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Learning In and Through the Arts: The Question of Transfer

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The Issue of Transfer

The issue of transfer from the arts to other subject disciplines has almost become a leitmotif of arts education – unhappily it has almost come to define what we do! Perhaps because the arts have lost ground in recent years, it has become almost axiomatic to claim their importance in learning to read, write and compute, or in learning other subjects. Advocates have been anxious to demonstrate that experiences in the arts can advance the general education of K-12 pupils, in particular through the development of higher order thinking skills. As our research team read through the accumulated literature we began to see that the value laden and somewhat strident claims often skewed research endeavors by coloring them with the needs of advocacy. Put directly, most studies of transfer in the 1980s and 1990s have been framed by a unidirectional and linear model of learning in which certain capacities engendered in the arts are thought to travel to other subject disciplines and to be "causal" in supporting enhanced learning.

Despite its attractiveness, there are two major problems with this as a theoretical model of learning. First, together with Gardner's (1983) more situated theory of multiple intelligences, neuroscience has given us a broader picture of the human mind actively creating connections and associations across a broad front of stimuli – or across intelligences. Thus, there is no reason to believe that learning from other subject disciplines does not in some fashion also "travel back to enhance arts learning." Second, capacities usually identified as "engendered in arts learning," such as creativity, imagination, critical and divergent thinking, are also dimensions that are widely held to characterize thinking in other subject domains (Burton, 1995; Gardner 1983; Greene, 1995; Perkins, 1987). In other words, perceptions of transfer may well be, in part, a function of the degree to which different disciplines share certain cognitive elements, dispositions, or ways of thinking. Given this, one can hardly argue that the acquisition of such capacities in the arts are "causal" to their emergence or enhancement in other disciplines.

A Taxonomy of Effects

However, while unidirectional causality may be a disputable claim, this hardly rules out the existence of some sort of effect implicating arts learning

in learning in other subject domains! Thus, transfer, if and where it exists, may be part of a larger constellation of impacts of arts learning on other subjects. Indeed, while there have been some dramatic failures to find what has been defined as transfer, there also have been some dramatic successes (Catterall, 1998; Dorn, 1994). Here, a long list of arts learning items have been introduced into the literature, which have been seen to boost, illuminate, or enhance learning in other domains (Catterall, 1998). For example, a list of cognitive capacities, dispositions, and attitudes that have been found to be implicated in arts learning—across visual arts, music, dance, and drama—include creativity, imagination, and the ability to think critically. Indeed imaginative, critical, and creative thinking have also been found to implicate other capacities such as the ability to centralize energy, focus perception, engage in reflection, show flexibility by changing directions, explore new possibilities, and elaborate on ideas (Catterall, 1998, Eisner, 1998; Getzels and Csikszentmihalyi, 1976). Beyond creativity and imagination, other kinds of meta-cognitive thinking have been implicated in the arts, involving the ability to: integrate divergent points of view, layer relationships, and construct unified wholes —in other words, construct coherence among relationships within complex forms—as in paintings, musical compositions, choreography, or poems (Eisner, 1998; Perkins, 1994).

Looked at from the other direction, a steady stream of studies carried out over the past decade have found gains in writing, reading and reading comprehension, and verbal expression among elementary age children following creative and appreciative experiences in visual arts and music (Catterall, 1998; Luftig, 1994; Moore and Caldwell, 1993; Redfield, 1990). Studies have also found improved conceptual understanding in social studies and history following carefully crafted arts experiences in drama, music, and art (Aschbacher and Herman, 1991; Edwards, 1994). Arts experiences in theater, dance, and visual arts have been thought to improve cognitive capacities in general among elementary and junior high school students, particularly in their abilities to think speculatively, analytically, critically, and representationally (Fineberg, 1991; Hudspeth, 1986; Wolf, 1994). The most widely popularized research in this domain, of course, stresses the benefits of music education for enriching the function of the brain, particularly as this has repercussions for spatial-temporal reasoning (Rauscher et al., 1993, 1995, 1997).

Contextual Conditions

Based on our analysis of the literature, it seemed plausible to suppose that certain capacities or ways of thinking may be situated within the arts themselves, while others may have more general across-discipline salience (Anderson, et al., 1996; Greeno et al., 1992). In other words, it may be that learning in the arts is both continuous with, yet distinct from, other subjects. While the literature is unclear about which group or groups of capacities are situated and which are generalized, in practical terms we took account of the fact that youngsters who do not internalize a skill or

master ways of thinking are unlikely to practice them in another domain. This suggests that the degree to which any skill, competency or way of thinking is amenable to generalization is dependent upon instruction. Perkins (1994) has long argued, and persuasively, that thinking skills do not generalize beyond the context in which they are learned unless teachers directly address transfer and encourage youngsters to use their skills and competencies in other subject domains (Perkins and Salomon, 1989). Learning for transfer, he has suggested, requires not only practice in the target task but also on how the task is represented to the learner. For instance, a long line of research suggests that in tasks which share common cognitive or symbolic elements, or underlying abstract structures, transfer is more likely to occur (Singley and Anderson, 1989; Thorndike and Woodworth, 1901).

As we know, many of the conditions that impinge upon arts learning and its perceived transferability stem from the characteristics of schools. Some children (beginning at age 5 and up) are fortunate to have arts lessons as part of a comprehensive curriculum with teachers who encourage cross-disciplinary endeavors. They may also be lucky enough to study more than one art form in their school. Indeed, instruction enriched by outside resources such as visiting artists, musicians, dancers, and actors leads to an excitement about learning that appears to motivate the transfer of certain cognitive capacities to other subjects (Fineberg, 1991). Similarly, it has been noted that the arts integrated into the general flow of the curriculum afford the greatest measures of transfer in learning, especially when higher order or critical thinking are aimed for as part of instruction (Redfield, 1990; Trusty and Oliva, 1994).

It is, however, in the area of the hidden curriculum that perhaps the strongest claims for the effects of learning in the arts have been made. Engagement in arts experiences has been found to relieve prejudice, hedge against violence, and help children become better risk takers, become more sociable, and enhance self-esteem. Of all measures, those of improved motivation to learn in general, and of enhanced self-esteem in particular, appear the strongest (Trusty and Oliva, 1994). This is not surprising, since in most settings where transfer from the arts has been investigated, improved teacher expertise has been found. The more teachers are excited about their work, the more insights and knowledge they have to guide their students, the more positively their students have been found to respond (Unsworth, 1990).

Some Questions

All of this raises some questions. It seems that there is mounting evidence to suggest that learning in the arts has significant effects on learning across the curriculum. However, to date, research offers an incomplete picture of what these effects are, how they occur, and the circumstances within schools that influence them. Moreover, there is a general theoretical assumption that these effects are unidirectional, moving from the arts to other disciplines, and are causal in promoting cross-disciplinary learning.

Yet the very capacities that are most often claimed to be transferred also characterize learning in other disciplines, suggesting either a parallelism in learning or a more multi-directional effect than has been recognized to date. It is far from clear, however, what constitutes the salient dimensions of this potential relationship—in particular, which indicators of learning are situated within the arts alone and which are more generally implicated.

