

Studio Thinking:

How Visual Arts Teaching Can Promote Disciplined Habits of Mind

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In the current climate of educational accountability, arts educators must answer two fundamental questions so that the arts will retain a place within public education: (1) What kinds of thinking skills do arts teachers strive to instill? (2) How can students learn these skills? It is not enough to say that the arts teach "how to paint or draw" or that the arts teach creative expression. We need to go beneath the surface and discover what underlying cognitive and social skills are imparted to students when the arts are taught well.

In the 1980s and 1990s, arts educators tried to skirt these fundamental questions and instead justified arts education by reference to what transferred from the arts to other "more basic" school subjects (Fiske, 1999). For example, a 1995 report by the President's Committee on the Arts and Humanities claimed that "teaching the arts has a significant effect on overall success in school, " and notes that both verbal and quantitative SAT scores are higher for high school students who take arts courses than for those who take none. (Murfee, 1995, p. 3). According to these kinds of arguments, the arts should be in our schools because they help students learn to read, because they boost math performance, and because students who take more arts classes do better on their SATs.

What the Evidence Shows about Transfer of Learning from the Arts

In a project called REAP (Reviewing Education and the Arts Project), our research team examined these instrumental justifications for arts education (Winner & Hetland, 2000). We conducted ten meta-analyses of studies testing the claim that some form of arts education transfers to some form of non-arts learning (e.g., reading, math, verbal/math test scores, spatial reasoning). We first conducted an exhaustive, systematic search for all studies, published and unpublished, carried out since 1950, examining the relationship between arts study and academic

achievement. We included only studies that assessed some kind of non-arts, cognitive outcome, and that compared children who received some type of arts instruction with those receiving either no arts instruction and/or some other form of non-academic instruction. We were able to identify almost 200 studies that met these criteria. We then sorted the studies by art form and outcome, and this sorting allowed us to conduct ten meta-analyses.

Our findings were controversial because they revealed that in most cases there was no demonstrated causal relationship between studying one or more art forms and non-arts cognition. Below we summarize our findings: we found three areas where a causal relationship had been demonstrated and seven in which no clear causal implications can be drawn.

Three Causal Findings

Classroom drama and verbal skills. Classroom drama refers to using acting techniques within the regular classroom curriculum (i.e., it does not refer to the formal production of plays). Podlozny (2000) found 80 studies that met the criteria for meta-analysis, and these studies all assessed the effect of classroom drama on verbal skills. In these studies, children who enacted texts were compared to those who simply read the same texts. Classroom drama significantly enhanced memory for and understanding of the texts, raised reading readiness and reading achievement scores, and improved oral language skills.

The most important finding of these meta-analyses on classroom drama is the demonstration that drama not only helps children to master the texts they enact, but also often helps them to master new material not enacted. The transfer of skills from one domain to another is generally not thought to be automatic: it needs to be taught (Salomon & Perkins, 1989). In the field of classroom drama, however, transfer appears to be naturally designed into the curriculum, even if teachers are not labeling it as such. If teachers of classroom drama did more to teach explicitly for transfer, these effects might be even stronger.

Listening to music and spatial reasoning. In 1993, the journal, *Nature*, reported that spatial-temporal reasoning is temporarily enhanced in adults after listening to Mozart for 10-15

minutes (Rauscher, Shaw, & Ky, 1993). This finding, which became known as the “Mozart effect,” captured the attention of the media and became distorted into the claim that exposing infants to classical music will improve their IQ (no such research has actually been conducted). The extreme media claims led researchers to reject the Mozart effect as bogus. However, Hetland (2000a) conducted a meta-analysis on 36 studies and demonstrated that listening to music does improve spatial-temporal reasoning temporarily when compared to listening to a relaxation tape or sitting in silence. However, the underlying mechanism has not yet been identified. In addition, this finding does not have direct implications for education, since no learning is involved, and the improvement in spatial reasoning lasts only a few minutes.

Making music and spatial reasoning. Studies have also examined whether children who learn to make music in the classroom improve their spatial reasoning abilities. Hetland (2000b) meta-analyzed 19 studies in which young children were taught to make music in the classroom (e.g., by improvising, composing, experimenting with rhythm instruments or moving to music, or by learning to play a particular instrument), and found that the children who learned to make music significantly outperformed those who did not on a range of spatial temporal tasks (such as the Object Assembly test, in which the child must put together a jigsaw puzzle).

