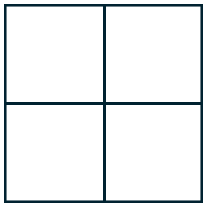

overview

Essay

The Arts and the Transfer of Learning

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Introduction

The idea that learning in one setting has positive effects "beyond the conditions of initial learning"[1] has engaged cognitive psychologists for at least a century. This should be no surprise. What and how children learn occupy center stage in education research; the impacts on future learning and action deserve an equally prominent place. As one recent review has pointed out, our entire system of formal schooling is built on the assumption that what children learn early on impacts what they learn in later grades; and that what students learn during formal education affects behavior after they leave our schools and colleges.[2] Educators would be quick to agree that skills, attitudes, and work habits surrounding schoolwork rank high among instructional goals—and that for many students such capabilities and orientations accrue over time and by all indications settle in as enduring traits. Debates about the necessary definitions, measures, and designs for inquiry notwithstanding, we refer in these cases to transfer. Transfer denotes instances where learning in one context assists learning in a different context.

Despite the "goes-without-saying" quality of transfer, learning research over the years has failed to corroborate transfer far more often than it has managed to support its existence. The failures are interesting. Children may persist for years studying Latin or rote mathematics under assumptions that general mental discipline will result. Available studies say it does not. Or we might assume that problem-solving strategies learned in one circumstance would naturally carry forward to approaches to solving analogous problems. Things don't always work that way. We might even think that something so specific as learning to judge the area of a rectangle would show up in ability to judge the area of a circle. Not likely, say researchers. Transfer has acquired a tarnished reputation over the years in the realms of learning and developmental psychology—transfer is difficult to achieve, and it is not often found, at least through the methods by which it has been studied. Under the circumstances, it is not surprising that research on transfer lay fairly dormant in recent decades.[3] Why pound one's head against a wall in anticipation of non-publishable research findings?

Arts into the breach

"At the level of neuro-function, learning experiences unequivocally impact future learning experiences."

With transfer so assigned to an intellectual backwater, it is only natural that recent worldwide attention to the academic and social effects of learning in the arts has stirred up the academic and artistic communities. A significant chronological marker seems to have been an announcement by researchers at the University of California[4] that was translated by the national media and parents across the nation as "Mozart makes you smarter." Flocks of listeners became curious, active, or agitated in response to the idea. Some academics scurried to replicate and extend the music studies; others took up studies of myriad possible effects of learning in and through other art forms.

Amidst the excitement, skeptics raised their voices. One group was learning psychologists who had reason, according to the traditions of their discipline, to question anything smacking of transfer. Surely, they felt claims such as cognitive development through music, reading achievement through drama, problem-solving through the visual arts, or persistence through dance must be based on flawed research. Or if examined closely, such relationships must be trivial, or not instances of transfer at all, or simply evidence of something else. And the nation's arts educators and artists found themselves in a dilemma as interest in learning through the arts escalated. They feared that the talk of learning mathematics through music or producing increased standardized test scores through the visual arts would demean the higher place of art in society, further shielding the intrinsic worth of the arts from the public eye. At the same time, however, increased interest in the arts was serving to shift public and private resources toward arts education in a significant way. Some artists and arts educators heralded a revival of the arts, for whatever rationale; others felt their callings compromised.

1 John Bransford and Daniel Schwartz (2000). Rethinking Transfer. Chapter in Review of Research in Education, Volume 24. Washington, D.C.: American Educational Research Association.

2 ibid.

