

**Journal of Design and Science**

# **Material Matters in Children's Creative Learning**

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**Published on:** Feb 19, 2019

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The age-old debate over why creativity and the arts are important in children's learning continues. Education theorists from John Dewey (1934, 1938) to Maxine Greene (2000) have argued that aesthetic experiences produced through the creative arts play an integral role in encouraging children to imagine and experience the world from new and multiple perspectives. While creativity has been flagged as a critical process to be supported in 21<sup>st</sup> century education systems (Jones, 2009; Resnick, 2017), a current emphasis on literacy and numeracy in school curriculum has reduced the possibilities for children to think differently (Robinson, 2000). Furthermore, a focus on these subjects at the expense of the creative arts falls short of supporting the diverse and "complex systems of inputs and outputs" (Ito, 2007) that different children learn through. This approach to public school curriculum also comes at a time when children are predominantly being assessed on learning outcomes instead of creative and critical processes. As a consequence, the need to generate opportunities for children to experience and understand a rapidly changing world from alternate perspectives is now more important than ever.

In this essay, I explore how the coming together of a new materialist approach to education with the experimental practices of artists and designers can open up expansive possibilities for children's creative learning. While materials have long been an important part of educational and artistic inquiry, how they are understood in relation to children's creative learning varies significantly across different education theories. I argue that materials are not just passive substances for children's manipulation or self-expression. Rather, they are active and participatory forces that open up new and divergent learning processes (Barad 2007 & 2011; Bennett, 2004 & 2010; Braidotti, 2013). Furthermore, as artists and designers produce novel ways of working with materials, including the fabrication of new ones, they provide dynamic springboards for educators to design children's material-based learning environments. In this paper, materials are defined as both tangible and intangible substances including paper, plastic, sound, resin, and cardboard.

I draw on documentation generated from my PhD fieldwork in the learning departments at the Whitworth Art Gallery and the Tate galleries (UK) to illustrate this argument and demonstrate why materials matter in children's learning. The documentation was created as part of a body of data produced over a 12-month action research project that investigated the mediators that facilitate young children's (0-5 years) learning in art museums.

## **A history of materials in children's education**

Materials have held an important place in education ever since Friedrich Froebel's invention of the kindergarten in 1800's Germany (Pacini-Ketchabaw et al., 2017). Steiner, Montessori, and Reggio Emilia education approaches have also emphasized the significance of sensory-rich material resources in supporting imagination and play (Montessori, 1994 & Steiner, 1995; Vecchi & Giudici, 2004). Jean

Piaget's (1964, 1999) developmental approach to education discussed children's manipulation of physical objects through linear stages of cognitive development. While Piaget acknowledged the active role children have in learning, he also believed that an individual's biological development preceded the human thought processes required to explore objects. This educational theory therefore assumes that biological and cognitive development occurs as independent precursors to children's interactions with materials, producing a chronological division between body, mind, and materials.

Beyond Piaget, children's expression through materials has also been a lively topic in early childhood education (Gandini, Hill, Cadwell, & Schwall, 2015; Vecchi & Giudici, 2004). This perspective on children's learning has explored the critical role of emotions and subjectivity in art making. However, an "art as expression" conceptualization of creative learning situates children's artistic creations as representations or reflections of their preexisting inner worlds, implicitly suggesting that human thought is produced before a child's encounter with a material. The material is then reduced to a passive substance that human meaning is projected onto. If we are to ethically consider the world as constituted of human and non-human forces, an expanded conceptualization of how children learn with materials needs to be produced.

## **Materials as active forces in learning**

In this paper, I draw on a new materialist framework that repositions materials as active participants in young children's creative learning (Braidotti, 2006 & 2013; Dolphijn & Van der Tuin, 2012; MacLure, 2015). Materials are not merely passive substances for children's self-expression or manipulation but vibrant and active entities that work in dialogue with people to mutually transform one another (Barad 2007 & 2011; Bennett, 2004 & 2010). New materialism situates meaning and matter as inextricably bound, recognizing a direct engagement between people and the world. From this perspective, learning and agency do not exist solely in people but are produced from mutual transformations between human and non-human entities—a process that physicist Karen Barad (2007) termed *intra-action*.