However, before policy-makers mandate music instruction as a means to enhance children's spatial abilities, some words of caution are in order. Because the spatial tests were conducted within a few weeks of the end of the music instruction, we do not know how long any enhancing effect lasts. We also do not know whether the effects of music instruction on spatial tests translate to better success in school. They might, or they might not. First, "real world" spatial problems, whether found in mathematics or the block corner or the ball field, may or may not be predicted by success on paper and pencil or table-task tests such as those used in these studies. Second, many classrooms do not give students a chance to use spatial skills, because instruction may not offer opportunities to apply spatial reasoning to school subjects. Third, because spatial reasoning is multi-dimensional (consider the differences in designing a bridge, packing a car

trunk, or finding your way around a new city, for example), it is not clear where the effects of the specifically "spatial-temporal" tasks would show up. Thus, although this is a solid finding, its implications for educational policy are not self-evident.

One Equivocal Causal Finding

Music and Mathematics. In 1999, a study published in *Neurological Research* reported that piano keyboard training along with computer-based spatial training led to greater improvements in mathematics than when spatial training was combined with computer-based English language training (Graziano, Peterson, & Shaw, 1999). A meta-analysis of six studies testing the effect of music learning on math found a nearly significant effect, leading to the conclusion that there may be a causal link between some forms of music instruction and some forms of mathematics outcomes (Vaughn, 2000). More studies are needed before we can determine whether these findings are significant or not.

One Case of Near Transfer

Dance and Spatial Reasoning. Keinanen et al. (2000) were able to find four studies assessing the effect of dance instruction on nonverbal, performance IQ scales and on nonverbal paper and pencil spatial reasoning tests. Meta-analysis of these four studies found a significant relationship and concluded that dance does enhance nonverbal skills. This finding, limited in significance because of the small number of studies combined, is one of "near transfer" given that dance is a visual-spatial form of activity.

Five Non-Causal Findings

Arts Rich Education and Verbal and Mathematical Achievement. Perhaps the most commonly heard instrumental claim for the arts is that they lead to enhanced standardized test scores, higher grades, and lowered high school drop out rates. Just what is the evidence for such claims? Winner and Cooper (2000) synthesized studies that examined the relationship between studying the arts (type of art course was not specified) and verbal and mathematical achievement. In these studies, students were either exposed to the arts as separate disciplines, or they received

such exposure but were also given an arts-integrated academic curriculum. Unfortunately, few of the studies explained in much detail anything about the nature and quality of the arts instruction, or about what it really meant to study an academic subject with arts integration. Academic achievement in these studies was measured either by test scores or grades or academic awards.

When we examined the correlational studies—studies that compared the academic profiles of students who do and do not study the arts either in school or in after school programs, we found a strong general correlation between studying the arts and verbal, mathematical, and composite verbal/math test scores. Thus, 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 to support the claim that studying the arts *causes* test scores to rise.

When we examined the experimental studies testing the claim that studying the arts causes academic achievement to rise, we found no global effects. These studies compared academic performance before and after studying the arts and included studies that integrated the arts with academics as well as studies in which students studied the arts as separate classes. The lack of relationship between arts study and academic achievement held for the 24 studies testing verbal skills and the 15 testing math skills.

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 or mathematical skills.

Arts Rich Education and Creativity. Does studying the arts lead to enhanced critical and creative thinking outside of the arts? All of the studies on this topic that we found assessed creativity via standardized paper and pencil creativity tests. A meta-analysis of these studies showed no significant relationship between arts study and creativity test scores (Moga, Burger,

Hetland, & Winner, 2000). Perhaps the problem is with the outcome measures, and future research should examine more authentic and creative thinking outcomes, such as the ability to find new problems (Getzels & Csikszentmihalyi, 1976).

Visual Arts and Reading. Can studying the visual arts help remedial readers improve their reading? This is the assumption guiding several programs set up in New York City, such as the Guggenheim Museum's Learning to Read through the Arts, Reading Improvement Through the Arts, and Children's Art Carnival, where children with reading difficulties are given experience in the visual arts integrated with reading and writing. These programs consistently report that remedial readers improve their reading scores, and then go on to conclude, erroneously, that the improvement is due to the arts. However, because these programs did not compare the effects of an arts-reading integrated program with the effects of an arts-alone program, we cannot know whether the reading improvement that undoubtedly did occur was a function of art experience, art experience integrated with reading, or simply of the extra reading experience and instruction.

