

Letterpress, Perception, and the Screen Generation: Materiality as Pedagogical Insight in Cross-Cultural Design Education

Li Yun-yun, National Taiwan University of Arts, Taiwan

The Asian Conference on Education 2025
Official Conference Proceedings

Abstract

This study examines how embodied engagement with letterpress printing deepens perceptual understanding of typography and visual culture among digital-native learners. Following the pandemic, in 2023, I collaborated with Tokyo-based letterpress studio Letterpress Letters to organize a cross-cultural workshop for Taiwanese high school students, providing direct experience with European typographic craftsmanship and printing techniques. Addressing a generation increasingly distanced from typography's material and historical foundations, this research investigates how tactile printing practices can reconstruct students' perceptual engagement with typographic forms and foster critical reflection on materiality within contemporary visual culture. Drawing on Tim Ingold's material engagement theory, Karen Barad's concept of embodied intra-action, and sensory learning frameworks, this study employs qualitative methods including participant observation, artifact analysis, and reflective documentation. Through guided instruction in manual type selection, arrangement, and layout adjustment, students developed heightened aesthetic sensitivity and nuanced understanding of the relationship between traditional craft practices and digital technologies. Findings demonstrate that letterpress printing enhances students' capacity for typographic discernment while fostering critical engagement with the visual structures and communicative logic underlying typographic forms. The research reveals how material engagement with printing processes enables students to perceive typography not merely as visual information but as culturally embedded practice. This study proposes a pedagogical framework integrating embodied perception, cultural awareness, and digital literacy as an effective approach to contemporary visual culture education.

Keywords: material engagement, letterpress printing, design pedagogy, embodied perception, cross-cultural learning, multisensory learning, perceptual reconstruction

iafor

The International Academic Forum
www.iafor.org

Introduction, Research Background, and Motivation

Digital-native design students navigate typography through screens with remarkable fluency. They adjust kerning in Figma, construct visual hierarchies in Canva, and produce visually refined layouts with efficiency that would have been unimaginable to previous generations. However, this apparent competence conceals a structural limitation in contemporary design education. Many students possess what has been described as *screen literacy without material literacy* (Heller, 2015): mastery of interfaces without an embodied understanding of typography as a material, historical, and culturally situated practice.

This perceptual gap has intensified in post-pandemic educational contexts. During the COVID-19 transition to online learning, even the limited tactile encounters once embedded in design education such as handling printed matter, visiting print studios, or examining physical typographic specimens were largely eliminated (Harland & Bohemia, 2021).

For students whose design education unfolded almost entirely through screens, typography increasingly appears as a system of adjustable parameters rather than as a material practice shaped by weight, resistance, and constraint.

Current design pedagogy has struggled to respond to this condition. While scholars have called for renewed attention to craft and making (Crawford, 2009; Sennett, 2008), material engagement is often framed as a supplementary or nostalgic practice rather than as an epistemological necessity. Typography education continues to emphasize principles such as contrast, hierarchy, and readability, yet without embodied experience these concepts remain abstract. The resulting crisis is not merely technical, but perceptual: an entire generation is learning to design without learning how to see through material engagement.

This study emerged from direct observation of this crisis within Taiwanese design education. In 2023, following the easing of pandemic restrictions, I collaborated with the Tokyo-based letterpress studio *Letterpress Letters* to organize a cross-cultural workshop for Taiwanese high school students. The pedagogical significance of this workshop lay in the layered unfamiliarity of the setting, in which students simultaneously encountered:

- a pre-digital printing technology (letterpress),
- a foreign writing system (Latin alphabets designed for European languages), and
- a cross-cultural learning environment in Japan.

These combined conditions disrupted students' habitual modes of perception. Without established cultural or technical scripts to rely on, students were compelled to attend directly to what the material itself demanded, rather than to pre-existing visual conventions.

The research question crystallized through close observation of students' interactions with the printing process. As they adjusted spacing by physically inserting or removing metal spacers, handled the substantial weight of wooden type, and observed the uneven adhesion of ink on aged surfaces, typography ceased to function as "text on screen." Instead, it revealed itself as a situated practice—performed by bodies, mediated by tools, and unfolding over time. This led to the central question of this study:

- *Can material engagement, particularly within cross-cultural contexts, reconstruct how digital-native students perceive typography and visual culture?*

This question carries both theoretical and practical significance. Theoretically, it contributes to material culture studies, the anthropology of making, and embodied cognition research, which emphasize that perception is shaped through interaction with materials and tools (Ingold, 2013; Malafouris, 2013). Practically, it addresses a pressing challenge in contemporary design education: how to cultivate visual and cultural literacy among students whose formative experiences are predominantly screen-based. As design increasingly mediates social communication, political discourse, and cultural identity, critical engagement with visual form becomes a fundamental democratic competence (Mirzoeff, 2015). Such engagement, however, requires understanding visual forms as material practices embedded in historical, technological, and power relations. From this perspective, material literacy is not an optional enhancement, but a foundational requirement for critical visual culture education in the twenty-first century.

Research Questions

This study is guided by one overarching research question and three interconnected sub-questions that address the theoretical, pedagogical, and perceptual dimensions of material engagement in design education.

Primary Research Question

Can embodied engagement with letterpress printing reconstruct perceptual understanding of typography and visual culture among digital-native learners?

This question frames material engagement not as skill acquisition or technical training, but as a form of perceptual intervention. The term *reconstruct* is used deliberately: it suggests that digital interfaces have already shaped a dominant mode of typographic perception, and that material encounters offer the possibility of reconfiguring how typography is seen, understood, and evaluated through different experiential foundations.