New materialism challenges the idea of cause and effect relationships, recognizing that phenomena are produced by "a multitude of interlocking systems" (Coole & Frost, 2010: 9). Creativity emerges from multiple sources and across multiple timeframes, generating dynamic relationships between people and materials over time. Children are therefore not separate from the material world but in a continuous state of becoming with it.

Different materials have the ability to open up unique and divergent learning pathways in young children (Lenz Taguchi, 2009 & 2011; Odegard, 2012; Pacini-Ketchabaw et al., 2016). For example, play with wooden blocks may open up learning around arrangement, balance, and height through stacking, placing, and constructing. Alternatively, children's play with large paper sheets may invite learning

around gravity, weight, and shape through movement and throwing. As children play with materials, they learn about their physical properties and what these materials can do in the world, such as how they can be rolled, stacked, or moved. A material's sensory and aesthetic properties may also transform as a child plays with it, generating opportunities for further experimentation. These transformations then allow children to extend and make their learning more complex over time.

## Materials in art and design practice

Materials have also long been a part of art and design practice. Cave art dating from 113,000BC demonstrates the use of mineral pigments to create paintings (Hoffmann et al., 2018). The discoveries and production of subsequent materials such as stone, terra cotta, porcelain, bronze, charcoal, and glass all produced new possibilities for creative experimentation. Materials have continued to be explored in novel ways through modern and contemporary art practices such as dance, performance, installation, video, conceptual, and live art. Paint, resin, plaster, polystyrene, fabric, and metal, as well as abstract materials such as human participants, are constantly being explored in new and innovative ways by artists and designers. Florescent lighting was used by [Dan Flavin](#) to create electronic sculptures. Turner Prize winner [Susan Philipsz](#) experimented with sound to explore memory and time. The human body has been a core material of [Marina Abramović's](#) practice. This experimentation has allowed for the emergence of new relations between materials, concepts, emotions, tools, and people over time (Ingold, 2011 & 2013). Art museums are rich archives of the varying ways that artists and designers have experimented with materials.

A recent "materialist turn" in art and design practice has further emphasized material's aesthetic, multisensory and agentic abilities in the process of making (Barrett & Bolt, 2013; Boivin, 2010; Robertson & Roy, 2017).

Many artists and designers are also at the cutting edge of material fabrication. Hannah Elisabeth Jones, a graduate of the Manchester School of Art, recently produced '[BioMarble](#)', a flexible and biodegradable material made from casting hand-dyed waste paper. Israeli designer Shahar Livne created '[Lithoplast](#)' from landfill designated plastics, plastic pollution from the natural environment, and industry remnants using a process mimicking rock metamorphism. Additionally, material innovation is being pioneered collectively by organizations such as [Material Driven](#), [Material Lab](#) and [MIT's Mediated Matter](#) research group. As artists, designers, and scientists produce novel ways of experimenting with and fabricating materials, these then provide innovative foundations for designing children's material-based learning environments.

## Evaluating children's learning with materials in an 'unknowable' world

Joi Ito discusses the limitation of [Singularitarian thinking in believing the world is 'knowable.'](#) He argues that we need to embrace the messiness, unknowability, and irreducibility of knowledge in

order to develop a sensibility and culture of flourishing. An emphasis on standardized testing, educational benchmarks, and quantifiable learning outcomes in early childhood education curriculum becomes problematic when evaluating children's learning with materials. This comes as a result of the implicit assumption that underpins current school assessment: that learning is controllable, easily measured, and clearly defined (Olsson, 2009). The philosopher John Rajchman (1998: 4) describes society as "an experiment and not a contract, a labyrinthine construction that we must enter and exist in many ways and by many ways, since 'the way' does not exist." Applying this postmodern perspective to children's learning, knowledge can be understood as part of a complex system that is continuously transforming, recombining, and connecting in new ways. Constructing an evaluative framework that is open to new and multiple connections is therefore a critical part of producing education and artistic practice that adds to an increasingly complex and interconnected world, rather than reducing it down (Dahlberg & Moss, 2010).

