The sculpture kit: Material pedagogy and entangled making

Ellie Barrett

Lancaster Institute for the Contemporary Arts, Lancaster University, Lancaster, UK; In-Situ, Brierfield, East Lancashire, UK

e.c.barrett2@lancaster.ac.uk

ORCID ID: 0000-0002-6195-4970

Abstract

Play, making and learning are increasingly understood in arts education and the wider social sciences as overlapping rather than distinct. This resonates with new materialist philosophies applied in a visual art context, which present the material encounter as a means of accessing information about the world, positioning it as a form of pedagogy. “The sculpture kit,” a collection of six materials (developed collaboratively with a young child, and then tested with larger groups of adults and children) responds to this condition. This paper presents the kit as a method to facilitate experiences of “entangled making,” acknowledging materials’ pedagogical role towards observing exchanges of knowledge between children and adults, materials and humans.

Key words

Sculpture, play, entanglement, new materialism, making

Introduction

In education and childhood studies, play, making and learning are increasingly understood not as distinct, but enfolded together as a complex, multi-sensory experience connected to the material encounter (Nilsson et al., 2017; Tesar & Arndt, 2016). This is reflected in visual art: though historically underexplored, play is an existing methodology for making, initiating a burgeoning call to repair a continuum between childhood and adult play in order for artistic practice to be fully comprehended (Thomas, 2019). Responding to these conditions, this article presents and analyzes "the sculpture kit" as an arts-based methodology to facilitate such experiences between children and their parents/carers. The kit consists of six materials: masking tape, pipe cleaners, tin foil, tissue paper, toilet roll and wool. It was developed collaboratively with my two-year-old daughter (N) during a residency with UK-based arts organization In Situ, then tested with public groups. Overall, this study aims to understand and test methods for involving children in arts-based research from a visual arts perspective, facilitating what I term "entangled making." This framework enfolds play, making and learning, foregrounding collaborative, materially-centric play and emerging objects towards offering reciprocal learning opportunities for adults and children.

Playing, making and learning

Materials and play are understood as an interface for learning across various disciplines. Play as learning may unfold via the tactile material encounter, since it imparts new embodied knowledge related to both exerting and experiencing agency, foregrounding the importance of touch (Mitchell, 2021). Recent psychology research emphasises the interwoven relationship between infants' interactions with objects and their capacity for imaginative play in their first three years.

Lockman and Tamis-LeMonda (2021) state that “children’s novel application of objects beyond their intended purpose lies at the core of creativity and divergent thinking.” (p. 173). Interactions with caregivers are also important: when infants play with adults, they “exhibit more frequent and sophisticated forms of functional and symbolic play” (p. 170). Creative thinking is nurtured via object manipulation supported by adults. Similarly, empowering children with creative freedom by offering opportunities for unstructured materially-centric play is well supported in arts education studies (Sunday, 2018). In this context, the adult/child relationship is more complex than teacher/learner, since arts-based methodologies may understand children as “valued sources of research knowledge” (Hickey-Moody et al., 2021, p. 1): they possess an innate drive to grapple with materials’ agentic potential. Whilst adults scaffold children’s creative development by engaging in materially-centric play, children may also inform adult creativity by contributing their heightened material sensitivity. This study is aligned with this approach, considering opportunities for children to influence adult creativity, positing a reciprocal learning relationship.

Many recent studies prioritize children’s hands-on participation in research projects, positioning children as agents in their educational experiences (Brinck et al., 2020). However, knowledge is still lacking on creative methods which surface children’s meaning making (Sevón et al., 2023). In contrast, visual art practices centralise the artist working alone in the studio or leading a team of assistants. Though sculpture may now occupy a variety of forms (such as scrunched paper or scattered sand), it remains connected to traditional processes such as casting, involving precise working and hazardous chemicals. This is at odds with welcoming children’s agentic interventions, which may disrupt or redirect the making process. Though there are historic

examples of children's involvement in making (such as Barbara Hepworth's and Ruth Asawa's integration of childcare into the studio) there is more to be understood surrounding how children's contributions may shape sculptural artworks (Rudd, 2020).

