)		X
Brock (1991b)		X
Brock (1991b)		X
Brock (1991b)		X
Catterall and Waldorf (1999)	X	
Coakley (1995)		X
Dillard (1982)*		X
Gardiner et al. (1996)		X
Glismann (1967)		X
Hudspeth (1986)	X	
Jackson (1979)*		X
Marston (1997)		X
Norman (1987)		X
Tunks (1997)	X	
Tunks (1997)	X	
Tunks (1997)	X	
Tunks (1997)		X
Weighted mean		X

Note: The full results are presented in table 2.A1.4. Experimental studies are asterisked.

Source: Winner and Cooper (2000).

The meta-analysis performed on the verbal outcomes yielded a very small mean weighted effect size *r* of .01 (equivalent to a *d* between 0 and .1). This effect size was not statistically significant. The *t*-test of the mean *Zr* testing whether these results can be generalised to new (future) studies was 1.66 which was not significant, $p = .11$. In addition, the 95% confidence interval for unweighted effect sizes spanned zero showing that the mean effect size of a new set of similar studies might well be at zero. Moreover, there was no difference in the effect sizes of those 19 studies in which the arts were integrated into the curriculum vs. those five assessing the effect of the arts taught separately.

Thus we had to conclude that we had found no evidence that studying the arts, including the arts integrated with academic subjects, resulted in enhanced verbal skills.

Box 2.3. **Arts integration: Inconsistent effects on content knowledge**

In one of the studies included in Winner and Cooper's (2000) meta-analysis of experimental studies with verbal outcomes, language-based content learning was compared when the same content was taught with and without arts integration (Baum and Owen, 1997). Fourth, fifth, and sixth grade students were taught the same academic content either in traditional format without the arts, or in one in which the content was integrated with the arts. Student learning in the two kinds of classes was compared for two lessons. For one lesson, no differences were found in learning between the traditional and arts integrated class. For the other lesson, students who did not get the arts integrated lesson actually showed more learning, though the difference between groups did not quite reach significance ($p < .07$).

We need more such studies in order to find out whether integrating the arts into an academic unit improves learning. One study cannot show that arts integration does not work. Everything depends on how well the arts are integrated.

Table 2.5 lists the 15 quasi-experimental studies assessing the effects of arts study on math outcomes from Winner and Cooper (2000). These again yield a very mixed and primarily negative picture.

The meta-analysis performed on the mathematics outcomes yielded a mean weighted effect size of $r = .02$ (equivalent to a *d* between 0 and .1). The *t*-test of the mean *Zr* showed that the mean effect size was not significantly different from zero. In this meta-analysis it was not possible to statistically compare the studies with and without arts integration since all but two were based on an arts integrated curriculum. Winner and Cooper (2000) concluded that they had found no evidence that studying the arts, including the arts integrated with academic subjects, resulted in enhanced mathematics achievement.

Table 2.5. **Fifteen quasi-experimental studies linking arts education with mathematical test scores**

Study	Positive relationship	Mixed, null, or negative relationship
Baum and Owen (1997)		X
Brock (1991a)	X	
Brock (1991a)	X	
Brock (1991a)	X	
Brock (1991a)		X
Brock (1991a)		X
Brock (1991a)		X
Brock (1991b)		X
Brock (1991b)	X	
Brock (1991b)	X	
Catterall and Waldorf (1999)	X	
Gardiner et al. (1996)	X	
Glismann (1967)	X	
Luftig (1993)		X
Norman (1987)		X
Weighted mean		X

Note: The full results are presented in Table 2.A1.5.

Source: Winner and Cooper (2000).

Of the experimental studies synthesised in the REAP report, only two were true experiments with random assignment to art vs. control programmes (Dillard, 1982; Jackson, 1979) – both assessing verbal outcomes. These studies showed no relationship between arts education and academic achievement: the *r* for Dillard was .03; the effect size *r* for Jackson was .02.

