

Reframing Arts Education for Children: A Structured Narrative Integrative Review of Embodied Cognition and Affordance Perspectives

Kijoo Cha¹⁾

Ewha Womans University

Abstract

Arts education is justified through broad claims about creativity, expression, and child development, yet such claims often under-specify the mechanisms through which particular artistic experiences support learning. Responding to calls for more differentiated theories of action in arts education research, this structured narrative integrative review synthesizes interdisciplinary scholarship on embodied cognition, affordance theory, and arts learning. Relevant literature published between 2000 and 2025 was reviewed and synthesized to address the following three questions: (1) What conceptual themes emerge across the literature on embodiment, affordances, and the arts?; (2) How do these perspectives reframe artistic learning for children?; and (3) What design principles follow for curriculum, pedagogy, and assessment? Across the corpus, four recurrent themes were identified: artistic action functions as thinking-in-action; materials and tools participate in cognition through relational affordances and externalized representations; sociocultural norms function as social affordances that shape which possibilities for action become salient and usable; and arts learning is cognitive in a broad sense that includes imagination, affect, reflection, and concept formation. From this synthesis, nine design principles were proposed. This review contributes a mechanism-oriented framework for rethinking children's arts education as embodied, material, relational, and culturally situated meaning-making rather than as the production of predetermined products.

Keywords: *embodied cognition; affordances; arts education; materiality*

Corresponding author, ¹⁾ kijoocha@ewha.ac.kr

Introduction

Arts education is frequently defended in broad terms as inherently valuable and broadly beneficial for children’s development (Eisner, 2002; Holochwost et al., 2021; Winner et al., 2013). Yet progress in research and policy depends on moving beyond undifferentiated claims about “the arts” and specifying which forms of arts education, under which conditions, are likely to support which outcomes. Holochwost et al. (2021) argue that the field needs more differentiated theories of action that connect particular artistic experiences to plausible mechanisms and developmental consequences. Responding to that agenda, this article offers a mechanism-oriented synthesis of children’s arts education through the lenses of embodied cognition and affordance theory.

Arts education for children is often justified by reference to creativity, self-expression, or aesthetic appreciation (Aylward et al., 1993; Eisner, 2002). In practice, however, it is still frequently organized around the acquisition of formal skills, the reproduction of model products, or the delivery of teacher-directed interpretations (Atkinson, 2017; Leung et al., 2023; McLennan, 2010). Such approaches risk underestimating what artistic learning entails. Artistic work is not simply the externalization of a fully formed mental plan; it is an open-ended process in which perception, movement, touch, rhythm, affect, attention, and interpretation continually reshape one another. The arts therefore offer a particularly productive site for reconsidering what learning itself is.

The proposition that “to make is to grasp” captures this logic succinctly. Making is not merely the production of an object; it is a bodily mode of inquiry through which form, relation, and concept become intelligible (Frens & Hengeveld, 2013). The verb *grasp* carries both a physical meaning—to *hold*—and a cognitive one—to *understand*—suggesting that manipulation and sensory engagement are foundational to conceptual formation rather than peripheral supports (Barsalou, 2008; Frens & Hengeveld, 2013; Kiefer & Trumpp, 2012). This claim is especially consequential in children’s arts education, where learning often emerges through bodily exploration before it can be stabilized in abstract verbal language.

Embodied cognition provides one major theoretical foundation for this perspective. Whereas classical cognitivism often treated cognition as internal symbol manipulation, embodied and grounded approaches argue that perception, action, bodily state, and

environmental coupling are constitutive of thought itself (Barsalou, 2008, 2020; Johnson, 2007; Shapiro & Stolz, 2019; Varela et al., 1991). On this view, concepts are not detached mental entities but patterns grounded in perceptual, motor, affective, and situational experience. Research in neuroscience and education likewise suggests that emotion is not external to cognition but integral to attention, decision making, and meaning formation (Damasio, 1994, 1999; Immordino-Yang & Gotlieb, 2017). In arts education, bodily sensation and affective resonance are therefore not auxiliary supports for “real learning”; they are part of learning’s core architecture (Kiefer & Trumpp, 2012).

A complementary foundation is provided by affordance theory. Originally developed by Gibson (1986), affordances refer to possibilities for action that emerge relationally between an organism and its environment. Subsequent work in ecological psychology, design, and sociocultural theory has expanded the concept while cautioning against reducing affordances to simple features or functions (Chemero, 2013; Fayard & Weeks, 2014; Norman, 1988; Rietveld & Kiverstein, 2014; Rietveld et al., 2018). Affordances are not merely properties of objects; they are shaped by skill, intention, history of participation, and sociocultural “forms of life.” Thus, the concept of affordance has become central to embodied accounts of cognition (Chemero, 2013; Gibson, 1986; Rietveld & Kiverstein, 2014; Shapiro & Stolz, 2019). In educational terms, an affordance perspective shifts attention from what materials, spaces, or tools are in themselves to what they make possible for differently situated learners.