The novelty of this study, then, is not its claims related to children's empowerment via materially-centric play, and neither its involvement of children in the design process (though these are core arguments), but its interest in finding new ways to bring the child learner into artistic making. The sculpture kit considers codesign strategies and pedagogical approaches from art education research from a visual art perspective, presenting possibilities for adults to both support children's play, and exchange knowledge with children via haptic encounters with material.

New materialism and material pedagogy

I approach the project not primarily as an educator, but as an artist researcher with a specialism in materially-centric making. Arts-education researcher Kristine Sunday (2018) observes that in early years pedagogical approaches such as Reggio Emillia: "materials feature prominently as offerings of sensorial connections with the physical world and they solicit concentration, persistence, motivation, and wonder." (p. 201). This notion is distinct from yet reflects posthumanist new materialist perspectives, positioning matter not as inert but active with the potential to influence human behaviour (Bennett, 2010). New materialism posits this as a necessary condition for understanding our position as beings who are entangled with the world, extending empathy to other non-human entities towards decentralizing a white, Eurocentric experience and creating space for other forms of knowing (Braidotti, 2021). New materialism

has had a profound impact on the visual arts, navigating a shift away from a formal, aesthetic analysis of artworks towards a renewed interest in their material properties which illuminates the sociopolitical systems from which they emerge (Behar, 2016).

However, whilst it has offered an opportunity to reassess critical emphasis on form and aesthetics, new materialism has been criticised for failing to engage with the ways in which relational interactions with materials have enforced biological power disparities related to race, gender, sexuality and debility, adopting a deracialized, desexualized understanding of sociopolitical conditions (Puar, 2017; Schuller, 2018). These criticisms place limitations around new materialism's claim that material-centricity may authentically open pathways to increase empathy between human and non-human entities.

Acknowledging its criticisms, new materialist approaches underpin this study's emphasis on the importance of material agency in play, making and learning, brought together in entangled making. Barad's term "entanglement" hypothesizes that all entities are not separate, but reciprocally impact one another (2007). Entanglement theory has been used as a framework in ethnographic approaches towards considering children's participation, positing that "a performative, new materialist enactment of 'participation' would transform *being with* to *doing with*," (Dennis & Huf, 2020, p. 485), acknowledging the presence of the researcher and the material environment in this relationship.

This study is aligned with this approach, whilst also zooming in on the impact of materials' affordances within such entanglements as a pedagogy. The "embodied entanglement of matter

and teaching as pedagogy" can be understood as "the moment when materials and spaces impact on bodies and ideas." (Hickey-Moody & Page, 2015, p. 12). Material's responsiveness guides how we understand and manipulate them. As anthropologist Alfred Gell (1998) observes "Material inherently dictates to [the] artist the form it assumes." (p. 29). This predates new materialist thinking, though articulates the notion that art making requires an embodied sensitivity to material's physicality. Sculptor Lawson Oyekan, for example, uses "leather dried" clay, which retains moisture but holds shape. Ceramists typically use this drying phase to work in detail, but Oyekan's works are hand formed from this state. Lacking the plasticity of wet clay, they bend and buckle with visible joins as they are pinched into an upright form. Clay's resistance to Oyekan's interventions is clearly visible. Material pedagogy exchanges the hierarchical relationship of the artist imposing form on inert matter with a reciprocal negotiation between artistic intention and material affordance.

Overall, this study: brings together approaches from arts education and visual art practice; considers methods which emphasize material's pedagogical role; and presents entangled making as an experience which encompasses play, making and learning. I first present the research design which generated and tested the sculpture kit. I then discuss the use of "kit" terminology and its relationship to arts education. Observations of children and adults interacting with the sculpture kit are then explored, focusing on the ways material affordances may adopt a pedagogical role.

The Sculpture Kit: Research Design and Methodology

This study took place during an artist residency between November 2023 and April 2024. It was hosted by In Situ, an arts organization in Brierfield, Lancashire, UK. In Situ adopts an "embedded" approach, delivering community-centric projects which position art as "part of everyday life" (In Situ, n.d.). Both In Situ's staffing and audiences are multi-ethnic: Brierfield's British-Pakistani population is higher than average (Pendle Borough Council, 2024) which is reflected in the organization's programming via partnerships with multi-ethnic community groups.