Purpose of the Study

The purpose of our study at Teachers College was, thus, to determine if cognitive skills developed through arts—such as higher order thinking—have an effect on learning and thinking in general, as well as on other subject matter domains. Our study did not assume a particular effect such as transfer. It did assume, however, that arts learning consists of a constellation of complex ways of thinking and responding that become unified within the activity of creating art, and that some of these ways of thinking generalize to other subject domains. In other words, we assumed that certain capacities and dispositions, or ways of thinking, would group together, perhaps hierarchically, to characterize the relationship between arts learning and learning in other subjects. We anticipated that this grouping might suggest a relationship based on transfer from the arts to other disciplines, or it might suggest a more interactive relationship between learning in the arts and learning in other subjects. The degree to which either of these relationships was apparent, we assumed, would depend upon the mitigating effects of arts experiences in schools.

We recognized at the outset that the practice of art teaching is extremely diverse. The arts are taught in a variety of ways and configurations and in the contexts of four different disciplines—visual arts, music, dance, and drama. Some arts programs in schools have the explicit goal of integrating all arts instruction, whereas others attempt to integrate the arts within the academic curriculum, while in others the arts are taught as quite separate disciplines. In addition, the arts can be taught by three different kinds of instructors with different goals, practices, and conceptions of arts learning: specialist teachers, general classroom teachers, and external arts providers such as artists or performers in residence or teaching artists making visits from cultural organizations.

In light of this diversity of practices and situations, we rejected a narrowly focused study of one program, art form, or behavioral outcome, on the basis that it would likely be context specific and not typical of a broad spectrum of arts learning. While we were interested in knowing more about cognitive capacities and dispositions implicated in arts learning, and their effects on other subjects, we were also interested in understanding more about how the contextual, pedagogical, and social aspects of learning influenced outcomes. We thought that by casting the net more widely and by including everyday experiences in the arts and learning as perceived by pupils, teachers, and our team of researchers, we could frame a more authentic study focused on naturally occurring relationships between learning in the arts and other subjects. Thus, we designed a study

that sought to examine a diverse sample of programs and practices across a range of 12 different types of schools involving over 2000 children in grades 4, 5, 7, and 8.

Our review of other studies led us to believe that quantitative measures alone would not offer the spectrum of data we needed. While they could tell us much about type, duration, and perceptions of arts learning—literal surface details—we needed to capture a more evocative picture of the deeper meanings underpinning the data. Taking seriously Eisner's (1997) caution about the limits of quantification, we designed our data collection along a continuum from quantitative to qualitative measures, reflecting both our need for factual information and for the illumination of these facts as manifested in the particulars of individual experiences in the arts and learning. In creating a framework for data collection we purposely intermingled quantitative and qualitative procedures, and intentionally did not give salience to one or the other in our final analysis. This makes particular sense in a study of arts learning, where accounts of actual experiences are coded differently, through descriptions, stories, and illustrations, than are the enumeration of numbers and facts.

Methods

Studies investigating arts learning and its transfer have typically examined either (a) a narrowly defined artistic behavior, and its one-to-one impact on a specific non-arts behavior or measure, or (b) a single arts program or school and its impact on the general or "hidden" curriculum. These studies, while extremely important, have been used to demonstrate the value of arts generally, regardless of the original narrow focus of the researchers. But arts learning is not so easily reduced, and such claims of transfer often reflect errors of external validity. In this study we developed a design that looked at a broader conception of arts learning as it is played out within real schools and programs. The study did not investigate any one particular program, approach to arts teaching, or behavioral outcome, but looked at a diverse sample of programs. By working within the real world of arts teaching and learning, we sought to obtain results that could have general implications for our understanding of arts learning within public schools.

The study was composed of five overlapping phases. In the first three phases we explored potential sites, determined the specific variables we would investigate, and our means for measuring them. In our fourth phase, we collected quantitative data in 12 elementary and middle schools. Analysis sought first to understand the relationships among variables, and then how these relationships may have come about. In our fifth, qualitative, phase we sought to understand better the nature of these relationships. We attempted not only to investigate transfer itself but also to understand the mechanisms by which it might take place. Five schools were selected for in-depth qualitative investigation.

Phase One: Variable Development and Field Study

The study is underpinned by the assumption that a set of cognitive, socio-cultural, and personal learning factors is implicated in the transfer

of learning, and that this transfer is itself framed by learning contexts involving characteristics of school, classroom, teacher, and child. At the outset, we developed a preliminary taxonomy of learning in the arts to serve as a framework. The taxonomy was developed through a review of literature, discussion with other professionals, and our collective experience as researchers and educators. Preliminary constituents of the taxonomy included:

- Focused perception and inquiry
- Reflection and questioning
- Construction and layering of relationships
- Organization and appraisal of meaning
- Insight into alternative perceptions
- Imagining new possibilities
- Multi-sensory learning

We then sought to develop two sets of variables: (a) potential **indicators** of effects from arts learning; and (b) **characteristics** of teaching and learning that might lead to effects from arts learning. Potential **indicators** of effects from arts learning were categorized within three broad groups: (a) Cognitive; (b) Socio-Cultural; and (c) Personal Learning. **Characteristics** of teaching and learning that might lead to effects from arts learning were also grouped according to three levels: Whole School (i.e., school climate, type of arts, leadership); Classroom (i.e., collaboration among arts providers, comfort and competence in teaching the arts, degree and type of arts integration); and Child (i.e., in-school arts experiences, out-of-school arts experiences).

Additionally we considered arts teaching and learning as a fourth group of characteristics, examining: (a) amount of time spent learning the arts; (b) what arts specialists and external arts providers believe they are teaching, and what their students are learning; and (c) children's achievement and artistic performance.

In spring 1997, we conducted a field study to help develop both sets of variables and refine our taxonomy. The research team visited 28 schools in the New York City metropolitan area, Connecticut, South Carolina, and Chicago. Several schools were visited five or six times, others only once. We observed classes, and interviewed principals, arts specialists, and classroom teachers. We were particularly interested in classroom teachers' perceptions of transfer effects. They provided us with numerous accounts of what they believed were examples of impacts from arts learning. Researchers wrote reports describing each visit, with a profile of the school and summaries of interviews and observations. Upon completion of the field study, the reports were analyzed and lists of characteristics and indicators were developed more fully, based upon the teacher interviews. Frequency counts identified the most salient characteristics and indicators.

Phase Two: Site Selection

We identified a mix of elementary and middle schools that provided a diverse sample along several dimensions: (a) a mix of arts disciplines (music, dance, drama, visual art); (b) a mix of approaches within disciplines

(i.e., within music: Orff, Kodály, creative approaches, instrumental music); (c) schools where the arts were taught by specialists and schools where the arts were taught by external providers; (d) schools where the arts were integrated into the general curriculum by classroom teachers, and schools where the arts were taught as discrete subjects by specialists; and (e) schools that were "arts rich" and schools that were "arts poor," as defined by the quantity of arts programming.

Our final site selection was based on obtaining as much diversity as possible along these dimensions. We invited 18 schools to participate in the primary data collection phase of our study. To participate, schools had to agree to allow us to test their entire 4th, 5th, 7th, and 8th grades for about 45 minutes. Classroom teachers and arts specialists also needed to commit time and access. Negotiations with schools took varied forms, but often consisted of consultation with teacher groups. Ultimately, we made arrangements to work fully within 12 schools, with several others asking to participate in the future.