The relevance of these perspectives to arts education is especially strong because the arts are inherently embodied, material, temporal, spatial, and relational. Making, listening, moving, improvising, performing, drawing, and appreciating all involve sensory feedback loops, material negotiation, affective investment, and sociocultural convention. The arts are therefore exemplary embodied activities in which bodies, materials, tools, time, and social worlds are deeply entangled (Freedberg & Gallese, 2007; Hubbard, 2007; Pacini-Ketchabaw et al., 2016). Embodied cognition and affordance theory help explain why process-oriented, multisensory, exploratory, and socially interactive arts experiences often feel pedagogically powerful even when they have not always been theorized with precision.

This article builds on that premise by integrating interdisciplinary scholarship on embodied cognition, affordances, and the arts to propose design principles for children’s arts education. The review addresses children broadly, from early childhood to middle childhood, while

emphasizing implications that are especially salient for younger learners. It focuses on conceptual and pedagogical scholarship and addresses three questions: (1) What conceptual themes emerge across interdisciplinary literature on embodiment, affordances, and the arts? (2) How do embodied cognition and affordance perspectives reframe artistic learning for children? and (3) What design principles follow for curriculum, pedagogy, and assessment? The review intentionally does not take the spatial-design literature as a primary analytic domain; museum and exhibition space, architectural design, and environmental psychology are therefore acknowledged but not reviewed systematically.

Methods

Review Type and Rationale

This study adopts a structured narrative integrative review with a theoretical emphasis. A conventional systematic review was not considered the most appropriate design because the literature relevant to this topic is highly heterogeneous in disciplinary origin, methodology, and purpose. It spans cognitive science, ecological psychology, philosophy of mind, museum education, art education, music education, dance studies, craft and design research, and the learning sciences. Many of the most influential contributions are conceptual rather than empirical, and many empirical studies are not directly commensurable in terms of interventions, outcomes, or populations.

Accordingly, the goal of the review is not to aggregate homogeneous findings or estimate intervention effects, but to integrate theories and studies into a coherent educational framework. This orientation is consistent with integrative review practice, in which conceptual synthesis is used to generate frameworks, propositions, and design implications rather than a single summary effect (Torraco, 2005). No formal risk-of-bias appraisal was undertaken because the review did not seek to compare equivalent interventions; instead, transparency was pursued through explicit databases, search terms, inclusion and exclusion criteria, and analytic domains.

Search Strategy

Literature published between 2000 and 2025 was identified through targeted searches in Web of Science, Scopus, ERIC, PsycINFO, and Google Scholar. The search process was iterative rather than exhaustive and was structured around conceptual relevance. Initial searches combined terms such as “embodied cognition” AND “art education,” “embodied learning” AND children AND arts, “affordance” AND “arts education,” “affordance” AND “museum education,” “embodied cognition” AND making, “relational affordance” AND craft OR design, “social affordance” AND dance OR music, “materiality” AND children’s creative learning, “embodied simulation” AND aesthetic experience, and “extended mind” OR “distributed cognition” AND arts. Backward and forward citation tracking was then used to identify seminal works, major debates, and closely related empirical studies.

Inclusion and Exclusion Criteria

Sources were included when they met one or more of the following criteria: (1) they explicitly addressed embodied cognition, grounded cognition, ecological-enactive cognition, affordances, socially extended cognition, or closely related frameworks; (2) they connected those frameworks to artistic processes, arts education, aesthetic experience, museum learning, music, dance, craft, design, or materially mediated creative learning, including STEAM contexts in which the arts were substantively present; (3) they proposed mechanisms—such as perception-action coupling, material scaffolding, affective attunement, or social affordances—that can plausibly inform children’s learning designs, even when the immediate study population consisted of adults or adolescents; and (4) they offered pedagogical implications through theoretical, conceptual, review, qualitative, quantitative, or mixed-methods work.

Publications were excluded when they focused primarily on purely technical descriptions of tools without educational or cognitive implications, on highly specialized clinical or therapeutic interventions that did not yield transferable pedagogical implications, or on museum-space and architectural analyses that were not directly connected to the pedagogical themes of the present review. This boundary-setting was particularly important because the

wider literature on “space” constitutes a large field in its own right and would have shifted the focus of the study away from its core concern with mechanisms of arts learning.

Selection Process and Analytic Approach

The initial database searches identified 139 records. After title and abstract screening, full-text review against the inclusion criteria, backward and forward citation tracking, and final corpus curation emphasizing conceptual coverage across the major analytic domains, 68 publications were ultimately included in the final analytic corpus.

Selected texts were then read iteratively and coded for recurrent conceptual claims, educational implications, and cross-disciplinary convergences. Coding emphasized two questions: (a) what mechanism was claimed or implied—for example, perception-action coupling, embodied simulation, tool-mediated cognition, or social attunement—and (b) what design-relevant condition could a teacher, curriculum designer, or institution intentionally configure? Through repeated comparison, four higher-order themes were identified and the mechanisms and design conditions were translated into a set of educational design principles. This final step was important because the article aims not merely to summarize literature descriptively, but to reframe children’s arts education through a coherent, mechanism-sensitive conceptual model. The following section reports the outcomes of the conceptual synthesis: the four higher-order themes and nine educational design principles derived from the literature.