In Situ's annual artist residency has an open brief, providing space and time to undertake research without a predetermined outcome. I proposed that my daughter (N) would accompany me, when she was aged 24 to 29 months. The primary motivation was to observe a young child's learning experience via materially-centric play as a means of incorporating children into sculpture making. This project was also an explorative study examining collaborative, materially-centric play as a method to encourage both children and adult learning. Again, whilst this is not a new endeavor for arts education research, this study offers insights from visual arts perspectives, adopting a sculptural understanding of material pedagogy.

Phased research design

The project was carried out in two phases during which creative activity (interaction with the sculpture kit) was the primary research method. Sevón et al. (2023) observe that, though such activities are not often primary methodologies, "when [children] were allowed to choose what to produce, they also exercised strong agency and control over the process," (p. 1009). Centralizing making both facilitated children's agency, and enabled me to closely observe their material

encounters. Phase 1 was a design process, in which N and I collaboratively developed the sculpture kit, which itself became the creative research method. Phase 2 was the delivery of three public playgroup sessions, testing the kit with groups of children and adults.

Across both phases, collaborative materially-centric play was captured by video, photography and field notes. Since I was the only researcher and also N's parent, note making often proved challenging. I was engaged in the activity whilst also prioritizing N's needs - a snack, a cuddle - as they arose. Notes were taken in fleeting moments, but predominantly after we had returned home. Discussions with participants were also captured via note-making and supplemented by images, not systematically via surveys or interviews. Videos and photographs enabled me to both return to the activity, and document children's non-verbal forms of expression since most were under 3 years and verbal communication was still emerging. Documentation focused on hands, emphasising touch whilst also anonymizing participants. This echoes visual art methodologies related to understanding the making process via image since it emphasises tactility as mode of communicating information (Lehmann, 2012). Analysis is focused on actions rather than verbal data.

Phase 1: designing the sculpture kit

Though many studies in arts education position children as co-researchers, (Brinck et al., 2020), N's contribution to research design and our mother-daughter relationship raises ethical considerations. Abandoning the activity due to N's tiredness, for example, was sometimes necessary and relied on my experience as a parent rather than a researcher. Current visual arts practice reflects this, since parent-child collaborations have recently emerged into mainstream

practice and relevant ethical frameworks are the topic of debate (Ruocco, 2024). Occupying positions of co-researchers, then, potentially diminishes our relationship by removing it from the conditions in which this research is conducted. N and I were present as mother and daughter, playing as we often did at home, with N's needs taking priority over research activities.

I began by offering N a choice of materials, laying down a selection on the floor. Initially, these were items I had offered N to play with at home, including water play and ribbons. Reflecting on notes and video recordings, I observed which: held N's attention, engaged different senses, could be transformed without equipment, and had different yet complementary affordances (e.g., tape wraps scrunched tissue paper). Each week, materials which did not hold her attention or did not facilitate independent transformations were exchanged for others (table 1). New selections repeated those she consistently chose to involve in play.

The final selection - pipe cleaners, masking tape, tin foil, tissue paper, toilet roll and wool - became the sculpture kit. Each offers a different tactile experience, aesthetic quality or constructive potential. They can be manipulated easily, requiring no skill or equipment. I repeated the sculpture kit four more times, and our play took different directions. We unraveled wool and kicked tin foil reels, watching tangles and listening to rattles. We dressed up in shredded tissue paper costumes (fig. 1). We made a "den" with tape strands roofed with toilet roll. We invented new toys: a woolen "nest" which was home to pipe-cleaner caterpillars. Each of these materials' affordances directed the flow of play.

Phase 2: public play sessions

Three public play sessions observed and captured children and parents interacting with the sculpture kit, coordinated with support from In Situ staff. Here, the research framework shifted focus away from N and I designing a creative methodology towards testing with wider audiences. N was no longer influencing the activity, but present as a research participant.

The sessions lasted for 1 hour and were aimed at children aged 0-5, though older siblings attended one session during school holidays. Participants were of mixed ethnicities, and did not necessarily engage with visual arts. Each session was also attended by a member of In Situ staff, who supported reflective discussions afterwards. The first two were delivered in partnership with two organisations, engaging different groups: Brierfield Family Hub (BFH), a government early-years provider; and the Deen Centre, a British-Pakistani-led organisation supporting women of colour. These took place at the BFH centre and a local library respectively. The final session was at In Situ, hosting the activity in a visual arts context. Attendance varied hugely: 5 children and 6 adults at BFH, 20 adults and 20 children in the library, and 3 children and 3 adults at In Situ. Variations reflected each organisation's existing audience: BFH and the Deen Centre offer regular early years programming whilst this was a one-off for In Situ.