Phase Three: Development of the Quantitative Design

Analysis of the teacher interviews identified a number of characteristics and **indicators** for further investigation. The potential indicators of transfer from arts learning were categorized within the cognitive, socio-cultural, and personal learning groups, as shown in Table 1.

Characteristics of teaching and learning that could lead to transfer were grouped within the Whole School, Classroom, and Child levels. The most salient characteristics are shown in Table 2.

Table 1. Potential Indicators of Transfer from Arts Learning

Cognitive	Socio-cultural	Personal Learning
• expression of ideas	• cooperative learning	• risk taking
• layered relationships	• school climate	• confidence
• imagining new possibilities		• self-esteem
• considering multiple vantage points		• competence

Table 2. Characteristics of Teaching and Learning That Could Lead to Transfer

Whole School	Classroom and Teacher	Child
• school climate	• collaboration with arts specialists	• extra-curricular arts experiences
• administrative support for the arts	• collaboration with external providers	• in-school arts learning
• staff development	• background and competence of teacher	
• coordination among teachers	• degree of arts integration	
• coordination and integration of external arts providers		
• type and degree of arts provision		

We examined the instrumentation available to measure these variables, recognizing that we would have approximately 45 minutes of children's time. We chose several standardized measures and also developed our own. In some cases we attempted to measure the variables directly, while in others we used instruments that approximated the variables, or components of the variables.

It was apparent that some of our variables could be understood best through qualitative means. During our exploratory field study we gathered a number of compelling accounts describing the impact of arts learning. For instance, many teachers cited changes in children's self-esteem. Many other teachers spoke persuasively about children's increased ability to express themselves, both verbally and nonverbally. They talked about how they had seen qualities in children they were previously unaware of, and how children had become more focused learners, or more self-confident.

Clearly, quantitative methods alone were insufficient to unravel these descriptive accounts, or to help us understand the mechanisms of transfer. We attempted to select or design quantitative instruments that approximately measured variables derived from the teacher interviews. But we understood that much of what the teachers spoke about so compellingly was somewhat "off the map" of our chosen instruments. At the very least, the selected instrumentation did not provide a deep, nuanced representation of the potential indicators of effects from arts learning that the teachers spoke about.

For instance, we selected a well-validated and reliable measure of self-concept to administer to all 4th, 5th, 7th, and 8th graders in participating schools. This test (the SDQ-I) contains some sub-scales that measure what we think teachers meant when they spoke of self-esteem, confidence, and competence within a school setting. However, teachers were also trying to describe other phenomena, such as the pride of a child when she creates something of personal meaning and then expresses it before the school community. Likewise, the whole notion of expression of ideas is difficult to understand quantitatively, because it is tied to the way an individual organizes and represents personal meaning, and then through a particular medium expresses those ideas to the larger community.

Phase Four: Quantitative Investigation

We collected data in 12 elementary and middle schools in winter and spring 1998. We requested that each 4th, 5th, 7th, and 8th grader take a creativity test (TTCT-figural), a self-concept test (SDQ-I) and fill out a questionnaire describing their arts experiences (SAB). Teachers of these students responded to a rating scale (TPS) that examined their perceptions of students' imagination, risk taking, expression and cooperative learning. All teachers within a school were asked to respond to two questionnaires, an index of school climate (SLEQ) and an arts teaching and learning inventory (CTAI). All arts teachers were interviewed and also responded to questionnaires exploring their curriculum and students' arts

achievement, pegged to the national standards in the arts. Principals and classroom teachers were also interviewed.

[1]As previously described, *characteristic variables* are variables that define the characteristics of teaching and learning that may lead to transfer.

Quantitative Characteristic[1] Variables

In the Students Arts Background (SAB) questionnaire, children were asked to circle each prior grade that they had received in-school arts instruction, and the number of years that they had participated in private arts lessons. The Classroom Teacher Arts Inventory (CTAI) examined the degree to which teachers believe they integrate the arts, collaborate with other arts providers, and whether they intentionally use arts as a tool to teach other subjects. It also measured the perceived comfort and competence of classroom teachers when they integrate the arts into their curriculum (arts teaching self-concept). Several characteristic (or input) variables were derived from the SAB and CTAI (Table 3).

Students within participating schools did not always have the same level of participation in school arts programs. For instance, external art providers sometimes only work with a portion of a particular grade. Participating students may have transferred in from another school, with a different pattern of arts participation. Therefore, in the SAB, we asked children to identify each previous school year that they participated in an in-school arts program, understanding that some error would be introduced through relying on children's self-report.

The data were then weighted according to the assumption that recent instruction might have greater current impact than instruction in the more distant past. The data were normalized on a 100-point scale according to the possible number of years that a child could have had arts instruction. For example, fourth graders could have had up to 5 years of instruction within each of the four arts disciplines (K-4). Scores for the four arts disciplines were averaged to obtain each child's in-school arts score.

Table 3. Quantitative Characteristic Variables

Variable	Definition
Years of In-School Arts (SAB)	Weighted number of years of in-school arts instruction
Arts Lessons (SAB)	Years of private arts lessons
Integration (CTAI)	Degree of arts integration within the general or academic-subject preparation
Teaches for Transfer (CTAI)	Degree to which classroom teachers use arts as a tool to teach other subjects
Arts Teaching Self-Concept (CTAI)	Comfort level of classroom teachers with integrating the arts
Collaboration with External Providers (CTAI)	Degree to which classroom teachers report collaborating, co-planning or team teaching with external arts providers
Collaboration with Arts Specialists (CTAI)	Degree to which classroom teachers report collaborating, co-planning or team teaching with arts specialist teachers

In the SAB, students also listed the number of years they received lessons in each arts discipline. The data were standardized on a 100-point scale according to the number of possible years that they could have had lessons. We chose the age of 5 as a plausible beginning age for lessons. Therefore, a 12-year-old could have had 8 possible years of lessons. If the 12-year old had studied music for 6 of those 8 possible years, she obtained a music lesson score of 75. Scores for the four arts disciplines were averaged to obtain each child's arts lessons score.

Quantitative Indicator[2] Variables

The Torrance Test of Creative Thinking (TTCT-figural) was administered to participating children. According to the test author, the TTCT measures creative thinking abilities, defined as a constellation of generalized mental abilities commonly presumed to be brought into play in creative achievements (Torrance, Ball, and Safter, 1992). Scores are provided for 5 creative thinking abilities (fluency, originality, elaboration, abstractness of titles, and resistance to premature closure), 13 creative strengths, and total scores. Although this test has been criticized in recent years for overly emphasizing fluency and not considering the intrinsic, personal meaning and value of creative thought, it has remained the most widely used yardstick for measuring the impact of arts learning, is relatively easy to administer, and is normed for different age groups.