Results

Conceptual Themes Across the Literature on Embodiment, Affordances, and the Arts

Across the corpus, arts learning emerges as a relational system in which children coordinate bodily action and perception with material affordances in environments saturated with social expectations and cultural meanings. Embodied and grounded cognition accounts emphasize sensorimotor simulation and situated conceptual processing as part of cognition

(Barsalou, 2008; Wilson, 2002), whereas ecological and affordance-based accounts emphasize real-time agent-environment dynamics and socioculturally organized landscapes of action (Heft, 2007; Rietveld & Kiverstein, 2014). Read together, these literatures suggest that arts learning is neither purely internal nor reducible to the external environment; it is constituted through the ongoing coupling of bodies, materials, tools, and social practices.

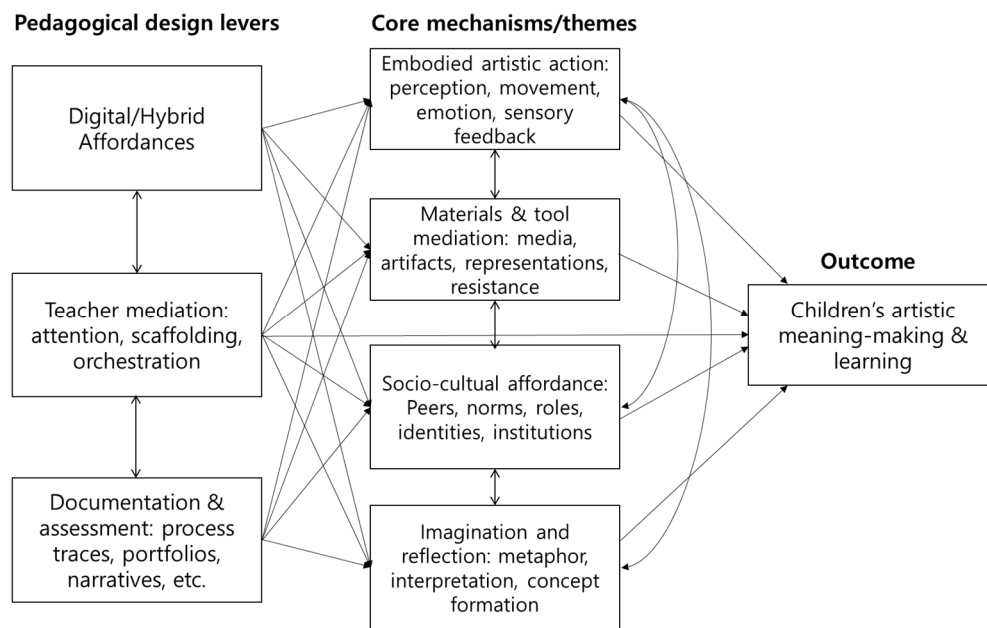


Figure 1. Heuristic synthesis of children's arts learning from embodied cognition and affordance perspectives.

Figure 1 presents a heuristic synthesis of this literature. The model is not intended as a linear causal account. Rather, it maps the main domains through which children's artistic meaning-making becomes possible and indicates where pedagogical design can intervene. The figure distinguishes designable pedagogical levers from the core mechanisms emphasized in the review, thereby clarifying how theoretical constructs can be translated into educational practice.

Across the literature, four themes recur with particular consistency: embodied artistic action, material and tool mediation, sociocultural affordance fields, and imagination-reflection as cognitive work. These themes structure the analysis below and provide the basis

for the design principles proposed later in the article. The following subsections elaborate each theme and show how it reframes children's artistic learning and educational design.

How Do Embodied Cognition and Affordance Perspectives Reframe Artistic Learning for Children?

Artistic Action: Making, Movement, and Appreciation as Embodied Meaning Making

A central insight across the literature is that artistic action should not be understood as the execution of thought already completed elsewhere, but as a mode through which thought itself emerges. Making is often described in conventional accounts as the realization of plans, ideas, and solutions previously formed in the mind (Frens & Hengeveld, 2013; Ingold, 2013; Schön, 1983). Once embodiment and affordances enter the discussion, however, making becomes a condition of thinking rather than a late stage of implementation (Frens & Hengeveld, 2013; Schön, 1983). In this view, artistic work is epistemic: perception, feedback, feeling, and discovery reorganize thought in real time.

This argument intersects with older discussions of tacit and procedural knowledge (Polanyi, 1966; Ryle, 1971), yet it extends them by foregrounding the dynamic, affective, and sensorimotor dimensions of cognition. Embodied and affordance-based perspectives are especially interested in what happens when a maker encounters resistance, surprise, texture, weight, rhythm, or serendipity (Groth & Kimmel, 2024; Malafouris, 2014; Schön, 1983). Planning and execution are therefore not two separate phases, but a single ongoing loop in which bodily action, material response, and reflective adjustment remain tightly coupled. Artistic learning is thus better described as thinking through making than as the application of already stabilized knowledge.

The implications extend well beyond visual art. Research on sound and movement shows that auditory perception is deeply connected to bodily simulation: hearing can activate motor systems associated with actions that could have produced the sound (Gazzola et al., 2006). Embodied music cognition likewise argues that rhythm, pulse, phrasing, and tension are understood through bodily entrainment, alignment, and prediction rather than through detached decoding alone (Bowman & Powell, 2007; Leman, 2016; Leman et al., 2018). For children, clapping, swaying, balancing, tapping, and gesturing are therefore not peripheral

“engagement strategies”; they are epistemic resources for musical understanding.