Burger and Winner (2000) therefore examined nine studies that compared an arts-only instruction to a control group receiving no special arts instruction and four that compared an art-reading integration treatment to a control group receiving reading only (four studies). The first group allowed us to see whether instruction in visual art by itself teaches skills that transfer to reading skills; the second group allowed us to test whether reading integrated with art is more effective than reading instruction alone.

We found no support for the claim that the visual arts enhance reading skills and were forced to conclude that programs that help remedial readers improve their reading through a reading-arts integrated program are likely to work well because of the extra intensive reading training that the children receive, independent of the fact that this training is fused with drawing.

Dance and Reading. In Chicago, a program called Whirlwind had sought to improve basic reading skills in young children through dance (Rose, 1999). One of the activities that children in this program engage in is "dancing" their bodies into the shapes of letters. By virtue of

this activity, these children in fact improved their beginning reading skills significantly more than did a control group which did not get the same kind of "dance" instruction. However, the activity of putting one's body into the shape of letters is not authentic dance, though in fact it may prove to be an excellent way of helping children remember letters. Our meta-analysis on the four studies found that more authentic forms of dance showed no causal relationship between dance and reading (Keinanen, Hetland, & Winner, 2000).

Music and Reading. Music has also been claimed to be a way to improve reading skills, possibly because of the effect of learning to read music notation. Perhaps practice in reading music notation makes it easier to learn to read linguistic notation. In addition, perhaps listening to music trains the kind of auditory discrimination skills needed to make phonological distinctions. It is also possible that music enhances reading skills only when students learn to read the lyrics of songs. When Butzlaff (2000) located six experimental studies testing music's effect on reading and performed a meta-analysis on these studies, he found no significant relationship and concluded that there is no evidence thus far that learning music enhances reading in children.

The findings from our REAP meta-analyses showed that for the most part, there is only weak scientific evidence that arts education leads to better performance in other school subjects. The two clear exceptions to this were that classroom drama improved verbal performance, and that music improved spatial reasoning. Does this mean that studying the arts has no effects on non-arts cognition? We believe that the research on transfer to date is too flawed to allow us to draw conclusions. In the words of David Perkins commenting on the above-described meta-analyses, "it is important to stand back from their findings [about lack of transfer] and ask whether the game is essentially over.... Some would say that it had never really begun (Perkins, 2001, p. 117).

The most glaring weakness in the studies conducted thus far on arts transfer is that researchers have failed to document the kinds of thinking skills learned in the parent domain – learning about the arts. Only once we have determined what students actually learn when they

study an art form does it make sense to test hypotheses about transfer. In none of the studies we found for our meta-analyses did researchers analyze what teachers were teaching in the arts, and what students were learning. Without knowing what is learned in art class, we cannot possibly guess at what might transfer outside of the arts.

The remainder of this chapter is devoted to a presentation of our current work, in which we have sought to identify the kinds of habits of mind that emerge from serious art study. Our model, derived from such documentation, provides art teachers a language for describing what they mean to teach and what students learn. Such a language should help advocates explain arts education to policy makers, help art teachers develop and refine their teaching practices, and help educators in other disciplines learn from existing practices in arts teaching. We have focussed here on the visual arts taught at the high school level.

Our goal is three-fold: to document the kinds of habits of mind taught in the visual arts; to develop a teacher-friendly instrument to assess how well students learn these habits of mind; and to provide the ground work for better transfer studies by identifying particular kinds of thinking skills actually learned in the arts that might be useful in other disciplines. In what follows, we describe the findings from the first phase of our study – the documentation of the kinds of habits of mind taught in serious visual arts classes. The second and third phases of our work (developing an assessment tool and carrying out transfer studies) are not yet complete.

Thinking Skills Promoted in Visual Arts Classes

In the fall of 2001, we began working with five visual arts teachers in two Boston-area high schools at which the arts are taken seriously. The Walnut Hill School for the Arts is an independent, residential, suburban school whose student body includes many students who are foreign nationals and non-native speakers of English (particularly from Korea). The Boston Arts Academy is a public, urban school whose students' ethnic, racial, and socio-economic backgrounds represent the demographics of the city of Boston. At both schools, students are admitted through audition into an art form (visual arts, dance, drama, or music), teachers are

practicing artists, and students receive over ten hours of arts instruction per week. During the 2001-2002 school year, we observed and videotaped 38 visual arts classes (some were two, most were three hours in length). After each class, we prepared video clips of what we thought were the most important teaching moments and then interviewed the teachers to find out what they meant to teach and why they had taught that as they had.