Participating children also took a measure of self-concept, the Self-Description Questionnaire (SDQ-I). The SDQ-I is based on a hierarchical model of self-concept developed by Shavelson (Shavelson, Hubner, and Stanton, 1976) and provides data on four areas of non-academic self-concept (physical ability, physical appearance, peer relations, and parent relations), three areas of academic self-concept (reading, mathematics, and general-school), and one general-self scale. These areas are combined to provide total nonacademic, total academic, and total-self scores. The SDQ-I was chosen, in part, because we wished to test assumptions that arts have an impact on children's sense of competence and interest in academics. Academic self-concept is associated with academic achievement (Marsh, Byrne, & Shavelson, 1988) and may influence academic achievement (Marsh, 1990).

The researchers developed a rating scale, the Teacher Perception Scale (TPS), based upon results of the field study. Content analysis of field study data revealed four dimensions of learning for further investigation: expression, imagination/creativity, risk-taking, and cooperative learning. Four scale items were developed from field study data to represent each of these dimensions. Classroom teachers were asked to respond to one TPS for every child in their class. Estimates of reliability for the TPS scale were .94 (internal consistency). Factor analysis suggested a two-factor structure with cooperative learning grouped separately from the other three dimensions.

The School-Level Environment Questionnaire (SLEQ) was selected to measure factors associated with school climate. The SLEQ measures teachers' perceptions of eight school environment dimensions: affiliation, student support, professional interest, achievement orientation, formaliza-

[2]As previously described, *indicator variables* are variables that define the potential effects of arts learning.

tion, centralization, innovativeness, and resource adequacy (Rentoul and Fraser, 1983). Several of these dimensions approximated potential outcomes of arts programming derived from the field study data, such as changes in teacher practice and teacher-student relationships. We obtained internal consistency reliability estimates of .83 for the overall SLEQ from our test sample.

Phase Five: Qualitative Investigation

Of the 12 schools, 5 were chosen for additional qualitative investigation. A lead researcher was assigned to each school. Data collection primarily consisted of interviews (with teachers, administrators, and students), observations, and examination of children's artwork, performances, and writing. Throughout the data collection period we increasingly focused our resources and efforts on the three schools that yielded the most richly descriptive data.

Throughout late spring and summer 1998, lead researchers working within each research site met weekly to compare data with the overall research team, leading to preliminary qualitative conclusions. We began systematic pre-analysis of interview transcripts, leading to the development of a codebook for coding textual data using NUD*IST qualitative analysis software. Interview transcripts and observational reports were numerically coded, with individual text lines as our unit of measure. Developing the codebook and our coding process refined our conception of our characteristics and indicators, as we simultaneously analyzed our quantitative data. We then proceeded to code all textual data, from all 12 research sites. At the very least, the qualitative data provided illustrations of some of the processes we were exploring. At a deeper level, they showed relationships among variables, and the processes with which they seemed to interact.

Description of the Sample

In total, we tested 2,406 students within our 12 target schools. All children attended public elementary and middle schools, in 4th, 5th, 7th, and 8th grades. The sample encompassed considerable diversity in arts background and interest, and academic opportunities and achievement.

Of the 12 schools, 7 were in New York City, 2 were in New York State, and 1 each in Virginia, Connecticut, and South Carolina. There were 7 elementary schools, 4 middle schools, and a school that spanned kindergarten to eighth grade. They represented a mix of arts provision and approaches.

Results

When considering our results, the reader should keep in mind that we worked within real school settings, where we attempted to have little effect on the teaching and learning process. We did not introduce an experimental "treatment" or only observe situations where teachers intentionally taught for transfer. By relying on children's memories of their

past arts experiences, we undoubtedly added error and reduced the magnitude of Pearsons *r* correlations. We believe these factors made it more difficult to obtain results but made our results more convincing.

The quantitative data were first subjected to exploratory data analysis (Harwig & Dearing, 1979) to understand the patterns within each variable and their associations. The exploratory analysis revealed: (a) significant associations (Pearsons *r*) between arts teaching variables and TTCT and TPS scores; (b) significant associations between arts teaching variables and some dimensions of school climate (affiliation, student support, professional interest, and innovativeness), and significant negative correlations with other dimensions of school climate (formalization, centralization, achievement orientation); (c) weak but significant associations between arts teaching variables and academic self-concept scores; and (d) little relationship between arts and non-academic self-concept.

To further explore these relationships, children's data were assigned to high-arts exposure and low-arts exposure groups according to two arts teaching variables: (a) years of in-school arts and (b) arts lessons. Children in the top quartile of these variables were defined as members of high-arts exposure groups, and children in the bottom quartile were defined as belonging to low-arts exposure groups.

Sets of high performing children were also identified for each indicator variable (or potential outcome of arts education). High performing children were defined as scoring in a variable's upper quartile. The percentage of high performing children within high-arts and low-arts quartiles were then compared. The results indicate that high-arts groups consistently outscore low-arts groups in almost every indicator dimension.

Torrance Test of Creative Thinking (TTCT) Results

Overall TTCT scores (Creativity Index) and individual scores are generally higher for the high-arts groups (Tables 4 and 5). The gap in performance between the high-arts and low-arts groups is widest in elaboration scores. This is consistent with correlation results from the exploratory data analysis.

Table 4. TTCT Scores Compared to the Number of Years of In-School Arts

TTCT Scores	High-Arts Group	Low-Arts Group
Creativity Index	37.01%	11.84%
Fluency	30.88%	16.70%
Originality	30.88%	14.80%
Elaboration	41.31%	11.21%
Abstractness of Titles	31.90%	15.86%
Resistance to Closure	34.97%	15.64%

Table 5. TTCT Scores Compared to the Number of Years of Arts Lessons

TTCT Scores	High-Arts Group	Low-Arts Group
Creativity Index	27.31%	9.28%
Fluency	26.47%	12.24%
Originality	24.37%	10.76%
Elaboration	29.62%	6.86%
Abstractness of Titles	24.58%	10.02%
Resistance to Closure	26.89%	11.32%

Table 6. Teacher Perception Scale (TPS) Items

Scale Dimension	Scale Items
Expression	1. The student is verbally expressive. 2. The student easily expresses ideas nonverbally, for example, through movement, music, or visual art. 3. The student is able to express personal ideas in diverse ways. 4. The student develops and expresses ideas that are important to him/her.
Risk-Taking	1. The student takes chances on projects, creating something unique. 2. The student performs (i.e., plays, music, reading) with expression before classmates. 3. The student is generally willing to convey ideas of personal value to others in the school community. 4. The student follows through on an idea, regardless of what others think.
Imagination	1. The student creates works with personal meaning. 2. The student examines challenges from different perspectives. 3. The student revises work to accommodate new insights or information. 4. The student easily imagines new possibilities in his or her creative work.
Cooperative Learning	1. The student works successfully with his or her classmates on group projects. 2. The student collaborates with classmates to produce original work. 3. The student adapts his or her ideas to what other students in a group are doing. 4. The student communicates with classmates in his or her group, both listening to other people's ideas and offering his or her own.

Teacher Perception Scale (TPS) Results

Content analysis of field study data revealed four dimensions of learning for further investigation: (a) expression, (b) imagination/creativity, (c) risk-taking, and (d) cooperative learning. Four scale items were developed from field study data to represent each of these dimensions. Classroom teachers were asked to respond to one TPS for every child in their class. Each dimension is understood best by examining its scale items (Table 6).