A similar point applies to dance and movement-based learning. Mirroring, collaborative improvisation, turn-taking, and responsive movement sequences support social understanding as well as expressive development by cultivating bodily attunement to others (Kronsted, 2021; Overy & Molnar-Szakacs, 2009). These practices matter educationally because they position artistic learning as participatory sense-making rather than as the isolated performance of a private inner state (De Jaegher & Di Paolo, 2007; Gallagher, 2013). What children come to know in such contexts is inseparable from how they move with others.

Appreciation is equally transformed by this framework. Aesthetic response is not reducible to detached contemplation. Work on embodied simulation suggests that viewers often respond to images, gestures, and textures by internally simulating action and affect (Freedberg & Gallese, 2007; Gallese, 2005). In dance spectatorship, kinesthetic empathy helps explain why observers may feel tension, release, anticipation, and even partial movement tendencies while remaining physically still (Reason & Reynolds, 2010). In museum education, Hubbard (2007) shows that inviting learners to respond bodily to artworks—through gesture, posture, sound, or movement—can deepen attention to form, composition, mood, and structure.

Taken together, these studies suggest that children’s arts education should treat making, listening, moving, and appreciating as embodied forms of cognition. Tasks that invite children to generate, test, and revise ideas through action—for example, translating a gesture into a line, a rhythm into a shape, or an artwork into a bodily pose—align with 4E (embodied, embedded, enactive, and extended) accounts of experiential learning in which understanding develops through enactment and reflection rather than abstract explanation alone (Lebert & Vilarroya, 2024). Artistic action is therefore not an “application” of knowledge after cognition has already occurred; it is one of the primary sites where cognition happens.

Materials and Tools: Relational Affordances, Material Agency, and Extended Cognition

If artistic action is embodied, it is also materially mediated. Materials and tools are not neutral channels for pre-existing ideas. They shape perception, constrain and invite action, carry sensory signatures, and participate in the production of meaning (Barati & Karana, 2019; Groth & Kimmel, 2024; Penfold, 2019). Design research has therefore re-described

affordances as material potentials, emphasizing how creative work can unlock novel possibilities in both conventional and emerging materials (Barati & Karana, 2019). In art, craft, and performance, affordances are not simply fixed functional properties; they are dynamic possibilities that emerge through sustained interaction among a maker, tools, and materials over time (Groth & Kimmel, 2024; Penfold, 2019). The notion of relational affordances is especially useful here: possibilities for action do not reside in materials alone but emerge through the ongoing coupling of bodies, tools, histories of use, and situated purposes (Fayard & Weeks, 2014; Groth & Kimmel, 2024; Rietveld & Kiverstein, 2014).

This perspective matters because it repositions materials as co-constitutive of thought. Material engagement accounts suggest that making is distributed across bodies, tools, environments, and substances rather than originating solely in an isolated human mind (Malafouris, 2013; Pacini-Ketchabaw et al., 2016; Penfold, 2019). Clay, paper, pigment, fabric, string, wood, digital interfaces, and natural materials all have their own forms of resistance, pliability, fragility, absorbency, elasticity, and rhythm. These qualities matter pedagogically because they shape what a learner notices, attempts, revises, and remembers (Pacini-Ketchabaw et al., 2016; Penfold, 2019). Learning does not happen only through materials; it happens with materials.

Research in children's art-making contexts demonstrates that materiality matters for meaning-making. Rönkkö et al. (2023), for example, show how natural materials in pre-primary land-art projects act as co-participants in children's inquiry, inviting assembly, fragility, ecological noticing, and narrative experimentation. Søyland (2020) likewise demonstrates that children's sense making across physical and virtual materialities is grounded in exploratory touch and sensory negotiation. Such studies strengthen the claim that materials should be treated pedagogically as provocations and partners rather than as passive carriers of teacher intentions.

Tools and external representations extend this argument more explicitly into the domain of cognition. From the perspective of extended and distributed cognition, sketches, diagrams, prototypes, models, scores, and digital media are not simply records of thought; they are part of thinking itself (Clark & Chalmers, 1998; Hutchins, 1995). External representations reduce cognitive load, enable comparison, stabilize provisional ideas, and make emerging thought discussable with others (Hutchins, 1995; Kirsh, 2010; Zhang & Norman, 1994). In children's

arts education, this provides a principled rationale for process journals, collaborative murals, iterative portfolios, visible thinking routines, and rough drafts, because such tools allow ideas to be manipulated over time rather than merely stored in memory.

Digital tools are especially significant because they can extend what can be seen, heard, manipulated, rehearsed, and reconfigured. Teachers' interpretations of those affordances, however, strongly shape what becomes pedagogically possible. Leung and Choi (2024) show that in early visual arts education, teachers' understandings of the technical affordances of digital devices affect whether those tools function as creative media, passive display technologies, or constrained instructional devices. Johnson-Glenberg (2018) similarly argues that the educational potential of immersive media depends on embodied interaction, gesture, and purposeful design rather than on novelty alone.