Since this study was originally framed as visual arts research, engaging with public groups was not initially part of project design but emerged as a means of considering the ways in which other children - not just N - might manipulate materials. As such, this study is limited in scope and requires further testing. It is small-scaled, involving only myself as a researcher, testing the sculpture kit three times. I was unable to form long-term relationships with participants, which may offer further insights into how different agencies and power dynamics inform research.

Whilst I have foregrounded materials' impact, more focus on the three environments in which the sessions took place may offer a useful comparison between educational and visual arts settings. Observing how participants engage with the kit over a longer period of time, and how interactions may be informed by context, would improve understanding about how it may function as a pedagogical tool.

Open pedagogical approach

Engaging in materially-centric play in both phases required awareness of my position and approach in order to support children's creative participation. I eschewed a hierarchical adult/child or teacher/learner relationship by avoiding instructions or dictating activities. Arts education studies exploring children's creative participation emphasise an open pedagogical approach, encouraging adults to "observe, listen and act on children's ideas, ingenuity and creativity" (Brinck et al., 2023, p. 236). Space and time to follow impromptu play parallels artistic activity in the studio, bringing together arts education and visual arts models (Thomas, 2019). In phase 1, I gave N space to initiate play, either by following her focus or responding to verbal commands (e.g. "walk around with the tape"). I sometimes suggested different actions (e.g. "shall we roll the toilet roll?"), but only after she had made an initial choice. Similarly, in phase 2, participants were not given instructions and were invited to "see what they could do" with the sculpture kit, presenting the same possibility for choice and exploration. I did not define the activity, only the materials with which to play. The kit was presented as an unruly pile (fig. 2): pipe cleaners protruded between reels of foil, sprawled on crumpled tissue paper sheets. Materials demanded to be rifled through, forging an immediate physical connection. N and I were on the ground alongside participants, similarly engaging in play.

“Kit” Terminology

The term “kit” is applied strategically, since kits often bring together play, making and learning across different contexts. Historically, object collections as pedagogical tools have a strong resonance with the material encounter as learning experience. “Object lesson boxes” were a nineteenth-century mechanism to develop communication via experiencing material affordances (such as bending an “elastic” whalebone) towards a bodily comprehension of language (Lehmann, 2016). This notion, though not a new approach, draws together similar contemporary threads across visual arts, arts education and new materialism.

From a sculptural perspective, kits are methods for catalyzing play processes such as reconfiguration and deconstruction. Researcher Elly Thomas (2019) explores sculptor Eduardo Paolozzi’s “Krazy Kat Arkive” - a collection of images, materials and toys - as a kit which may be reassembled and disassembled permitting multiple combinations. The “Arkive” emerges as a jumbled iconography throughout his 3D works, such as *Cyclops* (1957). Kits animate objects “within a flow of change” (Thomas, 2019, p. 27), a phenomenon which combines imaginative play and material-centricity, echoing parallel research in arts education and psychology.

In socially-engaged art practice, kits are often connected to play as a pedagogical strategy since they emphasise exploration and participation. The *Fluxkit* (Maciunas, 1965), for example, was produced by artists associated with the Fluxus movement in the 1960s, during their interventions in curriculum reform. It contained objects to be held, printed materials and scores for action which embodied Fluxus’s approach, centralising a “complementary relationship between forms

of artistic and educational play" (Krstich, 2016, para. 2). Drawing from this legacy, the *Instant Class Kit* (Krstich & Springgay, 2020) includes editions by artist-educators as a multi-sensory means of facilitating open-ended, collaborative teaching strategies oriented towards social justice. The collection of zines, scores, games, newspapers and sensory objects are intended to be explored, interpreted and activated in different ways to produce participant-led artworks, performances, and exhibitions as educational experiences. Rachel Clarke's *TicTacTec* (2017), which combines basic electronics with everyday sewing items as a means of creating "opportunities for communities to explore and reflect on histories of migration and trade" (p. 33) is another example of inviting exploration via the kit format.