In addition to developing the eight "Studio Habits of Mind" through this methodology, we also documented the interaction patterns of teachers and students. We documented three major kinds of classroom structures used by studio teachers, all of which we believe are emblematic of studio arts classes: Demonstration-Lectures, Students-at-Work, and Critiques. Once identified, we coded the 38 classes in terms of when and for how long each structure was used in each single class session.

The Three Studio Structures

We found that studio art teachers interact with students in three primary ways. They generally begin classes with a Demonstration-Lecture (which emphasizes "showing" processes and information that is relevant to the tasks assigned for the class). Most of the class is then spent with students working individually on a project, with the teacher circling through the studio and talking to students individually (we refer to this section as Students-at-Work). In addition, teachers often have one or more Critique sessions per class in which students look closely, reflect on, and evaluate their work and that of their peers. Teachers of other disciplines could well learn from these practices, practices which allow teachers to teach to large classes of heterogeneous students and to practice ongoing assessment of student work.

The Eight Studio Habits of Mind

If you ask someone what students learn in visual arts classes, you are likely to hear that they learn how to paint, or draw, or throw a pot. This is tantamount to saying that students learn techniques specific to the arts in arts class, and would be analogous to saying that students learn writing skills in writing class. We tried to probe this question more deeply. Of course students

learn arts techniques in arts classes. But what else do they learn? Are there any kinds of thinking dispositions that get inculcated as students study arts techniques? Careful study of the student-teacher interactions in the classroom helped us to uncover eight habits of mind which teachers were striving to instill.

We transcribed all the classes and interviews. We divided up the Students-at-Work segments into interaction units between a teacher and a student. An interaction unit could be one exchange or many, as long as the teacher remained in conversation with a single student or group of students. We then coded each unit for the kinds of thinking dispositions we saw being taught. As we watched the tapes over and over we refined our category definitions by working with four representative class sessions over a period of 18 months. After establishing eleven working categories of “studio habits of mind” (later collapsed to eight to facilitate ease of use), we achieved inter-rater reliabilities for coding of the remaining classes of between .71 - .91 for two independent raters. We describe each habit of mind below, in alphabetical order.

Develop Craft

Perhaps the most obvious habits of mind that students are taught in an art class are about craft. Students acquire the skills needed to work in various media, and we refer to this as Develop Craft: Technique. Here is where students learn to use tools (brushes, pencils, view-finders) and materials (charcoal, paint, clay). Students are meant to learn the varied properties of tools and materials and the range of ways these can be employed. Students also learn to care for materials and tools, and we refer to this as Develop Craft: Studio Practice. Here students develop a sense of which tools and materials to choose for the piece they wish to make. Whenever we saw students being taught to develop craft, we also saw one or more of the other habits of mind being taught as well.

Engage and Persist

Teachers in visual arts classes present their students with projects that engage them, and they teach their students to persist in their work and stick to a task for a sustained period of time.

Thus they are teaching their students to focus and develop inner-directedness. They teach them to break out of ruts and blocks and to feel encouraged about their work so that they are motivated not to give up. This habit of mind is taught first and foremost by presenting students with challenging projects that engage them and require sustained work. But this habit is also taught by reminding students to stay focussed, by pushing students to keep going, and by discouraging students from quitting. As one of our teachers said, she teaches them to learn “how to work through frustration.”

Envision

Students in visual arts classes are meant to learn to envision what they cannot observe directly with their eyes. By envisioning we mean generating images of possibilities in one’s mind. We saw envisioning taking several forms. Sometimes students were asked to generate a work of art from imagination rather than from observation. For instance, in one class the teacher asked students to paint an imaginary landscape. She asked them to think specifically about the light in the landscape. “Where is the light coming from? Is it day or night? What is the light like? Is it bright or foggy?” Sometimes students were asked to imagine possibilities in their works that are not yet there. For instance, our ceramics teacher told his students, engaged in making a ceramic tile project, “You need to know what each tile will look like before you start making it.” Sometimes students were asked to imagine forms in their drawings that could not be seen because they were partially occluded. And sometimes they were asked to detect the underling structure of a form they were drawing and then envision how that structure could be shown in their work. In all of these cases, students are being encouraged to generate a mental image that will help guide their work.