Overall, the literature suggests that materials and tools should be understood as cognitive partners. They do not merely facilitate arts learning for children; they partially constitute its form. The key educational question is therefore not simply which materials to provide, but what kinds of noticing, action, comparison, transformation, and reflection those materials and tools are likely to invite. A simple classroom illustration would be to invite children to represent "movement" using clay, corrugated cardboard, and fabric, and then compare how each material invited different actions, constraints, and revisions. Gubenko and Houssemand (2022), who frame creativity as the generation of new action possibilities with familiar objects, suggest that children's pretend play may function as an early training ground for affordance-based flexibility.

Sociocultural Affordances: Habitus, Socially Extended Cognition, and the Field of Artistic Possibility

Embodied and affordance theories are sometimes misread as focusing only on immediate bodily or physical relations. Yet both have increasingly moved toward sociocultural accounts of cognition and action (Gallagher, 2013; Heft, 2007; Rietveld & Kiverstein, 2014). People learn what to notice, how to respond, what counts as appropriate, and which actions are valued through long-term participation in families, institutions, communities, and traditions (Heft, 2007; Rietveld & Kiverstein, 2014). Cognition is therefore shaped not only by material environments but also by norms, histories, and socially organized practices.

This is where the Bourdieu-inflected extension of affordance theory becomes particularly useful. Habitus is a system of durable and transposable embodied dispositions that shape how individuals perceive, think, and act within their social world (Bourdieu, 1990). Fayard and Weeks (2014) draw on the notion of habitus to explain why some possibilities for action appear natural, desirable, risky, legitimate, or invisible to particular actors. If affordances refer to possibilities, habitus helps explain why those possibilities are not equally salient to everyone. In children's arts education, this means that participation is never purely individual. Learners encounter materials, activities, and expectations through culturally patterned dispositions and prior experiences.

Rietveld and colleagues' notion of a field of relevant affordances further clarifies this point (Rietveld & Kiverstein, 2014; Rietveld et al., 2018). At any given moment, multiple possibilities for action coexist, but which ones become salient depends on skill, interest, norms, and shared practices. A child does not enter an art activity as a blank sensorimotor organism. The child arrives with assumptions about what "counts" as drawing, which tools are "for children," what kinds of mess are tolerated, whether deviation from an example is welcome, and how safe experimentation feels. Artistic learning is therefore shaped by the classroom's social climate as much as by the nominal task.

This sociocultural turn also supports the idea of socially embodied learning. Cognitive resources are distributed not only across tools but also across interactional routines, peers, and institutional practices (Barsalou, 2020; Gallagher, 2013). Studies of rhythm, imitation, and embodied simulation suggest that understanding others often involves forms of bodily attunement rather than detached inference alone (Gallese, 2005; Overy & Molnar-Szakacs, 2009). Educationally, this lends theoretical support to collaborative improvisation, co-composition, critique, role exchange, and shared performance. These are not secondary "social additions" to an otherwise individual art lesson; they are mechanisms through which artistic meaning can be jointly constituted.

For children, this point is especially important because artistic confidence, experimentation, and risk-taking are strongly shaped by atmosphere, norms of evaluation, peer modeling, and teacher stance (Atkinson, 2017; Beghetto & Kaufman, 2014; Reeve, 2009). A classroom that silently communicates "do it correctly" affords a different field of action than one that communicates "try, notice, revise, and share." A sociocultural affordance perspective

therefore pushes arts education beyond individual creativity discourse and toward the curation of relational conditions under which creativity becomes possible.

Arts as Cognitive Action: Imagination, Metaphor, Reflection, and Concept Formation

A further contribution of the literature lies in reframing arts education as explicitly cognitive without reducing it to narrow rationalism. Heaton (2021) argues that cognition has been surprisingly underdeveloped in art education discourse and teacher education, despite the fact that art learning clearly involves concept formation, interpretation, judgment, imagination, and metacognition. The point is not to assimilate the arts to traditional academic rationality, but to recognize that artistic learning mobilizes distinctive forms of knowing.

One important strand of this argument concerns imagination. Lakoff and Johnson's work on image schemas and metaphor is especially useful because it shows how abstract meaning grows out of recurrent bodily experience (Lakoff & Johnson, 1980, 2002; Johnson, 2007). If concepts are structured through bodily patterns such as balance, force, containment, direction, and proximity, then arts education is not only expressive but conceptually generative. Children can map sensation onto idea, idea onto form, and form onto social meaning. Activities that invite movement across modalities—sound into gesture, gesture into line, texture into color, feeling into narrative, rhythm into shape—should therefore be understood as conceptual work rather than mere creative enrichment.

Embodied aesthetics also supports a broader account of interpretation. If aesthetic response involves embodied simulation and affective attunement, then bodily and emotional responses are not “subjective noise” to be screened out; they are part of how meaning is made (Freedberg & Gallese, 2007). This point resonates with wider 4E accounts of experiential learning, which argue that abstraction is strengthened when learners repeatedly move between concrete engagement and reflective reorganization (Lebert & Vilarroya, 2024). In arts education, such movement is often visible when children revisit an image, a gesture, or a sound and gradually refine their interpretation through repetition, comparison, and transformation.

This perspective also repositions metacognition. If arts learning is embodied, reflection is not only a verbal self-report after the fact. Reflection can also be documented in sketches, photos, recordings, annotations, replay, comparison, and retrospective dialogue about bodily

and sensory decisions. Pedagogical documentation is therefore more than a record-keeping device; it is a bridge between embodied activity and reflective awareness (Buldu, 2010; MacDonald, 2007; Rinaldi, 2004). Seen in this light, arts education is cognitive not because it imitates conventional academic learning, but because it creates contexts in which feeling, perception, action, imagination, and concept formation become mutually generative.