3 This brief overview is based directly on the Bransford & Schwartz characterization of past research on transfer.

4 Shaw et al., 1996

Transfer – a neurological basis

Widely accepted theories of cognition shed light on the transfer debate. At the level of neuro-function, learning experiences unequivocally impact future learning experiences.[5] The main questions are the nature and extent of impacts rather than whether or not effects exist. Experiences reorganize neural pathways, neural receptors, and functioning of specific brain regions such that subsequent experiences are received differently, at levels ranging from trivial or behaviorally undetectable to profound and exceedingly apparent. The experience of hearing a single musical note for the first time provides an illustration—say a well-attacked F sharp from the low register of a contrabassoon. This auditory experience impacts multiple and interacting regions of the brain—those engaged in feelings and attitudes (that sounded good but scared me), memory (I won't forget that), linguistic and rational responses (how did she do that?), autonomous reactions (increased heart rate), to name possible primary responses. When the same note is heard a second time, triggered neural impulses also travel paths among regions of the brain—those involved with cognition, memory, feeling, value, and autonomous response—but in patterns different from those traveled when the note was new. In its first pass, the brain sets up a filing system of sorts for the experience—the reaction on a second hearing may be one of recognition, pleasure or pain of familiarity, discernment, or perhaps rational discourse. Nonetheless, all from a brain restructured by experience.[6]

If a musical note can propel and reorient millions of neurons, the arts experiences described in this Compendium clearly impact the cognitive structures of the children and students involved. To begin, learning in the arts alone should be seen as evidence of cognitive restructuring—the increased expertise of a watercolorist or dancer manifests in neural reorganization. In turn, if altered neuro-function is a consequence of learning in the arts, it is reasonable to think that such neural-conditioning could enhance performance in related skills, either through improved related cognitive functioning or through positive affective developments such as achievement motivation.[7]

Thus we establish a neuro-function argument supporting learning through the arts—the cultivation of capabilities and understandings that occur as "byproducts" or "co-developments" of the changes in cognitive and affective structures brought about by experiences in the arts. More directly, the argument suggests that experiences in the arts create capabilities or motivations that show up in non-arts capabilities.

Transfer in the Compendium studies

This Compendium displays the results of a sizable effort to catalog and describe research on the effects of learning in the arts on academic and social skills. In order to explore the many relationships suggesting evidence of transfer in these studies, it may be useful to provide a detailed portrait of the many arts-related academic and social outcomes that in fact find support in research.

Figure 1 presents just such an inventory. A first reaction might be that a great many academic and social developments have been linked to the arts in accumulated research—65 core relationships by rough count and more if every nuanced outcome variable across all compendium studies were to be listed. Of the relationships shown

Figure 1. Compendium Summary: The Arts and Academic and Social Outcomes

Arts Learning:	Cognitive Capacities and Motivations to Learn:
Visual Arts	
Drawing	Content and organization of writing.
Visualization training	Sophisticated reading skills/interpretation of text.
Reasoning about art	Reasoning about scientific images.
Instruction in visual art	Reading readiness.
Music	
Early childhood music training	Cognitive development
Music listening	Spatial reasoning. Spatial temporal reasoning. Quality of writing. Prolixity of writing.
Piano/keyboard learning	Mathematics proficiency. Spatial reasoning.
Piano and voice	Long-term spatial temporal reasoning.

5 Bransford, J. et al. (Eds.) How People Learn, Expanded Edition. Washington D.C.: National Academy Press, 2002

6 Damasio, A.R. Descartes' Error:Emotion, Reason, and the Brain. New York: Avon Books, 1995. (First published in 1994.)

7 Sylwester, R. A celebration of neurons:An educator's guide to the human brain. Alexandria, VA:ASCD

Music performance	Self-efficacy. Self-concept.
Instrument training	Reading. SAT verbal scores.
Music with language learning	English skills for ESL learners.

Classroom Drama

Dramatic enactment	Story comprehension (oral and written). Character identification. Character motivation. Increased peer interaction. Writing proficiency and prolixity. Conflict resolution skills. Concentrated thought. Understanding social relationships. Ability to understand complex issues and emotions. Engagement. Skill with subsequently read, unrelated texts. Problem-solving dispositions/strategies. General self-concept.

Dance

Traditional dance	Self-confidence. Persistence. Reading skills. Nonverbal reasoning. Expressive skills. Creativity in poetry. Social tolerance. Appreciation of individual/group social development.
Creative dance	General creative thinking – fluency General creative thinking – originality, elaboration, flexibility.