A solution to this issue lies in the early childhood practice of pedagogical documentation. At its most fundamental level, pedagogical documentation is a critically reflective process that seeks to make children's and adult's learning visible through iterative cycles of planning, observation, reflection, and change (Pacini-Ketchabaw et al. 2014; Project Zero & Reggio Children 2001). Records such as photographs, videos, audio recordings, and artifacts such as artwork imagery are generated and used by groups of people to interpret children's learning from multiple perspectives. Attention can then be drawn toward the expansive social, emotional, and embodied relationships produced between children and materials. Pedagogical documentation supports educators in questioning dominant discourses and power structures that function as "regimes of truth" in education (Foucault, 1994; Mac Naughton, 2005). Through becoming critically reflective about these discourses and structures, educators can then begin to disrupt singular, universal paradigms of "best practice" and move toward reflective approaches that value uncertainty, contextuality, and difference in education. Pedagogical documentation is therefore a complex and open-ended process that can be used to reflect on the ethics, assumptions, and beliefs that shape children's learning and early childhood practices. In this research, pedagogical documentation was drawn on as the practice-based process for evaluating children's learning with materials.

## **Connecting new materialism, art practice, and children's creative learning**

In this essay I argue that connecting a new materialist approach to education with the novel material practices of artists and designers has the ability to open up dynamic and expansive opportunities for children's creative learning. In the following section, I draw on documentation generated as part of my PhD fieldwork in the learning programs at the Whitworth Art Gallery (Manchester, UK) and Tate (London, UK) to further illustrate this point. The documentation was generated as part of a 12-month action-research project run across the two art museum locations. Extensive records comprising field

notes, video records, photographs, and meeting transcripts were produced over 13 gallery-based activities. These records were then used to interpret and evaluate how children learned in the art museum's environment.

### **Creative learning through plastic: David Batchelor's 'Plato's Disco'**

The Early Years Atelier is a weekly drop-in art studio at The Whitworth, University of Manchester. The program was set up by the art museum's Learning and Engagement team in 2015 as a creative laboratory for young children's play-based experimentation with materials.

As part of the research project between the art museum and myself, David Batchelor's sculptural installation *Plato's Disco* (2015, figure 1) was selected as a starting point for constructing an Atelier activity for babies, toddlers, and their families.



*Figure 1: David Batchelor 'Plato's Disco' (2015). Image courtesy of the Whitworth, University of Manchester and the artist*

The artwork provided a rich starting point for exploring color mixing and color layering through translucent glass. When curating the design of the activity, the team substituted glass for plastic acetate and cellophane to allow babies and toddlers to safely experiment with the materials. Additional tools such as transparent tape, water spray bottles, overhead projectors and a lightbox were also selected based on their potential to open up new possibilities for creative experimentation.

The equipment and materials were then laid out in a way that encouraged social interactions between children and their families (figure 2). For example, large rolls of cellophane were spread out across the space in a way that allowed groups of children to explore and play with the materials together. Additional materials such as flashlights and colorful tape were placed to the side with the intention of being introduced to individual participants in response to their experimentation.



Figure 2: The initial Atelier setup in the Clore Learning Studio at the Whitworth, University of Manchester. Photo credit: Louisa Penfold

The experience of Charlie,<sup>1</sup> aged 2 years and 9 months, was drawn on to reflectively interpret learning that was occurring in the space. Charlie entered the Atelier with his mother. The pair had attended numerous Atelier sessions at the art museum before. On entering the space, Charlie started gathering acetate pieces off the floor.