Design Principles for Curriculum, Pedagogy, and Assessment

The synthesis above yields nine interrelated design principles for children's arts education. These principles describe recurring conditions under which embodied and affordance-rich arts learning is most likely to occur. Together they reframe curriculum, pedagogy, and assessment around sensorimotor coupling, material participation, social attunement, reflective documentation, and emotionally meaningful inquiry.

Design for Multisensory Sensorimotor Loops

Arts learning should be organized around sensorimotor loops rather than around static content delivery. In embodied accounts, cognition develops through coordinated cycles of perception, movement, and feedback rather than through abstract explanation followed by delayed "application" (Barsalou, 2008; Kiefer & Trumpp, 2012). Practically, this means designing tasks in which seeing, touching, hearing, and moving are meaningfully integrated from the outset. In music, for example, pulse can be walked, clapped, and drawn; in visual art, texture can be handled before it is described; in drama, gesture can become a pathway into narrative rather than a final embellishment. For instance, a teacher could ask children to walk and clap to a repeated pulse, translate it into lines or shapes, compare their representations, and revise them after listening again. This sequence makes the cycle of perception, action, and feedback visible while preserving multiple possible outcomes.

Multisensory design matters not only because it can increase engagement, but because it supports memory, transfer, and conceptual differentiation. Embodied music research, for instance, suggests that bodily entrainment strengthens attention to rhythmic and temporal relations (Leman, 2016; Leman et al., 2018). In arts education more broadly, multisensory tasks help children notice structural relations through more than one perceptual channel,

thereby expanding the routes through which ideas become meaningful.

Link Appreciation and Making Through the Body

Appreciation and production should not be separated too sharply. If aesthetic response is embodied, then appreciation can be deepened by gesture, movement, vocalization, rhythmic imitation, tactile analogy, or re-enactment (Freedberg & Gallese, 2007; Hubbard, 2007; Reason & Reynolds, 2010). After encountering an artwork, children can be invited to translate an observed quality into action: to pose like a figure in a painting, to map a musical phrase through a line, or to respond to a sculpture through movement. Such invitations do not trivialize interpretation; they make its embodied basis more available.

This principle is especially important for young children because bodily response often precedes or exceeds verbal articulation. Questions such as “What does this artwork make your body want to do?” or “How would this sound feel as a line?” can open interpretive pathways that are often inaccessible through discussion alone.

Preserve Open-Endedness, Improvisation, and Serendipity

Arts education should preserve room for open processes and indeterminate endings. Across the reviewed literature, artistic thought is repeatedly reoriented by material resistance, accidental encounters, and emerging possibilities rather than by rigid pre-specification (Frens & Hengeveld, 2013; Groth & Kimmel, 2024; Schön, 1983). This does not imply pedagogical chaos. Rather, it requires a shift from outcome-driven scripts to guided exploratory structures in which teachers frame themes, constraints, and provocations but do not overdetermine the path or product.

Atkinson’s (2017) argument for art education “without criteria” is relevant here insofar as it warns against premature closure through external standards that narrow the encounter with art. In practical terms, preserving open-endedness may mean asking children to make multiple versions, to revise in response to surprise, or to explain how a material changed their intention. Revision becomes part of meaning-making rather than evidence of initial failure.

Treat Materials as Pedagogical Partners

Curriculum should deliberately curate material affordances. Materials should be selected

not only for convenience or thematic relevance, but also for the kinds of action, sensation, contrast, ambiguity, and transformation they invite (Pacini-Ketchabaw et al., 2016; Penfold, 2019). Rich arts education therefore requires diverse materials with different textures, resistances, scales, and combinatory possibilities rather than only standardized craft kits or highly prescriptive media.

Educationally, this principle implies allowing children time to handle, compare, listen to, deform, combine, and dwell with materials before rushing toward a product. Research on natural materials, tactile exploration, and land art suggests that such exploration can open aesthetic, conceptual, and ecological dimensions of learning that would otherwise remain latent (Rönkkö et al., 2023; Søyland, 2020). Material exploration is not a preparatory warm-up; it is part of the learning itself.

Use Tools, Including Digital Tools, as Cognitive Extensions

Tools should be introduced as means of extending perception and thought rather than merely increasing efficiency. From the perspective of extended and distributed cognition, sketches, prototypes, storyboards, scores, mirrored movement tasks, recording devices, and simple digital interfaces function as thinking media because they externalize and transform ideas over time (Clark & Chalmers, 1998; Hutchins, 1995). In arts education, this justifies the deliberate use of process journals, collaborative planning surfaces, iterative portfolios, and manipulable representations that help children return to and revise earlier thinking.