Express

Students are taught to go beyond craft to convey a personal vision in their work. We refer to this as learning to express. Learning to express includes making works that exemplify properties that are not literally present, such as moods, sounds, or atmosphere (Goodman, 1976).

Learning to express also means making works that convey a strong personal meaning. As one of our drawing teachers said, "...art is beyond technique...I think a drawing that is done honestly and directly always expresses feeling." Here is a quote from this same drawing teacher in which he makes it clear to students that the power of a drawing depends far less on technical skill than on how expressive the drawing is. Students are drawing from the model: two people are posing at opposite ends of the room, and the task is to capture something about the space between the two figures.

"You're going to have to include all this space, this empty space. Now that's going to be a big challenge in your drawing, because something is going to be in that space...The strength of the drawing is going to depend very much on the evocative nature of this space." He draws students' attention to the expressive qualities of a Hopper painting to make the point that the evocative power of a picture hits us before the content does. About the Hopper painting, he said, "When they look at it, they don't think 'look at the figures.' They think 'wow, it's late mysterious night...'" That is the subject of the picture. It's not just a drawing of a figure."

Observe

"Looking is the real stuff about drawing," one of our teachers told us. The skill of careful observation is taught all the time in visual arts classes and is not restricted to drawing classes where students draw from the model. Students are taught, both implicitly and explicitly, to look more closely than they ordinarily do and to see with new eyes. Students are helped to move beyond their habitual ways of seeing and to notice things that might otherwise be invisible. Students are taught to look closely at their own works (the color, line, texture, forms, structure, expression, and style), at others works (whether by their peers or by professional artist), and at the world (when they are working from observation).

We saw drawing teachers using the view-finder as an observation tool. Students were given a view-finder to look through so that they could select a composition that they would then draw. As one teacher said to his students using the view-finder, "Instead of panting what we see,

we're going to see what you would paint." Looking through the viewfinder is also meant to help students learn to see objects as only lines, shapes, and colors in a frame. "Forget that you are looking at a bucket or a person's hair, or a table and a chair...Forget that these are objects that have any real definition. I want you to simply concentrate on the lines that are created and the depth in what you see." This teacher then went on to model the skill of observing through the view-finder. "Right here I am paying attention particularly to the way this line goes diagonally across this frame, and then there is another little line underneath it that I can see has a little bit of a distance. It's a different color, different texture, and the line is thicker because from my perspective this line is a little thinner than this line down here."

We also observed students being encouraged to look closely at the objects or forms from which they were drawing (e.g., "...get some of these straight verticals in, like maybe that big pedestal there, or maybe that box down there...so you can work these big diagonals against that") as well as at their drawing (e.g., "Where is your horizon line?"). They were encouraged to see the underlying geometry of complex forms. "Whether you're drawing a person or the most complicated thing in the world, you want to see it in simple terms first...If you just think of chest and muscles and arms and everybody's different shape, it can be overwhelming. But if you think of someone as just a cube and another cube attached, it can really help to simplify it." In short, students were taught to look in a new way, and this took many forms.

Reflect

Students are asked to become reflective about their art making and we saw this reflection take two forms. Students are asked to think about and explain their process, intentions, and decisions, and we refer to this aspect of reflection as Question and Explain. Students are also asked to judge their own work and that of others, and we refer to this as Evaluate.

Question and Explain. Teachers often ask students to step back and focus on an aspect of their work or working process. We often noticed teachers asking students to explain *what* some part of their drawing depicted, *how* they had achieved a certain effect, *why* they had made

something the way they did, and *what* changes they were planning in their work. These open-ended questions prompt students to reflect and explain, whether aloud or even silently to themselves. These kinds of questions help to foster an inner reflection. Our ceramics teacher explained to us that posing questions to students helps them become aware of the choices they make as they work. When students say, “this is the way I want it,” he urges them to think about why.

Evaluate. Students in visual arts classes get continual training in evaluating their own and others’ work. Teachers frequently evaluate student work informally as they move around the room while students are working, as well as more formally in critique sessions. Students can learn from these consultations and critiques how to evaluate themselves and others. Students are also asked to make evaluations themselves—they are asked to talk about what works and what does not work in their own pieces and in ones by their peers. Thus students are learning to make aesthetic judgments and to defend them. Because they are engaged in continuous self-assessment, they have the opportunity to learn to be self-critical and to think about how they could improve.