The sculpture kit similarly seeks to prompt explorative play which empowers the learner with open-ended outcomes, yet reframes everyday items as possibilities for making rather than presenting artist-made objects. Arts-based education researchers Hood and Kraehe (2017) suggest that experimental play with everyday materials surfaces "new ways of looking at taken-for-granted things that surround us every moment of every day" (p. 35). This resonates with new materialist approaches to the material encounter discussed previously (Hickey-Moody & Page, 2015), since it foregrounds material pedagogy, uncovering invisible affordances of items likely already in the home. Reframing everyday items as a "kit", then, provokes these new ways of looking since they also occupy a lower status than traditional art materials, associated with classroom, craft or domestic uses. Considering constructive potentialities of everyday materials disrupts hierarchies surrounding sculptural materials such as stone and metal which are plastic and enduring (Wagner, 2015). I observed this in practice during the public play sessions as many attendees asked to take unused materials. Participants were excited by the prospect of recreating

the sculpture kit at home. One parent commented that a limited set of materials “forces you to think about new ways to make them work.” These six materials, removed from their contexts as a kit, inspired an appetite for making by calling participants to uncover their unforeseen properties.

A kit may also remove the need for the artist’s presence, meaning that it may be deployed in a variety of contexts (Brunsden et al., 2017). This is true of the sculpture kit, since the six materials are accessible and affordable, removing the need for production and distribution. This is not to say that the actions and outcomes generated by interaction with the kit are reproducible. Rather, the approach it encourages may be replicated in other childcare, education and visual art settings towards facilitating entangled making more widely.

The sculpture kit is titled as such because it: is aligned with approaches in arts-education which positions the material encounter as a learning experience; facilitates play processes such as reassembling; foregrounds hands-on, collaborative learning; and recontextualizes the materials involved towards reframing their unforeseen affordances.

Observations and Discussion

Aligning this study with new materialist approaches to material pedagogy, whilst still acknowledging criticisms addressed prior, discussion of interactions with the kit during both phases are structured around some of the affordances of the six materials, considering how each influenced the direction of play and what this enabled participants to do. Though a variety of affordances emerged, I have focused on four which capture different examples of material

pedagogy: to bend, to stick, to be imprinted and to wrap. Some of these examples are focused on one material, others are the properties of different ones, or involve various materials contributing in complementary ways. These observations are not intended to simplify the different ways in which affordances impacted play. Instead, they zoom in on instances of material pedagogy which initiated a reciprocal learning experience between children and adults via materially-centric play towards establishing entangled making as a methodological framework.

Bendiness

Pipe cleaners' internal wire, contradictory to its fuzziness, may be easily bent yet retains a certain resistance. After presenting pipe cleaners for N, I observed her copy my actions, captured in my notes: "I had baled up pipe cleaners and wool into a ball - which at times she took apart again - and at the end of the day, I noticed her bring together pipe cleaners she scavenged from the floor into a ball like I had earlier." (fig. 3) Pipe cleaners' specific flexible rigidity meant that N could produce a complex object by shaping them around each other. This affordance focused her concentration as she gathered them, folding the wiry ends carefully into the mass to form a cohesive shape.

Here, material pedagogy illuminates how children's encounters with materials may be framed as a learning entanglement involving adults: as an entity in the entanglement between myself, N, the pipe cleaners and the floor, I received information about how pipe cleaners may be carefully coiled around one another, illustrating young children as "sources of research knowledge" (Hickey-Moody et al., 2021, p. 1). N observed and refined my action rather than replicated it, offering new knowledge towards producing sculptural forms. This becomes an act of making

rather than play, since this information is captured in the difference between my clumsy object and N's advanced one.

Pipe cleaners' bendiness also afforded skillful applications. In the last public session, a grandmother laid them out in parallel lines, alternating colours. As they twist whilst remaining stiff, she repurposed them as warp and weft, weaving them together as her grandson watched (fig. 4). This example echoes psychological research which positions the child's observation of adult object manipulation as crucial to facilitating learning, since adult hands yield "information about how to act on objects in culturally relevant ways." (Lockman & Tamis-LeMonda, 2021, p.179). Whilst it is difficult to discern whether the boy watching his grandmother's weaving hands acquired new knowledge in this moment, what is of interest is that the pipe cleaners' affordances catalyzed an instance which sparked his grandmother's imaginative approach - using them for something other than their purpose by applying textiles methods - and resulted in a situation which may not have occurred otherwise.