One weakness of most of the experimental studies is the lack of a treated control group – a group receiving some other kind of special treatment that is not arts. Without such a control group, any positive findings for the arts group could be due to a "Hawthorne effect" in which any new kind of programme at first leads to academic improvement due to the excitement of the teachers and students.

Effect sizes in correlational vs. Experimental studies

A comparison between the correlational and experimental findings reported by Winner and Cooper (2000) shows that it is the correlational studies that are fueling the claims that arts education boosts academic achievement. Figure 2.1 displays

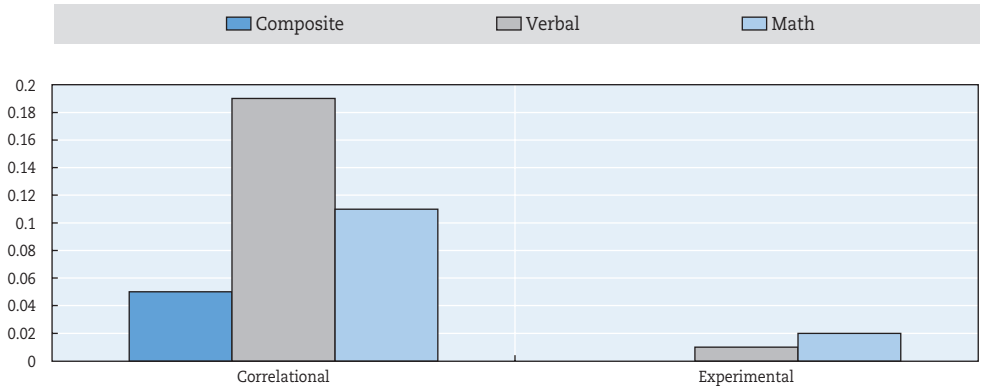
Box 2.4. **SPECTRA +: Arts integration group improves no more than control group**

Only one of the experimental studies synthesised by Winner and Cooper (2000) had a treated control group, a study by Luftig (1993). In this study, some of the students receiving an arts integrated programme called SPECTRA+ – often cited as a programme in which academics are strengthened by the arts – were compared to a treatment control group and to a treated control group receiving a new educational programme based on cooperative learning, flexible ability grouping, and parental involvement. All three groups showed the same rate of academic improvement in mathematics scores over the two years of the study. This is just one example we use to make the point that when advocacy claims are made, it is wise to look carefully at the data on which the claims are said to rest.

comparative findings across the five meta-analyses, showing the far higher weighted effect size *r*s for the correlational than the experimental studies, and also showing that the strongest correlational findings were for verbal outcomes.

However, as Winner and Cooper (2000) point out, many of the correlational studies examined the effects of four years of arts education; most of the experimental ones examined the effects of much briefer time periods (6 months to two years). Thus we need experimental studies examining the effects of long term exposure to arts education.

Figure 2.1. **Mean weighted effect size in correlational vs. Experimental studies**



StatLink http://dx.doi.org/10.1787/888932833010

Source: Winner and Cooper (2000).

Box 2.5. CAPE schools: High arts and high academic performance – with multiple possible explanations

One of the quasi-experimental studies synthesised by Winner and Cooper (2000) examined the effect on composite and verbal test scores of students in schools participating in a programme called Chicago Arts Partnerships in Education (CAPE) (Catterall and Waldorf, 1999). CAPE schools brought artists and teachers into partnerships so that they could develop curricular units lasting four to six weeks in which an art form was integrated with an academic subject. Typically units consisted of a visual arts project integrated into reading or a social studies topic, with the goal of enhancing learning in the academic area. Fifty-four percent of the teachers reported having developed one arts-academic integrated unit, while 24% reported having created four to five such units.