Differences in scores between the high and low groups are greater in the expression, risk-taking, and creativity-imagination dimensions, and lower in the cooperative learning dimension (Tables 7 and 8). This is consistent with factor analysis and correlation results from the exploratory data analysis.

Table 7. TPS Scores Compared to the Number of Years of In-School Arts

TPS Scores	High-Arts Group	Low-Arts Group
TPS Total	35.99%	10.15%
Expression	36.61%	9.30%
Risk-Taking	36.61%	11.21%
Imagination-Creativity	40.70%	13.74%
Cooperative Learning	35.79%	14.59%

Table 8. TPS Scores Compared to the Number of Years of Arts Lessons

TTCT Scores	High-Arts Group	Low-Arts Group
TPS Total	24.79%	7.61%
Expression	23.32%	7.05%
Risk-Taking	26.26%	9.28%
Imagination-Creativity	28.29%	10.02%
Cooperative Learning	24.37%	10.76%

Table 9. SDQ-I (Self-Concept) Scores Compared to the Number of Years of In-School Arts

SDQ-I Scores	High-Arts Group	Low-Arts Group
Physical Ability S-C	29.65%	20.08%
Physical Appearance S-C	27.40%	24.31%
Peer Relations S-C	29.45%	23.26%
Parent Relations S-C	35.17%	24.31%
General S-C	36.81%	27.48%
Reading S-C	40.49%	20.08%
Mathematics S-C	29.86%	15.43%
General School S-C	35.79%	18.60%
Total Non-Academic S-C	33.33%	24.31%
Total Academic S-C	41.10%	17.76%
Total S-C	34.15%	17.97%

Table 10. SDQ-I (Self-Concept) Scores Compared to the Number of Years of Arts Lessons

SDQ-I Scores	High-Arts Group	Low-Arts Group
Physical Ability S-C	26.47%	23.19%
Physical Appearance S-C	25.42%	22.45%
Peer Relations S-C	28.99%	24.30%
Parent Relations S-C	31.72%	21.71%
General S-C	35.08%	25.23%
Reading S-C	47.69%	15.58%
Mathematics S-C	25.84%	17.81%
General School S-C	32.56%	15.77%
Total Non-Academic S-C	30.67%	22.45%
Total Academic S-C	34.66%	17.07%
Total S-C	29.20%	16.70%

Self-Description Questionnaire (SDQ-I) Results

Analysis of our data revealed significant but weak correlations between academic self-concept scores and arts teaching variables, and generally weak and not significant associations between non-academic self-concept scores and arts teaching variables. However, quartile analysis showed clear differences between high-arts and low-arts groups on several of the scales, such as reading self-concept, math self-concept, general school self-concept, and total academic self-concept (Tables 9 and 10).

School-Level Environment Questionnaire (SLEQ) Results

Our qualitative data indicated that teachers and principals within schools with strong arts programs attributed several effects on school climate to the arts. Specifically, they cited changes in teacher practice as they: (a) learned new skills and broadened their curriculum; (b) were encouraged to take risks and be innovative; (c) developed an increased rapport with students, and an increased awareness of different aspects of students' abilities and personalities; and (d) increased enjoyment in their school as a workplace.

Some of the SLEQ scales measure similar aspects of school climate, particularly affiliation, student support, innovativeness, and professional interest. Other dimensions of the SLEQ, such as formalization and centralization, were not considered to be potential outcomes of arts programming.

Analysis revealed significant associations between all SLEQ dimensions and arts programming in schools, as defined by the *years of in-school arts* variable (Table 11). Positive correlations were obtained between in-school arts and the SLEQ dimensions of affiliation, student support, professional interest, innovativeness, and resource adequacy. Negative correlations were obtained between in-school arts and the dimensions of achievement orientation, formalization, and centralization.

This pattern of association is consistent with the relationships among the SLEQ dimensions. Achievement orientation, formalization,

Table 11. Correlations Between SLEQ Scores and Years of In-School Arts

	Years of In-School Arts	Teacher Affiliation	Student Support	Professional Interest	Achievement Orientation	Formalization	Centralization	Innovativeness	Resource Adequacy
In-school Arts	—	.395**	.502**	.426**	-.461**	-.616**	-.265**	.418**	.572**
Teacher Affiliation		—	.639**	.823**	-.473**	-.487**	-.827**	.834**	.362**
Student Support			—	.556**	-.288**	-.647**	-.443**	.773**	.408**
Professional Interest				—	-.209**	-.286**	-.482**	.844**	.254**
Achievement Orientation					—	.832**	.402**	-.064*	-.434**
Formalization						—	.383**	-.336**	-.627**
Centralization							—	-.601**	-.349**
Innovativeness								—	.451**
Resource Adequacy									—

** $p < .01$ * $p < .05$

and centralization are all negatively correlated with the other SLEQ scales. These results suggest that—within our sample, at least—arts programming may support aspects of school climate identified in our qualitative analysis. On the other hand, arts programming may be inconsistent with a centralized, top-down administrative structure that stresses teachers' compliance with administrative rules, performance on standardized tests, and academic competition.

Classroom Teacher Arts Inventory (CTAI) Results

Analysis revealed significant associations between CTAI scales, measuring classroom teachers' practice and comfort level with arts education, and several indicator variables (Table 12).

Results Controlling for Socio-Economic Status

The poverty index for each school was obtained by dividing the number of free-lunch eligible students by the total number of students in the school. Within our sample, the poverty index was negatively associated with arts in schools. That is, more affluent schools tended to have more arts. However, when controlling for the poverty index, characteristic and indicator variables still had significant associations, with Pearsons r correlations generally reduced by < .07.

Qualitative and Quantitative Analysis and Testing

The correlations alone do not allow us to claim a causal link between the arts and the cognitive and social dimensions explored. However, because they are positively and significantly correlated, we were able to proceed to our next analysis phase, to test theoretical models that described effects from arts learning on cognitive, social, and personal learning areas. Our research design was not experimental. Real children in real schools cannot be easily controlled in numbers large enough to encompass the range, diversity, and depth of arts experiences in public schools.

Our results, therefore, are dependent upon theoretical models—in other words, our view of how the world of public school teaching and learning operates, and our view of which variables are likely to affect other variables. Some assumptions are based on common sense: arts classes may affect elaborative thinking scores but elaborative thinking in children is not likely to result in more arts classes. Overall, however, we base our views on literature, the qualitative data derived from our initial field study, and from the final 5 case studies and interviews from our sample of 12 schools.

Qualitative Analysis

Our qualitative data primarily consisted of interview transcripts, site reports, photographs of children's artwork, and children's writing samples. The research team met regularly to compare data and experiences across school-sites. Through this collaborative process, the data collection and filing procedures were systematized, and a pre-analysis identified common findings.