Multi-arts Programs

Integrated arts/academics	Reading, verbal and mathematics skills. Creative thinking. Achievement motivation. Cognitive engagement. Instructional practice in the school. Professional culture of the school. School climate. Community engagement and identity.
Intensive arts experience	Self-confidence. Risk-taking. Paying attention. Persevering. Empathy for others. Self-initiating. Task persistence. Ownership of learning. Collaboration skills. Leadership. Reduced dropout rates. Educational aspirations. Higher-order thinking skills.
Arts-rich school environment	Creativity. Engagement/attendance. Range of personal and social developments. Higher-order thinking skills.

"Gardner applauds two different types of transfer from the arts that should be considered foundational."

in Figure 1, some links prove to be stronger than others, some less. Some relationships appear in multiple studies, others in only one or two high-quality investigations. The main task here is not to parse this inventory according to comparative strengths of relationships—the essays corresponding to each arts form and the study summaries themselves can assist readers in these purposes. The message of Figure 1 seems first that research has identified a wide variety of academic and social developments to be valid results of learning in or engagement with the arts. Moreover, because the studies chosen for the Compendium met strict criteria for quality of design and their ability to make causal suggestions, Figure 1 suggests the "state of research" on the impact of the arts on academic and social development; the figure at least maps the territory in which effects have been reliably demonstrated.

The Compendium's studies organized and outlined in Figure 1 all show evidence of transfer in the sense that learning activities in the arts have various effects beyond the initial conditions of learning. Virtually all of our studies can be said to fit under such an umbrella; and the myriad ways they can be seen to fit are worth explication. Research on the arts and learning has far transcended the need to test whether or not the arts have impacts with potential manifestations beyond direct learning in the art forms. Of present interest is just what are such manifestations and what can be said of their importance or how they come about. Two somewhat overlapping organizing schemes are useful for considering transfer across the studies in this Compendium. One addresses how similar transferred learnings are to the learnings observed or claimed as their progenitors. The second entails some partitioning between cognitive (skill-based) transfer and affective (motivation-based) transfer.

Similar learnings – near and far. One differentiating quality within the idea of transfer is the degree of similarity between the context in which learning in the arts occurs and the context in which transferred developments are seen and measured. This question closely follows the discussion of transfer and neuro-function above: because specific skill developments impact cognitive structures, similar or closely related skills engaging the same structures may benefit. Some refer to this as a condition of near transfer (very similar contexts). In contrast, skill transfer where the resulting skills bear little similarity to the skills learned (say in the arts) or where they are used in very different situations has been called far transfer (disparate contexts).

These terms are useful more in a heuristic sense than in a substantive sense. While "far" transfer may seem more impressive as a phenomenon in its suggestions of transformed behavior or unexpected effects, any transfer to learning, near or far, is better judged on the veracity of the claimed relationship along with the value of the outcome itself. For example, when reading comprehension skills result from artistic learning that itself involves reading (such as certain classroom drama activities) or when mathematics achievement results from training in music, both outcomes—reading skills and mathematics skills—should be judged in their own right, not at one level of value or another just because the transfer came from near (drama to reading) or far (music to mathematics).

Transfer through motivation. A second way of thinking about transfer from the arts is to distinguish transfer of cognitive or thinking capabilities from transfer of affective orientations, particularly various orientations linked to motivation. Cognitive development of course refers to increased abilities and expertise supporting such developments as academic achievement or social understanding. Affective development refers to the willingness of individuals to put their skills to use: their intrinsic and extrinsic interests in what they are learning, their engagement with tasks at hand, the importance they assign to success, the attributions they make for their success, and the feelings of self-worth generated through effective performance.

Affective gains from the arts find much support. Psychologist Howard Gardner points out that certain learnings in the arts are quite likely to spill over, even if the arts are not in a unique position to make such claims of transfer. In a recent essay on multiple intelligences and the arts, Gardner applauds two different types of transfer from the arts that should be considered foundational. First, in reacting to widespread advocacy for nurturing different intelligences in school in response to his writings, Gardner registers his comfort with the idea, "…because participation in the arts is a wonderful way to develop a range of intelligences in children."[8] A conception implied is that participating and learning in an art form can cultivate awareness, judgment, facility, sensibilities, connoisseurship, and other cognitive attributes that we might associate with artistic or other intelligences more generally. These developments can in turn impact the way children learn or the way they choose to express themselves within the disciplines and perhaps across disciplines. An example is gaining artistic intelligence through progressive learning as a painter. Art skill and artistic intelligence surely are close in kind, yet they may involve some dimension of transfer; intelligence gained is a positive outcome lying beyond the initial conditions of learning to paint or to dance.