Stickiness

Stickiness is the most apparent quality of masking tape. One girl (L) repeatedly stuck ragged strips on top of one another until they formed a robust yet ragged pile (fig. 5). Her mother supported the direction of play, tearing strip after strip which focused L's attention. As an In Situ staff member observed, where adults may be more concerned with making a preconceived object - a woven pipe cleaner square - young children were not concerned with artistic production. L was instead interacting with the tape's stickiness, which yielded textured surfaces. As an artist, I was interested in the emergent object, since the repeated action of sticking may be replicated in a

studio context towards forming a complex sculpture. L demonstrates unforeseen possibilities for surfacing affordances which may be hidden from an adult's perspective; sticking tape to itself, rather than using it to stick other objects together, is counterintuitive to its intended function. L's tactile encounter with the tape, scaffolded by her mother, provided her with sensory information in order to deploy its properties to form an object as a material pedagogy (Hickey-Moody & Page, 2015).

Stickiness was often at odds with children's play. N frequently stood on a tape strand which stuck to her shoe and caused other materials to attach to her, resulting in frustration. Here, the tape contradicted N's intention to move freely - contrasting L's application of it - as an example of children experiencing material agency which acts against rather than synchronizes with their own. Children's encounters with material via play is a means of both exerting and experiencing agency (Mitchell, 2021) towards gaining a more complex understanding of inhabiting the physical world.

Imprinting

Tin foil morphs under slight pressure and holds the resulting form, though with some vulnerability. As such, it was often a focus of younger participants, responding to grasp by transforming into a scrunched form. A mother rolled foil along the floor, creating a silver pathway. Her eighteen-month-old child (A) noticed the noise this made and ran across it. His stamping feet imprinted onto the foil, which captured the patterns on the soles of his shoes (fig. 6). Foil's yield to pressure and its ability to freeze this intervention in three-dimensional relief caused A to make this gesture again and again, with his mother's encouragement, pausing

between to look at the results. His footprints were evidence of the relationship between his own agency and the material's responsiveness. From a sculptural perspective, this is evocative of "press moulding," a process in which objects are pressed into clay to capture a texture which is then cast in a more durable material, often plaster. In this way, the affordances of non-art materials begin to overlap with those predestined to become artworks, again presenting ways in which children's interventions with material may present possibilities for their application in the studio. Here, children's creative interactions with materials with no existing technical methods may generate new and innovative means of establishing new ones, aligned with Gell's (1998) suggestion that material dictates the form it assumes. This aligns with art historian Georges Didi-Huberman's (2015) suggestion that materials' functionalities, rather than their ability to hold form immutably, may inform how its affordances may be alternatively deployed. Foil's potential usage is observed in the resulting object - imprinted footprints - rather than the act of play.

Wrapping

Many of the materials in the sculpture kit could be used for wrapping, an action which emerged repeatedly. Wool's lightweight strands which unravel easily tended towards engaging the body. One boy wrapped his hand in layers of pink and purple wool, entrapping pipe cleaners which poked out from between the threads. L ran in excited circles clutching an unwinding ball, wrapping her mother's shins in a tightening peach web (fig. 7). Her mother mentioned that L often ran around her during their play at home. She wondered if the addition of wool in her caused L to giggle because she was empowered by seeing the affect of her actions unfold materially, entrapping an adult body via its ability to unwind and cocoon. This also occurred as

children collectively wrapped an adult staff member in toilet roll. In these examples, the adult/child power dynamic is interrupted, facilitated by the affordance of wrapping. Wool enabled children to form literal iterations of Barad's (2007) entanglements, forming physical links between children, adults and materials. These instances emphasise the importance of making in addition to play, since we can understand them as temporal yet sculptural objects in which all entities become entangled with one another.