The research team developed a codebook that defined specific characteristics and indicators. Groups of three or more researchers coded sample data in order to reach a common understanding of the definition of each

Table 12. Classroom Teacher Arts Inventory Results

Indicator Variable	Finding
Creativity (TTCT):	All CTAI scales significantly correlated with TTCT Creative Abilities. When students have teachers who collaborate with other arts providers and integrate the arts, they are more likely to have higher creativity scores.
Teacher Perception Scale (TPS)	All CTAI scales significantly correlated with all TPS scales. When students have teachers who collaborate with other arts providers and integrate the arts, they are more likely to have higher expression, risk-taking, imagination-creativity, and cooperative learning scores.
Self-Concept (SDQ-1)	Comparison of CTAI variables and self-concept variables revealed some significant but weak correlations between teacher practice and some self-concept dimensions. These results were similar to results obtained from comparing children's in-school arts experiences with the self-concept scales. That is, children who have teachers who collaborate with other arts providers and integrate the arts tend to have higher reading, math, general school, and total academic self-concept scores.
School Climate (SLEQ)	There were strong, significant patterns of association among school climate variables and CTAI scales. Classroom teachers who integrate the arts and collaborate with other arts providers are more likely to be innovative, enjoy their jobs, and have good relationships with their students. This finding is consistent with results from our field study, with many teachers attributing changes in teacher practice and positive relationships with children to arts programming.

code. This process was repeated with fresh data until the research team reached consensus on the definitions. Coding categories included (a) expression of ideas and feelings, (b) focused perception, (c) making connections, and (d) risk-taking, as well as other cognitive, socio-cultural or personal learning outcomes. After the data were coded we established three criteria for determining the relative importance of each variable: (a) the frequency of the code within the overall data sample transcripts; (b) the frequency of the code across different schools; (c) the quality of the coded data.

The results indicate that *expression of ideas and feelings* and *making connections* were the most cited codes in the cognitive indicator category. *Cooperative learning, school or classroom climate,* and *displaying learning before the school community* were most cited in the socio-cultural category. *Confidence, ownership of learning,* and *task persistence* were most cited in

the personal learning category. *Collaboration among arts providers* was frequently cited in the school and classroom characteristic categories.

The quality of the coded textual data was considered, as well as quantity. For example, the data of a teacher who often said, "My students take risks" was considered less valuable than that of a teacher who explained or illustrated how the students take risks. Even better was observational or interview data of individual children. Through this analysis of the coded qualitative data, we identified several variables that appeared to indicate an effect from arts learning, or that were salient characteristics of teaching or schools that might lead to an impact. These key variables are listed below, with examples from the data.

Cognitive Indicators

Schools with the strongest arts provision provided evidence of these cognitive indicators: (a) expression of ideas and feelings, (b) layered relationships, (c) multiple or alternative vantage points, (d) construction and organization of meaning, and (e) focused perception. The following data gathered through our qualitative research was culled from an interview with a middle school science teacher and presents some exemplars of these multidimensional cognitive indicators.

This year we started a new unit on motion, and I wanted them to go and do research on the different kinds of sporting events, for instance track, and I asked them to write down the different times that the people had. I wanted them to show pictures and present it in a way that would be interesting for the rest of the class. I came up with the idea of mobiles. On one side they would have a picture, and on the other side they would have the writing part of it, and they would hang it up and come around and explain it to the rest of the class. It is just another way to show that what we learn in class is definitely applicable in real life.

The teacher continued by describing her students:

They come up with a lot more ideas. He [one of the students] was the one that came up with the idea of the cylinder rather than just the regular mobile. He wanted people from any angle to look at it and see the theme.

One thing that I have noticed, children who excel in art excel in my class. I don't know if it is because they are very creative in art, or maybe because they are very structured here. A lot of the students in my class that are very structured are invariably the top artists.

The science, drama, and English teachers from the same middle school described how learning in the arts enhances personal learning through construction and organization of meaning. First, the science teacher described the connection she sees for the students between running a science experiment and making a project in visual arts.

You have to have an idea of what you want to do first when you want to run an experiment. You have to sort it out in you head. Write down your procedure... figure out how to carry out this experiment. And the same thing with art, if you want to build something, or make something, what do you want to show? What do you want to relate? What

do you want people, when they see the end result, what do you want them to think about? So I think there is a correlation there.

The drama teacher also characterized similar habits of mind developing in students through drama:

They learn faster through monologues. They learn there is a beginning, middle, and end in their piece.

The English teacher in this school also lent support to these ideas:

The kids who have the self-discipline to process being in band and playing a concert, and the kids who have the self-discipline to learn their monologues, and the kids who have the discipline to fill the page and create something are the kids who are the more organized students.

Socio-Cultural Indicators

Support for the outcomes of compassion and empathy, cooperative learning, and positive school climate came from our qualitative data. Within this study, we found that comprehensive drama programs were particularly associated with the ability to understand and feel for other points of view, and to work collaboratively with other students. Compelling examples of students' enhanced sense of compassion and empathy came from a middle school with a strong drama program which incorporated plays using historical and social themes. In addition, these examples demonstrate that through the drama program students learn to take multiple vantage points, develop layered relationships, and construct and organize meaning.

An English teacher described what the students experienced:

They step in the shoes of the people who endured it [the Holocaust]. And they feel the emotions, and identify with them – what it was like to be trapped underground hiding from the Nazis, and how frightened they were. We have kids recreating it. And they feel the fear, they feel the panic. The kids who have done that can't read that kind of stuff any more with indifference, because they have felt it. What you learn with your emotions is more indelible than what you learn intellectually.

During our research study, the school presented a play based on the Vietnam War, with students performing monologues based on actual letters from the period, written by soldiers, family members, and others. The performance was well attended by the school community, and enthusiastically received. A substantial percentage of the school's students participated in the performance. Student performances were exceptional, and revealed considerable drama learning. Later that year, the students traveled to Washington, DC and visited the Vietnam Memorial. The school director described the experience:

I saw them walk through. As we walked past the wall, children stopped. They read the inscriptions. They read the cards and the letters. They sobbed. One comforted another. At the other memorials, as the kids walked through they were just conversing, but not attending to what they were seeing. We had to push them out of the bus to see a lot of the other memorials. At this one, they were still. One student picked up a letter that had fallen, and stood and read it, and she fixed the flowers. It

took the children a very long time to walk through it. It was my first experience with anything like that, where kids had studied in depth, and performed it, and then seen it. I saw the impact. There was still a hush when the kids got back on the bus.

Visiting the Vietnam Memorial Wall helped me. I had to study so hard for the show about Vietnam, and then we went there and I could really see those soldiers and feel for them. I actually felt like a mother for a moment, even though I could never know exactly until I am one. But I was very upset. (Eighth grade girl)

Another student wrote later about the experience:

After doing a lot work on the drama show, learning the different facts and feelings about the war, it was an amazing experience to go the Wall and see it. The difference is that we also observed the Korean Memorial which for me was not as gratifying an experience because I did not know nearly as much about that war.

There are a number of dimensions to school climate, as demonstrated by our administration of the SLEQ school climate questionnaire. Some of the data we coded for school climate reflected a similar dimension to the student support scale in the SLEQ. The following quotes are taken from coded interview transcripts, where teachers in arts-rich schools attributed their good relationships with students to arts programming.

There is a much closer teacher-student relationship here compared to my previous school.

The teachers are always working with the youngsters during prep, during lunch, before school, after school. The youngsters know that there are a lot of people here who are available as resources for them.

I see an incredible friendship between the kids and the teachers.