Figure 3: Charlie plays with plastic in the Atelier. Photo credit: Louisa Penfold

After a few minutes, his mother picked up a water spray bottle and demonstrated how to use it. She commented, "This is the first time he has used a spray bottle... as you can see he is spraying everyone and everything... I think he likes the look of the water flowing down things." Charlie walked over to the window in the corner of the room. He started to spray the water on the window. He then began to stick the colorful plastic acetate shapes to the glass, remarking "I am making colors" (figure 3). As Charlie stuck

the acetate to the glass in different formations, we interpreted his experimentation as exploring concepts such as transparency, opacity, light arrangement and color mixing through the water and plastic. The acetate's properties, such as how it adhered to the glass when wet, generated new starting points for Charlie to stick more acetate and cellophane onto different surfaces. Experimentation with the technique of spraying the water opened up new possibilities for Charlie's experimentation. Charlie then sprayed the water onto a long strip of yellow cellophane that was hanging from the ceiling (figure 4).

He stuck the acetate shapes onto the cellophane using large amounts of water from the spray bottle. As the water ran down the cellophane, the dye from the plastic started to drip onto the floor. The dye ran from the acetate, creating an unexpected pool of yellow liquid. *"The yellow is leaking... It is a yellow waterfall!"* (figure 5). In the research, these unfamiliar and unexpected material transformations were important catalysts for learning as a result of their ability to encourage children to respond to unforeseen changes.



Figure 4: Charlie creates a 'yellow waterfall' with the cellophane and water.

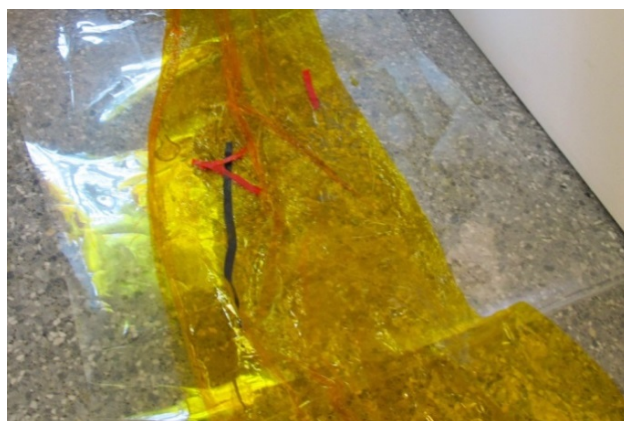


Figure 5: The plastic transforms after having water sprayed on it.  
Photo credit: Louisa Penfold



## Creative learning through paper: Jessica Dismorr's 'Related Forms'

This second documentation sequence was generated as part of the “Under-fives explore the gallery” program at Tate Britain. The session was co-developed by the art museum's Early Years and Family team and a practicing contemporary artist. The program aimed to support family's engagement with artworks and the gallery space. Jessica Dismorr's painting *Related Forms* (1937, figure 6) was selected as a starting point for developing the activity. In the curatorial planning of the session, the team considered how different materials could be brought together to encourage participants to produce new relationships with themselves, other people, artworks, and the gallery space.

*Related Forms* provided a unique way of thinking about children's learning with materials and concepts. The initial activity setup featured tin foil, tissue paper, and tracing paper presented alongside masking tape and scissors. The paper and foil were cut into large oblong shapes and carefully arranged across the gallery's granite floor (figure 7). This provided a sensory-rich starting point for children's play with the materials.



Figure 6: Jessica Dismorr 'Related Forms' (1937). Photo credit: ©Tate, London 2018.