Gardner also helps with another notion of transfer in the arts—a sort of transfer that does emerge in the Compendium's studies. Among what Gardner describes as "…the compelling reasons for arts education…are the likelihood that skill and craft gained in the arts help students to understand that they can improve in other consequential activities and that their heightened skill can give pleasure to themselves and to others."[9] This points to instances in which heightened self-concept ("I can succeed on stage") can lead to heightened academic or social

8 Howard Gardner. The happy meeting of multiple intelligences and the arts. Harvard Education Letter, 15/6 (November/December) 1999, 5.

9 Howard Gardner, op. cit.

self-concepts through some mechanism of transfer. Several of our studies included measures of self-concept that were spawned by successful artistic accomplishments and experiences, although Gardner reminds us, correctly, that the arts hold no monopoly on creating transferable feelings of self-worth. Here an important question becomes under what conditions and for whom does success in the arts transfer to success and persistence in school? While success in most anything in school might be assumed to have similar spillover effects, it appears that the arts can attract students who have been pushed away from other opportunities for success in school. Compendium studies showing at-risk and failing students revived by immersion in arts programs offer such suggestions—including that students benefit from engagement inspired by the complexities of the arts in well-drawn programs. Among the relationships shown in Figure 1, learning to perform music, learning in traditional dance, and dramatic enactment emerge in our studies as augmenting general self-concept. It may not be a coincidence that the studies involved are in the performing arts, where demonstrating skills for audiences is an integral component.

"…if story understanding, reading comprehension, and topical writing are valued curricular goals, the drama studies in the Compendium offer suggestions of promising ways to pursue these ends."

The arts and motivation more generally. It is a short step from self-conception to broader ideas of achievement motivation and engagement, and some of the Compendium studies show effects in these areas. Research on self-concept is a component of the larger human development domain of motivation. In this domain, notions of intrinsic and extrinsic interest in schoolwork, levels of cognitive engagement, and attributions made by children for their success or failure in school are central issues. Several of the multi-arts program evaluations summarized in the Compendium, along with specific studies in arts learning, conclude that children are more engaged when involved in artistic activities in school than when involved in other curricular activities. Higher engagement is observed when children integrate the arts and academic learning in programs such as the Chicago Arts Partnerships in Education.[10] Individual studies involving at-risk students frequently characterize their success as a consequence of induced or revived enthusiasm for school attained through the arts.[11] Claims of transfer in the form of higher engagement include observations that children in schools with high levels of arts experiences are generally more engaged and motivated in school. This can be seen as the transfer of attitudes or orientations about school from learning in and with the arts to learning situations more generally. Perhaps children who find parts of their school day satisfying and fun through the arts become more sanguine about the whole school experience.

Arts as curricula for academics. Research studies on drama in education illustrate additional ways that transfer can be considered and observed. One perspective is that the studies in classroom drama tend to focus on what could be called near transfer according to the discussion above. In some cases, the learning studied is so near to learning in the dramatic experience that naming the phenomenon transfer might be called into question. For example, the majority of drama studies in the Compendium connect dramatic enactment with story understanding and reading comprehension. Considering what dramatic play may do to produce such effects conjures suggestions that drama is in fact a curriculum for story and reading comprehension. Witness the Compendium's study designs: young children who act out a story after hearing it read to them ultimately understand the story better—its sequence, its details, its characters—than children who hear the story and then process it through a traditional classroom discussion. In such studies, we might say that dramatic enactment is simply a better way to process a story than a teacher-led discussion; this appears to be the case. As such, when a child's story comprehension is shown to be greater after participation in an enactment than when simply listening to the story, it may be a stretch to call such learning an incidence of transfer. Dramatizing is simply a good way to learn a story. Or when young children write more effectively after acting out a situation, in contrast to receiving a teacher-led lesson, we might say that such dramatization is a better curriculum for topical writing than traditional classroom instruction regarding the topic. But whether or not this should be called transfer is debatable. But an important point should not be lost in the discussion—if story understanding, reading comprehension, and topical writing are valued curricular goals, the drama studies in the Compendium offer suggestions of promising ways to pursue these ends.