Wrapping was a means of solidifying forms, bringing objects more cohesively together. One boy (Y) was more hesitant than other children, and patiently watched his grandmother wrapping scrunched tin foil with tape to make balls (fig. 8). Tape's stickiness, alongside its smooth surface, transformed the foil's uneven shape into a coherent, spherical object. Foil and tape in combination could now be used to play catch. Y used these balls to initiate play with other children. This flow of exchanges between Y's grandmother, the materials's affordances and qualities (scrunching and wrapping; bulky, sticky and smooth), the resulting objects, Y and other children may be framed as an entanglement between different human and non-human entities which impacted and supported Y's social interactions.

Entangled making: an empirical definition

Each observation demonstrates entangled making in practice, expedited by the sculpture kit. Moments when material affordances - bending, sticking, imprinting and wrapping - collide with human intervention offer intergenerational learning experiences, as actions and outcomes were guided by materials' pedagogical role. Each affordance produced vastly different objects, catalyzing both focused interaction and bodily engagement.

Making is emphasised as a reciprocal learning experience. Entangled making offers insights towards exerting and experiencing agency via negotiating with material properties. The sculpture kit, though limited to a selection of six materials, opens possibilities to engage in entangled making, since these materials may be explored and deployed in a variety of different ways. Resulting objects - N's pipe cleaner form, L's tape pile, A's foil footprints - resist imprinting adult meaning, which may occur when analyzing verbal or written data (Sevón et al., 2023). Understood as sculptures, they exist as children's autonomous creative outputs since they may be interpreted yet have no fixed meaning. Through these emergent objects, children's grappling with material agency becomes evident, whether they may be preserved - like footprints in foil - or are ephemeral - like wool-wrapped bodies. Emphasis on these objects, therefore, positions entangled making as a useful alternative to sensory or explorative play which may prioritize experiential learning (Nilsson et al., 2017), since it directs critical attention to physical artefacts which offer further insights into how material's pedagogical role may inform our own becoming. L's tape strips formed an object which holds information about how it was made, emerging from her learning from the tape, supported by her mother.

Adopting an open pedagogical approach enabled these instances, permitting curiosity towards how the six materials might be manipulated differently. Collaborative play did not always follow a straightforward model of knowledge passed from adults to children - though it did adhere to this in some examples - but a more complex, entangled learning relationship. Adults did not always direct play, and created the conditions for children to lead, often unintentionally. A's mother rolling the tin foil sheet, for example, supported A to find his own way of interacting

with the material. N copied my pipe cleaner collecting, but the object she produced was more deliberate. Children applied material affordances which may be less perceptible to adults, simultaneously informing and eluding adult creativity. These observations support entangled making as a reciprocal pedagogical model in which adults, children and materials all have the capacity to offer and receive knowledge.

Entangled making, therefore, emerges from these observations as enfolding together play, making and learning as relational and inseparable. It highlights the material encounter as a pedagogical exchange; the objects which emerge as capturing instances of material pedagogy; and the reciprocal learning which takes place via collaborative play between adults and children.

Conclusive Remarks

The value of children and adults collaboratively exploring the sculpture kit as a play, making and learning experience has been demonstrated towards conceptualizing entangled making, a framework which acknowledges the pedagogical role of material and the reciprocal exchange of information between adults and children, materials and humans. Each of the observations discussed offer applied examples, capturing agential flows in practice which are chartered in part by material affordances. This has implications for visual art practice, since it posits that children's grappling with material qualities may uncover new ways of working which are difficult to access from an adult perspective. As such, entangled making disrupts traditional hierarchies surrounding teaching and learning, understanding children as deeply connected to and affected by material agencies.

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Declaration of Interest Statement

The author has no competing interests to declare.

List of Tables/Figures

Table 1. Detailing, reviewing and revising the different material selections offered to N and the codesign process which resulted in the sculpture kit.

Figure 1. Dressing up in tissue paper and masking tape. Photograph by the author.

Figure 2. Presenting the sculpture kit as a pile during a play session. Photograph by the author.

Figure 3. Bending a pipe cleaner form. Photograph by the author.

Figure 4. Weaving with pipe cleaners. Photograph by the author.

Figure 5. Sticking strips of masking tape. Photograph by the author.

Figure 6. Imprinting footprints on tin foil. Photograph by the author.

Figure 7. Wrapping legs with wool. Photograph by the author.

Figure 8. Handmade balls made from masking tape and tin foil. Photograph by the author.