Stretch and Explore

Students are asked, implicitly and explicitly, to try new things and thereby to extend beyond what they have done before – to explore and take risks. When teachers encourage students to stretch and explore, they do not tell students exactly what to do. Instead, they urge students to experiment, to discover what happens, to muck around, and try out alternatives. Comments such as “See what would happen if...,” “How else could you have done this,” “Don’t worry about mistakes, be brave” were all ones prompting students to adopt an exploratory risk taking attitude and discover that instead of avoiding mistakes one should capitalize on them. As our painting teacher said, “You ask kids to play, and then in one-on-one conversation you name what they’ve stumbled on.”

Understand Art World

Students in visual arts classes learn about art history and the practicing art world today and their own relationship to today's art world. They also learn to see art making as a social and communicative activity. We called all of this learning Understand Art World, and broke this learning into two components: Domain and Communities.

Domain. Students are meant to learn about the domain of art. While art history is not taught in a systematic fashion in studio arts classes, teacher often ask students to look at reproductions of works of art that relate in some way to the project students are engaged in. Students are meant to learn about their own relationship to the domain of art and consider the similarities between the problems explored in their own works and those explored by established artists. For instance, when students were engaged in drawing two figures standing far apart separated by an evocative lonely space, our drawing teacher asked them to study the same kind of atmosphere evoked by Diebenkorn and Hopper paintings.

Communities. Students are meant to learn about the community of people and institutions that shape the art world – the “field” of art (Csikszentmihalyi, 1988). By this we refer to galleries, museums, curators, gallery owners. These gate-keepers decide whose work will be exhibited and immortalized. Students are taught to think about their relationship to the art community and to consider ways that they might fit into this community if they want to become professional artists. They must learn how to present themselves as artists (e.g., by matting and framing their work, making slides, creating a portfolio, or hanging a show). All of these activities are ways in which students learn to become part of the *profession* of artists, if this is to become their career choice.

The community component of Understand Art World also refers to learning to work collaboratively with peers on group projects, as well as learning from others' work.

Do the Studio Habits of Mind Transfer?

These eight habits of mind are important in a wide range of disciplines, not only in the visual arts. Students must learn a great deal about tools and materials in a science lab, and this kind of learning is analogous to *developing craft* in the art studio. The skills of *engage and persist*

and *stretch* and *explore* are clearly important in any endeavor: students need to learn to find problems of interest and work with them deeply over sustained periods of time, and to experiment and take risks. The skills of *observation* and *envision* are clearly important in the sciences. The skill of *reflection* (including self-evaluation) is important in any discipline. Perhaps the least general of the eight habits of mind are *express* and *understand art world*. Yet even these might have broader reaches. Clearly learning to *express* is often important in any kind of writing that one does, even in analytical non-fiction. And *understand art world* may be more broadly construed as learning to see links between what one does as a student in a particular domain with what professionals in that domain do.

If a habit learned in the arts is a general one that would be useful in other domains, it does not follow that this habit transfers to other domains. The transfer hypothesis remains a hypothesis to be tested, but it is a plausible one. It is our plan to test the hypothesis that particular habits learned in the arts transfer to particular domains outside of the arts. For example, it seems reasonable to suggest that the habits of both observation and envision may transfer to a science class. It is possible that these habits would transfer only if students were explicitly taught to think about those that they had learned in arts class and to try to use them in biology class, for example. For each of the habits identified as learned in the arts, we can think carefully about how and where it might be deployed outside of the arts and then test for transfer. We need to assess how well each habit has been learned in the parent domain and then determine whether depth of learning in the arts for this habit predicts how well the habit is used outside of the arts. In our view, this is the only logical way to go about testing for transfer.

Michael Timpane, former university president and former federal education office policy director, was paraphrased as follows by Richard Deasy and Harriet Fulbright's "Commentary: The Arts Impact on Learning," *Education Week*, January 24, 2001. "Arts education research today is at an early stage of its development... [similar to] research on reading, where the accumulation of studies over time gradually honed the understanding of educators and policymakers as to the best

policies and practices." It is our hope that our work will move arts education research up one firm notch.

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