Dramatic enactment usually produces an environment focused on interpersonal relations, and here we must acknowledge both opportunities for and evidence of transfer. In drama studies focused on such relations, we see impacts on character understanding, comprehension of character motivation, increased peer-to-peer interactions, increased conflict-resolution skills, and improved problem-solving dispositions and strategies. These outcomes, more than story understanding and writing through classroom drama, seem to be evidence of transfer.

Music and spatial reasoning. Nowhere in the spectrum of arts learning effects on cognitive functioning are impacts more clear than in the rich archive of studies, many very recent, that show connections between music learning or musical experiences and the fundamental cognitive capability called spatial reasoning. Music listening, learning to play piano and keyboards, and learning piano and voice all contribute to spatial reasoning. While

10 See the summary of the Chicago Arts in Education: Evaluation Summary in this volume.

11 An example is Jeanette Horn's 1992 study, An Exploration into the Writing of Original Scripts by Inner City High School Drama Students, summarized in this volume.

"…transfer of skills from learning in the arts should be more pronounced for students who learn more in the arts."

spatial reasoning is not a measure in other music studies, some of the outcomes measured in music research have strong ties to spatial reasoning ability: mathematics, reading and verbal competence, and writing ability. In the vast literature on spatial reasoning (about 3,000 studies in some bibliographies[12]), it is clear that mathematical skills as well as language facility benefit directly from spatial reasoning skills. Some core concepts in mathematics are inherently spatial in character, proportions and fractions as examples. In the case of language development, the relationship is a bit more oblique but nonetheless robust: what we write, what we read, and what we hear involve words that are used and understood in specific contexts. These contexts can be seen as spatial networks involving words with related words, words with their historical backgrounds, words with their social relationships, and words with nearly placed words in expressions. Spatial reasoning is also fundamental to any planning task—a capacity without which we would have trouble organizing our daily lives. The music studies in this Compendium testifying to benefits in the form of spatial reasoning skills are not to be taken lightly. Future studies, including direct neurological studies, are likely to affirm and extend what we see in present research.

Where to from here?

While a great many relationships between the arts and human development have been drawn under the umbrella of transfer, several directions for future research in these traditions seem important. One is a closer examination of "learning in the arts" at the front end of the transfer equation and a closer relationship between transfer research with the more complex and situational views of learning populating the literature in recent years. Another is addressing the clear shortage of transfer studies in the visual arts and dance. And research on the arts and learning might follow the cues of Bransford & Schwartz[13] to test for longer-term impacts on thinking skills and problem-solving dispositions.

More on learning in the arts. Most of the research designs employed in the Compendium studies differentiate average outcomes for students participating in one arts training or arts-related experience versus comparison students without such experiences—classroom drama or not, visual training or not, keyboard lessons or not, or listening to Mozart versus Bach. This assuredly distinguishes learners from those who have had arts training or an arts-related experience and those who have not and sets up conditions in which effects of the arts can be identified. But the Compendium studies generally do not examine learning in the arts within their treatment groups, despite the fact that doing so could significantly increase the power of arts transfer studies. The central point is that transfer of skills from learning in the arts should be more pronounced for students who learn more in the arts. Many designs come to mind: gauging the acquisition of drama skills in a training program across participants to see if high learners gain more in the way of transferred skills; sorting subjects by measures of learned keyboard skills to see if more learning in music associates with higher acquisition of spatial reasoning skills. One suggestion of this design appears in drama studies showing more transferred skill development among those children who spontaneously get out of role to direct or lead a classroom dramatization. These children may be learning more drama and consequently gaining reading or interpersonal skills faster; but they may simply be higher-achieving children within the drama groups to start with—a crucial distinction.

"…we know far less about transfer from learning in the visual arts and dance than we do in drama and music."