The reading and math test scores for CAPE schools were compared to scores from other Chicago public schools at grades 3, 6, 8, 9, 10, and 11. In none of the comparisons did the control schools perform better than the CAPE schools. Forty comparisons were made at the K-8 level: in 16 of these comparisons CAPE schools increased their lead over control schools in math; in 25 of these comparisons, CAPE schools increased their lead over control schools in reading. (Note that this leaves a majority of the comparisions not demonstrating this effect!) At the high school level, 8 out of 12 comparisons showed CAPE schools increasing their lead in math, and 7 out of 12 did so in reading. The differences between CAPE and control schools were statistically significant at the elementary but not at the high school levels.

This study is often cited as evidence that arts integration elevates academic achievement. For example, Ruppert (2006) refers to this study as showing the "benefits" to student success provided by arts education. However, this study does not allow such a conclusion. First of all the results were decidedly mixed. In addition, there is no way to know whether the relative advantage of the students in the arts-integrated CAPE schools in some grades is due to the role of the arts in their schools or to the energising effect of any new kind of programme (this is referred to as a "Hawthorne effect"). In addition, we are not given sufficient details about the comparison schools and thus we cannot know whether the schools were identical except for the presence of the arts. It is possible that schools that elected to participate in CAPE had better teachers to begin with. Perhaps better teachers are more likely to opt for a programme infusing the arts and bringing in teaching artists. In addition, studies of this kind all too often lack a treatment control that does not involve the arts.

Other studies on multi-arts and general academic achievement identified by REAP

Winner and Cooper (2000) identified 27 studies that could not be included in their meta-analyses: either the data provided did not allow the calculation of an effect size (necessary for a meta-analysis), or the study lacked a control group (summarised in Table 2.6). Most of these studies were correlational and reported that students attending schools in which the arts play a central role are also high academic achievers. Seventeen of these studies reported a positive outcome; ten reported null or mixed findings. A binomial probability test showed that the chances of finding 17 positive studies out of 27 did not achieve statistical significance at $p < .05$.

Table 2.6. **Twenty-seven studies examining multi-arts education and academic achievement not included in reap meta-analyses**

Study	Positive relationship	Mixed, null, or negative relationship
Annenberg Challenge (1998)	X	
Brock (1991c; Newbill (1992)		X
Catterall (1995)		X
Chapman (1998)	X	
Dept. of Test Development and Administration, Prince George's county Public Schools (1997); Maryland Alliance for Arts Education (1995)	X	
DiMaggio (1982)	X	
Fowler (1979b)	X	
Fowler (1979b)	X	
Getz (1984); Hoffa (1979); Lawton (1987)		X
Goldberg (1998)	X	
Haanstra (1999)		X
Harland, Kinder, Haynes and Schagen (1998)		X
Lardo (1982)		X
McGuire (1982)		X
Missouri Arts Education Task Force (1990), as cited in Murfee (1993)	X	
Redcliffe School Performance Profile (1990-1994); Edmunds (1991); Slay and Pendergast (1993); Welch and Greene (1995)	X	
Redfield (1990)	X	
Rombokas, Heritage and West (1995)		X
Ross (1990)		X
Spectra Rhode Island (1998)	X	
Spilke (1991)	X	
Spilke (1991)	X	
Spilke (1991)	X	
Spilke (1991)	X	
Spilke (1991)	X	
Spilke (1991)		X
Walker (1995)	X	

Source: Winner and Cooper (2000).

Two of these studies highlight the role that culture plays in how we interpret a correlational finding. In the Netherlands, Haanstra (1999) found that students who take the arts in high school to prepare for a national exam that includes the arts attain the same educational level as those with no arts electives. This study, which controlled for students' socio-economic status (SES), shows that in the Netherlands, taking the arts in high school does not predict ultimate educational level attained. In the United Kingdom, Harland and colleagues examined performance on the United Kingdom's national academic exams (GCSE) for 27 607 students from 152 schools and found that the greater the percentage of arts courses taken in high school, the poorer the performance on national exams at the end of secondary school (Harland, Kinder, Haynes and Schagen, 1998).