Figure 7: The material layout of the 'Under-fives explore the Gallery' session at Tate Britain. Photo credit: Louisa Penfold

Tom,\* age 10 months, attended the session with his mother and father. It was the first time the family had visited the museum together. Tom's father sat him down in the middle of the paper arrangement. Tom looked around for a few moments before beginning to touch the tissue paper with his hands (figure 8). He then held, scrunched and threw the paper back and forth with his hands, exploring the weight of the materials using his body. After a few minutes, Tom then began to crawl across the paper, foil and gallery floor. He laid flat on his tummy and slid himself backwards using his upper body strength (figure 9). He repeated this action numerous times and giggled as he did so. Tom's father commented "... I think he loves the physicality of it and how his body connects with things."

While Tom was sliding, rolling, and moving through the materials, he was able to explore the movement and friction of his body against different tactile surfaces. The different material's physical properties created unique opportunities for learning with texture, space, push, pull, weight, and mass. The smoothness of the floor allowed Tom to slide across and explore the push and pull of his body on the marble. Tom then picked up pieces of the tissue paper and raised them above his head (figure 10). These actions can be interpreted as an exploration of the paper's weight, the height of the material above his body, as well gravity's ability to pull the material to the ground.



Figures 8 & 9 (top and bottom): Tom plays with tissue paper in the 'Under-fives explore the Gallery' activity at Tate Britain. Photo credit: Louisa Penfold



Figure 10: Tom lifts the tissue paper over his head. Photo credit: Louisa Penfold



Figure 11: The tissue paper's properties changed as Tom played with the material. Photo credit: Louisa Penfold

As Tom crawled, rolled, and pulled himself across the paper and raised it above his head, the paper physically and aurally changed form (figure 11). As other babies and toddlers entered the space, they began to play with the paper in its new form, producing more complex transformations between children and the materials.

## Constructing creative learning fit for the 21<sup>st</sup> century

While creativity and the creative arts always have and will continue to hold important places in education, a new materialist approach to creative learning sheds light on how we understand this process and its significance in the 21<sup>st</sup> century. I argued at the beginning of this paper that previous education theories that position materials as passive substances for children's manipulation and self-expression fall short of acknowledging the dynamic and complex relationships between children and the world. The argument I have presented suggests that materials have the ability to support children in making new connections with themselves, others, and the ever-changing world around them. This framework is important for educators, creative practitioners, and policymakers in shaping education

practices, as it raises significant issues around about the importance of the creative arts and materials in children's lives.

As a result of this research, I propose that children need more access to play with diverse and sensory-rich materials. While artists' experimental practices provide a dynamic starting point for children's material learning, further collaborations with individuals and groups exploring materials across science, architecture, engineering, and technology may open up even more possibilities for designing material-based learning environments. Additional networks between educators and practitioners exploring materiality may also allow for more diverse, aesthetically-rich, and child-friendly materials to be produced.

While the study does not offer a conclusive answer to the question of evaluating children's learning with materials, it does acknowledge some of the key dilemmas in basing educational assessment around standardized testing and learning outcomes. It would be beneficial to pursue further research into the use of pedagogical documentation as a formative process for evaluating children's learning across multiple settings, timeframes, and contexts. Results of this research will then give more complex insights into the transformative processes that occur between humans and materials. The evaluative framework can then also be used by a network of artists, designers, scientists, researchers and educators to further explore and share practices surrounding children's creative learning. While the future investigation of new materialism, experimental material practices, and children's learning may require substantial resources, I believe these to be a fundamental part of producing an expansive and creative future.

## Acknowledgments

This research was conducted as part of a partnership with the Early Years team at the Whitworth Art Gallery, University of Manchester and the Early Years & Family team at Tate Modern and Tate Britain. Special thanks to Dr Patricia Thomson, Dr Emily Pringle, Lucy Turner, Andrew Vaughan, Amy Jones, Frances Walker, Isobel Pickup, Susan Sheddan, Jean Tormey, Lucy MacDonald and Ania Bas. Finally, thank you to all of the children and families who participated in this research. This research was funded by the University of Nottingham, Brisbane City Council, The Ian Potter Cultural Trust and The Graduate Women of Queensland Fellowship Fund.

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## Footnotes

1. Not child's real name [↔](#)