Personal Learning Indicators

In arts-rich school settings, we found qualitative support for these personal learning indicators: (a) risk-taking, (b) confidence, (c) ownership of learning, and (d) task persistence. For example, **ownership of learning** is represented by the following example from the data. Here, a teacher comments on the reasons she has her students do visual projects:

This is another way they understand what is going on. They bring their own perspective into it, and it gives them ownership. They feel that they own the work. It's their work. It's not what I taught them.

Teachers from many schools described children involved in the arts as positive **risk-takers**, willing to take chances and express ideas of personal meaning before the school community. Some examples from interview transcripts:

Through drama, students learn to take risks, to get up there and bare their souls. To have the courage to dream that they can do it, and understand the possibilities open to them. (Drama teacher)

I have learned a tremendous amount about expressing my feelings, taking on another character and letting out all of the happiness that is buried deep inside of me. It's not good to be open about your business, but you have to know how to give just enough. When the drama class

learned about expressing our feelings, this helped me in expressing my feelings towards the people I know, and not keeping them inside. (Eighth grade girl)

One little girl would cry because she couldn't do anything well in school. She was very timid. She wouldn't try. Now she's very confident. She looks someone in the eye and speaks to them. She takes risks. (Drama teacher)

Characteristics of Teaching and Learning

Several characteristics of teaching and learning emerged as particularly salient in arts-rich schools, such as (a) administrative support for the arts, (b) collaboration among classroom teachers, arts specialists, and/or external arts providers, and (c) flexible and comprehensive arts programming. We found that we were considerably more likely to identify these characteristics in schools and classrooms where we also found evidence of the cognitive, socio-cultural, and personal learning indicators described in the previous sections.

The following quotes are examples of data that were coded according to our list of characteristic variables. The first quote was coded for **administrative support**:

You are talking to somebody who had very little to do with arts before I came here. This has changed me enormously. I have an appreciation for the arts that I never had before, in every arts area. I have seen youngsters come through here who perhaps weren't as motivated, and I have seen them take off and fly because we pulled them into an art and opened up new avenues. I couldn't work in a school that wasn't totally immersed in the arts anymore. (Principal)

These examples, from a teacher interview transcript, were coded for **collaboration between arts specialists and classroom teachers**:

When we do any project that is art related they go into the art room and get supplies from Ms. Z—get ideas from her. She has given me ideas as well. When I am thinking of a project to do with them, she comes up with some ideas. We work together in a casual way. The next project that we are going to work on, they are going to create their own different plants...imaginary plants. So I'm going to talk to Ms. Z about that: What other materials could we use? (Science teacher)

According to Ms. Z:

There is some collaboration with classroom teachers, usually in an unofficial, informal friendly way. Occasionally the students will do illustrations of original poetry they have done in the English classes. Occasionally the science teacher will come in and say, "I love this. Can you show me how to do it?" (Art teacher)

Regression Analysis

Viewed cumulatively, the qualitative data provided a rich picture of teaching and learning within the schools. The pattern of inter-relationships among the coded data added support to the idea that the characteristics and indicators were linked. Teachers expressed the view that the arts classes were directly leading to changes in cognitive skills and social behavior.

By comparing the results of the qualitative analysis with the quantitative results we were able to develop models of possible avenues of the impact of arts learning within cognitive, social and personal learning dimensions. Based on our analysis, we developed regression models that considered levels of arts programming to be a cause of differences in indicator scores, such as creativity, imagination, risk-taking, school climate, etc. The following tables show the results of regression analyses.

Table 13. Amount and Context of Arts Instruction as Predictors of Elaboration Scores

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.333	.111	.108	1.4413

Predictors: (Constant), Collaboration with external providers, Years of in-school Arts, Integration, Collaboration with Arts Specialists

Table 14. Analysis of Variance - Arts Instruction and Elaboration Scores

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	303.761	4	75.940	36.554	.000
	Residual	2428.560	1169	2.077		
	Total	2732.321	1173			

Predictors: (Constant), Collaboration with external providers, Years of in-school Arts, Integration, Collaboration with Arts Specialists
Dependent Variable: Elaboration

Table 15. Amount and Context of Arts Instruction as Predictors of Risk-Taking Scores

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.292	.085	.084	.8217
2	.309	.095	.094	.8175

Model 1 Predictors: (Constant), Years of in-school Arts
Model 2 Predictors: (Constant), Years of in-school Arts, Integration

Elaboration as a Dependent Variable

The amount of arts instruction a child received, in combination with the classroom teacher's efforts at arts integration and collaboration with other arts providers, were found to be significant predictors of TTCT elaboration scores (Tables 13 and 14).

Risk-taking as a Dependent Variable

The amount of arts instruction a child received, together with the classroom teacher's efforts at arts integration, were found to be significant predictors of TPS risk-taking scores (Tables 15 and 16).

Teacher Innovativeness as a Dependent Variable

The amount of arts instruction a child received, in combination with the classroom teacher's efforts at arts integration and collaboration with other arts providers, were found to be significant predictors of SLEQ Innovativeness scores (Tables 17 and 18).

Similar regression results were obtained from other models, demonstrating that arts in schools significantly predicts various dimensions of the TTCT, TPS and SLEQ scales, such as originality, resistance to closure, expression, and student support.

Table 16. Analysis of Variance - Arts Instruction and Risk-Taking Scores

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	63.864	1	63.864	94,593	.000
	Residual	685.272	1015	.675		
	Total	749.139	1016			
2	Regression	71.487	2	35.743	53.484	.000
	Residual	677.652	1014	.668		
	Total	749.139	1016			

Model 1 Predictors: (Constant), Years of in-school Arts
Model 2 Predictors: (Constant), Years of in-school Arts, Integration
Dependent Variable: Risk Taking

Table 17. Amount and Context of Arts Instruction as Predictors of Teacher Innovativeness Scores

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.986	.937	.936	6.447E-02

Predictors: (Constant), Collaboration with external providers, Years of in-school Arts, Integration, Collaboration with Arts Specialists

Table 18. Analysis of Variance - Arts Instruction and Teacher Innovativeness Scores

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	81.027	4	20.257	4874.258	.000
	Residual	5.490	1321	4.156E-03		
	Total	86.517	1325			

Predictors: (Constant), Collaboration with external providers, Years of in-school Arts, Integration, Collaboration with Arts Specialists
Dependent Variable: Innovativeness

Discussion and Significance

This study examined the artistic experiences of 2,406 children grades 4, 5, 7, 8, in real-world public schools. We set out to capture the children's own perceptions, the perceptions of the teachers who taught them, of the administrators of their schools, and of the research team itself. The research design could not control for all possible variables in the sample sites, although we made strenuous efforts to dig as deeply into each school context as we could. The design was complex, however, in both the cognitive and artistic variables examined and its instrumentation and analysis. This complexity was based on the recognition that children's artistic thinking is diverse and complex, as are the factors in schools that influence their behavior.