How can we reconcile the Dutch and British findings with the US findings that students with four years of arts score higher on their SAT exams than those who take none, or the findings of Catterall and Heath described above reporting an association between high arts involvement and high academic achievement? Harland et al. (1998) speculate that in Britain, academically weak students are often counseled into the arts track, and this could explain the negative association. In contrast, European students may feel their best chances for admission to a university lies in a focus on traditional academic subjects. US students may also feel that adding an arts portfolio gives them an extra edge in the increasingly competitive race for admission to the top college and universities in the country (Stevens, 2009).

In any case, the lack of a positive association between arts education and academic achievement in the Netherlands and in the United Kingdom should caution us against drawing causal conclusions from correlational data.

Post-REAP quasi-experimental studies of multi-arts education and general academic achievement

A number of studies have evaluated the effects of arts integration programmes since the 2000 REAP report. Programmes that have been evaluated include (listed alphabetically) the *A+ Schools Program in North Carolina* (Nelson, 2001); *Arts for Academic Achievement* (Anderson and Ingram, 2002; Freeman and Seashore, 2001; Freeman, Seashore with Werner, 2002; Ingram and Seashore, 2003); *Arts in the Basic Curriculum* (ABC) (Seaman, 1999); *Kaleidoscope* (Brown, Benedett and Armistead, 2010); *Learning Through the Arts* (Smithrim and Upitis, 2005); *Transforming Education Through the Arts Challenge (TETAC)* (Frechtling, Rieder, Michie, Snow, Fletcher, Yan and Miyaoka, 2002; NAEC, 2003); one study of a programme in just one school (Bezrucsko, 1997); and one study of a programme in just one school comparing an arts infusion approach to teaching math to a non-arts approach (Omniewski and Habursky, 1999). Table 2.7 summarises the findings of these evaluations.

Table 2.7. **Eight studies since REAP examining relationship between multi-arts education (in arts integrated programmes) and general academic achievement**

Programme evaluated	Positive effects: Arts Children Score Higher Than Controls	Inconsistent results: Gains in only some grades/ classes/ outcomes	No effect: No difference between arts vs. Control groups in test scores
A+ Schools			X
Arts for Academic Achievement		X	
Arts in the Basic Curriculum			X
Learning Through the Arts		X	
Kaleidoscope	X		
Transforming Education Through the Arts Challenge	X		
Bezrucsko (1997)	X		
Omniewski and Habursky (1999)			X

As shown in Table 2.7, findings from these studies are not conclusive with respect to the question of whether students in such arts integration programmes do better on standardised test scores than students in programmes that do not integrate the arts. Three studies report greater gains for children in the programme than for comparable children not in the programme. Two studies reported that for some grades or classes, gain scores were greater in arts integrated programmes. And three studies reported equivalent scores for students who did and did not participate in arts integration programmes (e.g. A+ Schools, Arts in the Basic Curriculum). Some report that scores improve once the programme has been implemented, but the comparisons made are not for the same children over time, but between students in one year who received the programme once it had been fully established, and students in an earlier year who received the programme before it was fully implemented (e.g. TETAC).

Why are these findings of the studies summarised in Table 2.7 not conclusive? The major problem is that there may be many differences between the arts integration programme and the programmes in the comparison schools, especially quality of teachers and type of student attending. The best way to determine whether arts integration fosters academic skills would be to design a true experiment in which the identical lessons are taught with and without arts integration, preferably with random teacher assignment to arts vs. non-arts integration, and with student random assignment as well. We do not believe that such studies are needed to justify arts integration programme. Our claim is far more circumscribed: such studies are necessary only if we wish to determine whether arts integration *by itself* improves academic performance. Thus far, the evidence is not in.

Box 2.6. Learning through the arts: Inconsistent transfer findings

In 2005, Smithrim and Upitis published a study of Learning Through the Arts (LTTA), a Canadian arts integrated programme, in which they assessed the effects of this programme on general academic achievement. The findings of this study were inconsistent.

In the Learning Through the Arts program, professional artists worked with teachers to develop an arts integrated curriculum. The 4 063 children in this programme were compared to control groups of 2 602 children either in schools with another kind of non-arts curriculum focus or in schools with no special school-wide focus.