Digital tools require especially careful pedagogical framing. Affordance theory is useful here because it shifts evaluation away from “technology” in the abstract toward the specific action possibilities a given device or interface makes available. Research in early visual arts education shows that teachers’ interpretations of digital affordances directly influence what children are allowed to do and notice (Leung & Choi, 2024). Immersive media may also offer valuable embodied extensions when gesture, movement, and spatial manipulation are pedagogically central (Johnson-Glenberg, 2018). Emerging work on VR painting, however, suggests that digital artistic media should be evaluated in terms of the specific artistic affordances they offer—such as tool simulation, mid-air mark making, scaling, and teleporting—as well as the new learning burdens they introduce (Sidik et al., 2024). For younger children, digital tools should remain subordinate to the broader logic of embodied

arts learning: they should extend tactile, social, and sensory activity, not replace it.

Organize Socially Embodied Learning

Socially embodied learning should be built into the pedagogical core rather than appended as an optional extra. Shared rhythm, mirrored motion, collaborative role exchange, responsive improvisation, and peer critique all create conditions for embodied attunement, perspective taking, and distributed meaning making (Gallagher, 2013; Kronsted, 2021; Overy & Molnar-Szakacs, 2009). In practice, this means structuring activities in which children watch and follow one another, alternate leading and responding, contribute to shared artifacts, and encounter art as a jointly evolving event rather than as a purely individual achievement.

Reframe the Teacher's Role as Co-Explorer, Guide of Attention, and Emotional Coach

Embodied and affordance-based perspectives imply a shift in the teacher's role. Radical embodied cognition in education critiques overly prescriptive "strong" pedagogy and instead emphasizes the education of attention: helping learners become more sensitive to relevant information in the environment (Kamp et al., 2019). In arts education, this means that the teacher becomes less a transmitter of correct procedures and more a co-explorer who orchestrates conditions, guides attention toward subtle qualities that children may overlook, and supports emotional regulation during uncertainty, frustration, or surprise. As Kronsted (2021) argues in the context of improvisational dance, pedagogical growth often depends less on teaching additional moves than on helping learners perceive and act on different affordances.

Such pedagogy is not passive. It requires carefully curated provocations, responsive questioning, protection of time for experimentation, and recognition that silence, repetition, hesitation, and focused manipulation may all be signs of thinking rather than lack of progress. Because affect is integral to learning, the teacher also functions as an emotional coach who helps children name and work with frustration, delight, uncertainty, and attachment as legitimate dimensions of artistic inquiry (Immordino-Yang & Gotlieb, 2017).

Adopt Slow Pedagogy and Process-Centered Assessment

Embodied and affordance-based arts education supports what may be called slow

pedagogy and process-centered assessment. The point is not to reject evaluation, but to resist forms of assessment that collapse artistic learning into the measurement of predetermined products alone. Open-ended artistic work often involves revision, exploratory detours, failed attempts, and collaborative negotiation; assessment should therefore remain sensitive to attention, experimentation, revision, risk-taking, sensory awareness, and reflective growth rather than only to finished objects (Atkinson, 2017).

Pedagogical documentation is especially important in this context because it makes process traces available for shared interpretation. Documentation through photographs, audio recordings, annotated drafts, teacher notes, and children's retrospective commentary can connect embodied activity to reflective discussion and formative assessment (Buldu, 2010; MacDonald, 2007; Rinaldi, 2004). Learning stories and narrative documentation can also help preserve the temporal unfolding of artistic learning rather than reducing it to a single snapshot (Carr & Lee, 2012).

Re-Center Emotion as a Core Learning Medium

Emotion should be treated as integral to arts learning rather than as a side effect. Children's affective reactions during making and appreciation—immersion, frustration, joy, hesitation, attachment, curiosity—are significant learning events because they shape attention, memory, and judgment (Damasio, 1994, 1999; Immordino-Yang & Gotlieb, 2017). In practical terms, this means that stories, scenarios, atmospheres, and relational safety matter. It also means that children should be supported to notice how bodily feeling and expressive impulse inform artistic choices. Emotion, in short, is not an ornament added to cognition; it is one of the media through which children think artistically.

Discussion

This review contributes to current debates in arts education by responding to a recurrent methodological problem: the tendency to defend the arts through broad claims while leaving the underlying mechanisms underspecified. By synthesizing embodied cognition, affordance theory, and adjacent work on distributed and socially extended cognition, this study offers a

more precise account of how artistic experiences may support learning. Rather than asking whether “arts education” is beneficial in the abstract, the framework asks what kinds of embodied, material, social, and reflective conditions are being designed and what kinds of learning they plausibly make possible (Holochwost et al., 2021).

The analysis also reframes a longstanding divide in arts education discourse between skill-centered and expression-centered positions (Heaton, 2021; Rietveld & Kiverstein, 2014; Shapiro & Stolz, 2019). Embodied and affordance perspectives suggest that this divide is misleading. Artistic learning is neither mere technique nor unfettered self-expression; it is a situated process in which action, sensation, material resistance, social normativity, and interpretation are mutually shaping. This position makes room for technical development, but it treats technique as the expansion of what children can perceive and do within a field of affordances (Heaton, 2021; Rietveld & Kiverstein, 2014; Shapiro & Stolz, 2019).

A further implication is that “quality” in children’s arts education can be reframed as the degree to which learning environments support embodied inquiry, affordance-rich exploration, social participation, and culturally meaningful engagement. A well-designed arts environment offers varied materials, time for revision, visible process traces, invitations to collaborate, and norms that legitimate experimentation. In such environments, teacher mediation matters not because the teacher supplies the “right answer,” but because the teacher curates what becomes noticeable, discussable, and worth pursuing.