More attention to contemporary views of learning. As just argued, the pursuit of transfer in the Compendium's studies does not at the same time illuminate the nature or degree of learning from which transfer takes place, relying instead on differentiating group treatments or experiential accountings of arts experiences. It is equally evident that current studies on the roles of the arts in academic and social development do not unpack either in fine detail or within comprehensive cognitive models the learning processes accounting for transfer. This point should not be interpreted as an oversight on the part of the researchers—this Compendium contains studies carried out in careful designs that support the relationships argued.

Nonetheless, more thorough understandings of the transfer of learning—from the arts as well as more generally—would require additional and different research. Such inquiry would ultimately need to accommodate growing evidence and beliefs that learning is situational, interactive, and extremely complex. This complexity can be seen in full color in the more completely rendered images of cognitive activity shown in brain scans; it also appears in the models of cognitive scientists attempting to illuminate a full spectrum of influences at play when children learn.

Learning and the role that transfer (by whatever definition) plays are far more complex than simple conceptions allow; we see a range of different words in use to characterize learning such as "parallel," "entangled," "entwined," and "contextual," all of which suggest that not all transfer is alike and that it is not direct. Contextual or situational explanations pose relationships that are key for learning and that will probably begin to define

12 One spatial reasoning bibliography focused on computer science numbers 2700 studies (http://liinwww.ira.uka.de/bibliography/Ai/Spatial.Reasoning.html). Another on-line source organizes spatial reasoning research into broad categories including cognitive and linguistic studies (http://www.cs.albany.edu/~amit/spatsites.html).

13 John Bransford and Daniel Schwartz (2000). Rethinking Transfer. Chapter in Review of Research in Education, Volume 24. Washington DC: American Educational Research Association.

"transfer" as distributed cognition or situational cognition. Processes of transfer would be seen in interactions and relationships of various sorts, and new states of learning, either new knowledge or new understanding, should be seen as the product of these relationships. The implications for this Compendium? While the Compendium research documents valid links between the arts and academic and social abilities, an extended and complementary program of research is needed if we want to understand transfer in its full cognitive glory.[14]

More studies in the visual arts and dance. There are abundant and strong studies supporting transfer from learning and experiences in drama and music, but a significant shortage of studies in the visual arts and dance. The imbalance is considerably wider than the listing in Figure 1 implies. The many relationships shown under drama and music show up in multiple studies. The relationships shown for the visual arts derive from only four studies, and there are about the same number of studies in dance as there are relationships cataloged. Clearly, we know far less about transfer from learning in the visual arts and dance than we do in drama and music. If research is drawn to vacuums, here are two for the taking.

"…transfer could materialize if researchers would reformulate their theories about transfer and exercise patience in seeking its manifestations."

A higher order of transfer. An enticing contribution of the Bransford & Schwartz review discussed above is the introduction of a formal definition of transfer that contrasts sharply with prevailing conceptions including those seen in the Compendium studies. These scholars argue that traditional studies of transfer have been exceedingly narrow in their search for various direct applications of learning. As such, research to date has been myopic in not asking questions about the degree to which learning experiences might prepare students for future learning or have long-term repercussions on how learners approach any sort of problematic situation. Bransford & Schwartz hypothesize that transfer could materialize if researchers would reformulate their theories about transfer and exercise patience in seeking its manifestations. Transfer may be thought to leap beyond immediate tests of application altogether. The arts and human development generally, and the Compendium's studies particularly, are good candidates for such rethinking. The "preparation for future learning" concept of transfer offers an enticing but relatively unattended prospect that seems tailor-made for research in the arts. Future inquiries into the arts and learning should investigate longer-term developments in how learners approach artistic creation and expression generally; studies also should investigate the possibility that sustained and deep learning in the arts may cultivate habits of mind and dispositions impacting future problem-solving behavior. To some, this represents the Holy Grail of transfer—Transfer with a capital T perhaps. Such potentially powerful Transfer may not occur straightaway, but rather emerge over time. The many contributions of the Compendium's studies notwithstanding, perhaps we have overlooked important evidence of Transfer from learning in the arts by searching at the wrong times and in the wrong places.

14The section on contemporary conceptions of learning draws on discussions and written exchanges with Dr. Terry Baker of the Center for Children and Technology in New York. This author accepts full responsibility for possible misrepresentations or distortions of Baker's contributions.