After three years, 6th grade students (ages 10-12) showed greater gains in math computation and math estimation than the control children. However, a regression analysis showed that participation in the arts integrated programme accounted for only 1.2 percent of the variance in these two areas. Moreover, these 6th graders in the programme did not show greater gains in two other aspects of math tested – geometry and application of math concepts. Nor did they show greater gains in reading comprehension, vocabulary, or writing. And finally, it was only the 6th graders and not the children in the four other grades tested who showed this improvement. Given that the arts group improved only on two of the many cognitive tests, and that this improvement occurred only for one of the four age groups, we must conclude that these findings are inconsistent.

Qualitative interviews with LTTA students indicated high levels of engagement in school. The researchers speculate that improvement occurred selectively in math computation and estimation as a function of the greater school engagement engendered by the programme. They suggest that computation and estimation may be easier to change via attention or engagement than skills such as reading.

However, no a priori predictions were made that these functions and not others would be improved by the programme and will still miss a good theory of why this should be the case. Thus, while possible, this explanation remains highly speculative.

Conclusion

The evidence reviewed in this chapter shows that there is a clear positive correlation between multi-arts education and several measures of academic achievement: composite measures such as SAT scores, but also verbal and mathematical test scores. There is some cultural variation in the results as the Netherlands and the United Kingdom display a different pattern. However, experimental studies that allow to better grasp causality do not find a positive association between multi-arts education and cognitive outcomes. This leads to the conclusion that there is as yet no firm evidence that multi-arts instruction, whether in stand-alone arts classes or in arts-infused/arts-integration classes, leads to improvements in academic skills as measured by standardised test scores.

Moreover, we suggest that there is no theoretical reason to expect multi-arts instruction to improve academic achievement: the habits of mind trained by arts instruction are very different from the kinds of skills assessed by verbal and mathematical multiple choice tests. Study of the arts focuses on visual observation (visual arts), understanding characters (drama), motoring and auditory skill (music), etc. These kinds of skills are important but are not the kinds of skills captured by verbal and mathematical tests. However, if it can be shown that building strong arts into our schools changes the school culture such that teachers of all subjects begin to teach in a more inquiry-based, student-centreed, project-based manner, then a reasonable hypothesis to test would be that arts can improve academic learning via the indirect route of improving school culture.

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ANNEX 2.A1

Supplementary tables

Table 2.A1.1. **Five correlational studies linking multi-arts education with composite test scores**

Study	N	R	Z(p)* (*<.0001)
Catterall, Chapleau and Iwanaga (1999)	2 813	.08	4.42*
Dwinell and Hogrebe (1984)	21 479	.05	7.33*
Heath (1998a)	17 143	.04	4.88*
National Center for Education Statistics (1984)	3 367 000	.05	97.48*
Whitener (1974)	200	.04	-.31(p = 38)

Note: N: number of observations; R: effect size; Z(p): statistical significance. See Box 1.2.
Source: Winner and Cooper (2000).

Table 2.A1.2. **Eleven correlational studies linking multi-arts education with verbal test scores**

Study	N	R	Z(p)* (*<.0001)
Catterall, Chapleau and Iwanaga (1999)	7 440	.19	16.24*
College Board (1988)	353 679	.14	80.64*
College Board (1989)	296 189	.15	80.42*
College Board (1990)	274 168	.16	81.92*
College Board (1991)	273 034	.17	86.95*
College Board (1992)	269 453	.18	95.54*
College Board (1994)	352 824	.20	121.48*
College Board (1995)	360 911	.21	129.10*
College Board (1996)	367 314	.23	137.09*
College Board (1997)	337 517	.25	146.31*
College Board (1998)	318 392	.23	130.18*

Note: N: number of observations; R: effect size; Z(p): statistical significance. See Box 1.2.
Source: Winner and Cooper (2000).