The literature on materiality is particularly consequential here. When materials are treated as cognitive partners rather than as neutral supports, questions of curriculum design change. The issue is not only what children will make, but what a given material ecology is likely to invite, resist, stabilize, or transform. Research on natural materials, tactile exploration, and material dialogue suggests that material choice is pedagogically consequential because it shapes both aesthetic possibilities and the concepts children can build through them (Penfold, 2019; Rönkkö et al., 2023; Søyland, 2020).

The review also has implications for assessment. Process-oriented documentation is not merely a progressive supplement to “real” evaluation; it is theoretically justified by the claim that artistic meaning-making unfolds across time, media, and interaction. Documentation can therefore support reflection, teacher inquiry, and family communication while preserving the temporal and embodied character of learning (Buldu, 2010; MacDonald, 2007; Rinaldi,

2004).

Finally, the review clarifies how digital and hybrid tools should be positioned. From an affordance perspective, digital media are not inherently progressive, nor are they automatically detrimental. Their value depends on how they extend or thin embodied, social, and material engagement. Teachers therefore need conceptual tools—not only technical training—to judge when digital mediation expands children’s opportunities for comparison, transformation, and reflection and when it merely accelerates production or reduces sensory depth (Johnson-Glenberg, 2018; Leung & Choi, 2024).

Taken together, these implications operate at the levels of curriculum, instruction, and assessment. At the curriculum level, units should be organized around open-ended inquiries and deliberately varied bodily, material, and social affordances rather than predetermined products. At the instructional level, teachers should sequence cycles of noticing, acting, comparing, and revising, guide attention without preempting discovery, and build in collaborative improvisation and reflection. At the assessment level, finished work should be considered alongside process traces and children’s verbal or nonverbal reflections, thereby enabling educators to identify and interpret changes in perception, strategy, participation, and meaning-making.

Limitations and Future Research

This review has several limitations. First, it remains primarily conceptual. The design principles proposed here are theoretically grounded, but they still require validation and refinement through curriculum design studies, classroom ethnographies, intervention research, and museum-education studies. A logical next step would be design-based research that deliberately manipulates specific affordances—such as material diversity, documentation routines, or collaborative structures—and examines their effects on children’s participation and learning trajectories.

Second, the review is not exhaustive and does not claim the full coverage associated with systematic or scoping reviews. Because the literature is conceptually heterogeneous, the selection strategy privileged conceptual relevance and transferability rather than

comprehensiveness or formal quality appraisal. Future reviews could therefore complement the present study by mapping the field more systematically and comparing how different arts domains operationalize embodiment and affordances. Indeed, recent work in music education further differentiates affordances into cognitive, educational, mental, affective, and social dimensions, offering a domain-specific vocabulary for specifying what particular tools and environments make possible for learners (Cheng et al., 2025).

Third, many of the most theoretically generative sources included in the review concern adults, professional artists, museum visitors, or interdisciplinary design contexts. These works are educationally suggestive, but their direct transferability to children requires empirical testing. The enactment of these principles may vary across early and middle childhood, particularly in the amount of verbal explanation, the duration of sustained inquiry, the complexity of peer collaboration, and the degree of independence expected in documentation. Accordingly, more child-centered studies are needed to examine how specific material, sensory, social, and digital affordances shape learning across age groups, developmental stages, and cultural settings. For instance, participatory visual methods may be especially useful in this regard, since research using children's own photography has shown that visual elicitation can capture the physicality and personal meaning of embodied museum experiences in ways that verbal description alone may miss (Kalessopoulou, 2017).

Fourth, the review intentionally excludes the larger literatures on spatial design, exhibition architecture, and environmental psychology. As a result, it does not fully address how embodied and affordance-based pedagogy intersects with institutional design at the architectural or policy level. Future research on learning environments for arts education—including questions of display, movement, sound ecology, outdoor learning, and technological mediation—would provide a more nuanced understanding of how physical and social infrastructures support or constrain embodied arts learning in combination with pedagogical approaches.

Conclusions

This article has argued that embodied cognition and affordance theory provide a productive

framework for reframing arts education for children. Across the interdisciplinary literature, four consistent themes emerge: artistic action is a mode of thinking; materials and tools participate in cognition through relational affordances and externalized representations; sociocultural norms and shared practices shape fields of action and interpretation; and arts learning is cognitive in the fullest sense, involving imagination, affect, concept formation, judgment, and reflection.

These themes challenge reductive models of arts education that privilege product, compliance, or detached interpretation. In their place, the review proposes a broader view of children's arts learning as multisensory, affective, material, and social meaning making. From this synthesis follows a set of design principles: organize learning around sensorimotor loops; connect appreciation and making through the body; preserve open-endedness and improvisation; curate material affordances carefully; use tools as cognitive extensions; structure socially embodied learning; reposition the teacher as a co-explorer and guide of attention; assess process through documentation and reflective dialogue; and treat emotion as a core learning medium.

The larger implication is that arts education should not be treated as a soft supplement to "real cognition," nor as a domain of expression detached from knowledge. It is one of the most powerful contexts in which children can learn to perceive, feel, imagine, interpret, collaborate, and reflect through embodied participation in the world.

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