Constellations and Relationships

In essence, our combined qualitative and quantitative data suggest a picture of thinking in the arts wherein a set of cognitive competencies, such as: elaborative and creative thinking, fluency, originality, focused perception, and imagination, group to form constellations in pedagogical contexts which demand the ability to take multiple perspectives, layer relationships, and construct and express meaning in unified forms of representation. These higher order competencies are accompanied by an array of dispositions such as: risk taking, task persistence, ownership of learning, and perceptions of accomplishment in school subjects such as reading and mathematics. Students whose cognitive competencies and dispositions scored within what we designated as the "high-arts group" were found to be in schools where the climate for learning included: supportive administrators, knowledgeable and collaborative teachers invested in their own professional development, and a flexible art curriculum which included opportunities for arts integration.

Our study does not offer clear evidence of transfer, or point to the specific effects of transfer on other specific subject disciplines. It does suggest, however, that a relationship exists between learning in the arts and other disciplines. In the first instance, our analysis of the quantitative data demonstrated associations among a constellation of cognitive elements

and dispositions, and exposure to arts learning. Interestingly enough, analysis of the qualitative data reinforced the perception that this constellation emerged in other subject matter disciplines in contexts that call for juggling divergent perspectives, imagination, and layering of relationships among ideas and associations in the construction and representation of meaning. For example, we find these kinds of thinking exemplified in the science lessons which called for "figuring out ideas" or the demonstration of knowledge through the construction of a mobile, and in the English lesson which called for elaborative and creative thinking in the organization of ideas. Is this evidence of transfer?

Given our results, it seems plausible that the generalized nature of what we are calling a constellation of cognitive competencies and dispositions, and the kinds of task demands that bring them into being, imply that the relationship between arts learning and learning in other disciplines is not so unidirectional as other studies have implied but is more dynamic and interactive. Along with Singley and Anderson (1989) and Greeno et al. (1992), we found that groups of cognitive elements such as the capacity for elaboration, fluency, and originality, and underlying cognitive structures such as taking multiple perspectives and layering relationships, are activated by learning in the arts and in other subjects. In other words, we suggest that learning in the arts and in other subjects each contribute in their distinctive ways to a constellation of higher order cognitive capacities and dispositions—or ways of thinking—by activating them within broad and flexible pedagogical contexts.

The significance of these findings for how we think about learning is considerable. We might now question whether transfer, as usually interpreted in the arts education literature—as sets of one-to-one correspondences serving other domains of knowledge—exists, or exists only in very limited circumstances. Yet, transfer has been regarded by many as pivotal in arts learning, defining its relationship to other domains of knowledge in terms of a flow of effects from the arts to other subjects. We agree with Eisner (1998) and suggest that this model is too simplistic. In contrast, we argue that transfer is probably only one of a complex of relationships interweaving arts learning with other domains. This affords us an infinitely more complex and dynamic picture of arts learning in particular, and learning in general. We also suggest that these relationships are fashioned from and activated by constellations of cognitive capacities and processes —or ways of thinking—which have general salience across the curriculum. In short, our data gives us grounds to speculate that learning in the arts and in other subjects consists of a dialectic involving the cumulative effects of participating disciplines.

Conditions in Schools

Our study also shows that the cognitive and dispositional elements we have identified as characterizing the relationship between learning in the arts and in other domains are positively influenced by a number of contextual factors. For example, our data revealed strong patterns of association

between elements of school climate and the kinds of thinking promoted in the arts. As in many other studies, for example, we found that children exposed to strong and varied arts experiences over periods of time, both in and out of school, are more confident and willing to explore and take risks, exert ownership over and pride in their work, and show compassion and empathy towards peers, families and communities (Darby and Catterall, 1994; Luftig, 1994). Young people in arts rich schools also tend to enjoy demonstrating their learning to others and, in general, have a higher academic self-concept than children whose arts learning experiences have been of a shorter duration and less rich in provision. Youngsters who are the beneficiaries of what we have called high-art experiences tend to think they are good at reading, mathematics, and in school generally.

Our study also shows that the beneficial effects of arts learning appear to be intensified by mediating variables: the central role of administrative support—school principals who make possible adequate and flexible arts programming, including integrating the arts within the general classroom; teachers who are confident and innovative in their approaches to learning and who have strong professional interest, and enjoy collaborating with other arts and classroom teachers. Schools that exemplified this kind of administrative support and teacher professionalism were characterized by environments that displayed pupil work and allowed opportunities for public performances and other kinds of demonstrations of learning.

Educational Implications

Given the current interest in the issue of the transfer of arts learning, this study has far-reaching implications. In the first instance, it calls into question the assumption that transfer is the single defining relationship of learning in the arts to learning in other subject disciplines. Rather, it suggests that there are a number of kinds of relationships characterized by different constellations of cognitive competencies and dispositions, or ways of thinking, in arts learning and other subjects. Given this theoretical model, teaching centered on transfer may well be considered rather limiting, both in the arts and in other domains. Moreover, teaching that does not engage constellations of competencies of the kind that have surfaced in this study may offer young people a rather superficial menu of arts learning. For instance, teaching that motivates for elaborative thinking and the exercise of the imagination in contexts that ask for variable perspective taking is more likely to bring about learning that has both artistic and general salience than teaching that motivates for rhythm or pattern alone. Put directly, teaching that assumes transfer—along a one-way street—denies to arts learning a measure of dynamic interaction back-and-forth—along a two-way street—that might add richness to youngsters' competencies and skills.

The entry of the arts into what we suggest is a dialectical relationship with other knowledge domains is dependent upon enlightened administrative support, professionally informed teachers, and the provision of

sufficient opportunities to study the arts in various forms, including integrated study within the daily flow of classroom learning. Our data were very strong and replete on all measures of contextual support for arts learning. Of significance is also the finding that arts provision in schools is not tied to socio-economic status so much as it is to school climate, years of study in the arts, and opportunities to engage in more than one arts subject. As a policy implication this finding suggests that if the arts contribute a richness to learning across the curriculum, then schools should provide a critical mass of arts instruction over the duration of young people's school life. This argument goes some way towards mitigating Eisner's (1998) concern that the justification for arts education is not to be found in assumptions about transfer, boosting, or enhancing other subject disciplines.

Our data also undercut the debate about whether the arts are core or ancillary to learning across the curriculum. Indeed, this issue has been a motivating factor for many investigations of transfer that have sought to show the importance of the arts in serving other disciplines. We have begun to offer solid evidence for learning in and through the arts—learning that is continuous yet distinctive from other school subjects. Interestingly, the only item from our original taxonomy that did not appear to have general salience across subjects was multi-sensory learning. On reflection, this may be a capacity situated more within arts learning than other subject disciplines. After all, the arts offer possibilities for engagements with materials, body, and sound, and encourage sensory-affective responsivity in creating and appraising for which there are not clear-cut parallels in other disciplines. Arts learning, involving as its does the construction, interweaving, and interpretation of personal and socio-cultural meaning, calls upon a constellation of capacities and dispositions that are layered and unified in the construction of paintings, drawings, poems, musical compositions, and dances. Many of these same competencies and dispositions are implicated in other subject domains where they coalesce in equally distinctive forms: mathematical, scientific, linguistic – in the organization of different kinds of meaning, insight, and understanding. What is critical is not that capacities and dispositions transfer, but that they are exercised broadly across different knowledge domains and that no subject has prior rights over any other subject. To diminish one is to diminish the possibility and promise of them all.

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