Table 2.A1.3. **Eleven correlational studies linking multi-arts education with mathematical test scores**

Study	N	R	Z(p)* (*<.0001)
College Board (1988)	353 679	.05	31.66*
College Board (1989)	296 189	.06	31.99*
College Board (1990)	274 168	.08	40.95*
College Board (1991)	273 034	.08	43.17*
College Board (1992)	269 453	.10	49.34*
College Board (1994)	352 824	.12	71.98*
College Board (1995)	360 911	.15	87.51*
College Board (1996)	367 314	.15	91.28*
College Board (1997)	337 517	.18	100.93*
College Board (1998)	318 392	.14	80.43*
Demeter (1986)	128	.00	.00 (p=.50)

Note: N: number of observations; R: effect size; Z(p): statistical significance. See Box 1.2.
Source: Winner and Cooper (2000).

Table 2.A1.4. **Twenty-four quasi-experimental and experimental studies linking arts education with verbal test scores**

Study	N	R	Z(p)* (*<.0001)
Ashbacher and Herman (1991)	520	.00	0 (p = .5)
Baum and Owen (1997)	132	.12	1.40 (p = .08)
Brock (1991a)	308	.02	.33 (p = .37)
Brock (1991a)	354	.02	.39 (p = .35)
Brock (1991a)	438	.11	2.37 (p = .009)
Brock (1991a)	438	-.07	-1.55 (p = .06)
Brock (1991a)	516	-.10	-2.37 (p = .009)
Brock (1991a)	392	-.12	-2.37 (p = .009)
Brock (1991b)	384	.05	.92 (p = .18)
Brock (1991b)	316	.00	.08 (p = .47)
Brock (1991b)	352	.00	.05 (p = .48)
Catterall and Waldorf (1999)	13 388	.02	2.33 (p = .01)
Coakley (1995)	63	.16	1.27 (p = .10)
Dillard (1982)*	97	.03	.34 (p = .37)
Gardiner et al. (1996)	80	.10	.89 (p = .19)
Glismann (1967)	149	-.03	-.31 (p = .38)
Hudspeth (1986)	32	.66	3.72*
Jackson (1979)*	245	.02	-.60 (p = .27)
Marston (1997)	40	-.25	2.23 (p = .01)
Norman (1987)	1 444	-.10	4.69*
Tunks (1997)	32	.29	1.64 (p = .05)
Tunks (1997)	32	.29	1.64 (p = .05)
Tunks (1997)	39	.26	1.64 (p = .05)
Tunks (1997)	45	.00	0 (p = .50)

Note: N: number of observations; R: effect size; Z(p): statistical significance. See Box 1.2. Experimental studies are asterisked.

Source: Winner and Cooper (2000).

Table 2.A1.5. **Fifteen quasi-experimental studies linking arts education with mathematical test scores**

Study	N	R	Z(p)* (*<.0001)
Baum and Owen (1997)	90	.14	-.87 (p=.19)
Brock (1991a)	308	.13	2.37 (p=.009)
Brock (1991a)	354	.11	2.05 (p=.02)
Brock (1991a)	438	.11	2.37 (p=.009)
Brock (1991a)	438	-.02	-.44 (p=.33)
Brock (1991a)	516	-.06	-1.34 (p=.09)
Brock (1991a)	392	-.09	-1.75 (p=.04)
Brock (1991b)	384	-.05	-.92 (p=.18)
Brock (1991b)	316	.13	2.37 (p=.009)
Brock (1991b)	352	.11	2.05 (p=.02)
Catterall and Waldorf (1999)	13,388	.02	2.33 (p=.01)
Gardiner et al. (1996)	80	.34	3.03 (p=.001)
Glismann (1967)	149	.33	4.01*
Luftig (1993)	137	.00	0 (p=.5)
Norman (1987)	1,444	.05	1.41 (p=.08)

Note: number of observations; R: effect size; Z(p): statistical significance. See Box 1.2. Experimental studies are asterisked.

Source: Winner and Cooper (2000).

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