Sub-Question 1: Theoretical Mechanisms

How does physical interaction with material artifacts generate knowledge that digital interfaces cannot convey?

This question addresses the epistemological role of materiality in learning. Drawing on Ingold's (2013) concept of thinking-through-making and Barad's (2007) notion of material-discursive practices, it examines whether materials function as active participants in knowledge production. Specifically, it investigates how the physical properties of letterpress printing—weight, resistance, dimensional constraint, and traces of historical use—enable understanding of spacing, hierarchy, and legibility in ways that remain inaccessible through screen-based manipulation.

Sub-Question 2: Pedagogical Conditions

What role does cross-cultural unfamiliarity play in enabling perceptual transformation?

This question focuses on pedagogical design rather than materiality alone. The study situates Taiwanese students in a Japanese letterpress studio working with European wooden type, producing layered unfamiliarity across technology, writing system, and cultural context. It

examines whether such unfamiliarity functions as an epistemic resource by disrupting habitual interpretive frameworks and directing attention toward material properties themselves. In doing so, it asks whether perceptual awareness is sharpened when cultural shortcuts are removed.

Sub-Question 3: Perceptual Durability

How does multisensory material engagement shape lasting changes in typographic perception and digital design practice?

This question addresses the durability and transferability of perceptual learning. It investigates whether sensory-rich experiences—integrating touch, sight, sound, smell, and bodily movement—produce perceptual shifts that persist beyond the workshop context. More critically, it asks whether these shifts transfer back into digital practice: do students subsequently approach tools such as InDesign or Figma differently, informed by embodied material memory?

Taken together, the three sub-questions are necessary to address perceptual reconstruction as a process rather than as a single outcome. Examining material engagement without attention to pedagogical conditions would risk treating perception as an individual response divorced from context. Conversely, focusing on cross-cultural unfamiliarity alone would foreground difference without accounting for how perception is physically negotiated through tools and materials. Finally, without considering perceptual durability, any observed shift could be dismissed as situational or short-lived, limited to the workshop setting itself.

Each sub-question therefore addresses a distinct but interdependent dimension of perceptual change. The first examines how material properties participate in shaping judgment at the moment of making. The second considers how unfamiliar cultural and technological conditions disrupt habitual ways of seeing, creating openings for perceptual reorientation. The third asks whether such reorientation persists beyond the immediate encounter and informs subsequent design practice.

These questions are not arranged as a linear sequence, but as a relational structure. Material engagement, pedagogical context, and perceptual durability continuously shape one another. Only by considering all three together can the study account for how perceptual understanding is destabilized, re-formed, and potentially sustained among digital-native learners. Removing any one of these dimensions would leave the process of perceptual reconstruction conceptually incomplete.

Integration of Research Questions

Together, these questions correspond to three analytical lenses: material engagement theory, pedagogical frame-shifting through unfamiliarity, and multisensory learning. Their integration enables systematic examination of whether, how, and under what conditions material encounters can reconstruct perception for the screen generation, contributing both theoretical insight and pedagogical implications for contemporary design education.

Research Methodology

This study adopts a qualitative, practice-based research design to examine how cross-cultural material engagement reshapes digital-native students' perceptual understanding of typography. The investigation centers on an intensive letterpress workshop structured to generate embodied learning through unfamiliar materials and cultural contexts.

Research Context

Figure 1

Letterpress Workshop Setting at Letterpress Letters Studio, Tokyo (2023), Showing Students' Embodied Engagement With Tools and Materials



Note. The workshop was conducted in August 2023 at *Letterpress Letters* studio in Tokyo, Japan.

Eight Taiwanese high school students (ages 15–17) participated. All had prior experience with digital design tools but no exposure to letterpress printing. The setting was intentionally cross-cultural: students encountered European wooden type and mechanical printing technology within a Japanese cultural environment. This layered unfamiliarity prevented reliance on habitual design frameworks and directed attention toward material properties and physical processes.

The workshop consisted of six hours of hands-on engagement with wooden type, metal furniture, and manual printing presses. Instruction progressed from guided demonstrations to independent experimentation. After learning basic letterpress principles, students designed and printed individual works reflecting their Tokyo experience. This structure enabled observation of how material constraints and tactile feedback gradually altered students' typographic decision-making.

Researcher Positionality and Pedagogical Role

This study was conducted within a pedagogical setting in which facilitation and observation were closely intertwined. The workshop was structured around guided participation rather than detached instruction, reflecting the practice-based nature of embodied learning. Within this setting, instructional responsibility focused on enabling safe and sustained engagement with letterpress tools and materials, while analytical attention was directed toward how perceptual judgment emerged through students' interactions with material constraints.

Pedagogical intervention was deliberately limited to procedural guidance. Participants were not provided with evaluative criteria regarding “correct” spacing, hierarchy, or composition. Instead, instruction emphasized operational familiarity with letterpress processes, allowing typographic decisions to develop through bodily engagement with resistance, weight, and limitation rather than through prescriptive rules. This approach created conditions in which perceptual understanding could arise through action and adjustment.

Throughout the workshop, instruction and communication were conducted in Japanese, with continuous interpretation into Chinese to ensure comprehension among Taiwanese students. In addition, a professional instructor with extensive experience in letterpress printing was present to provide technical support and ensure proper handling of tools and presses. This collaborative instructional arrangement distributed authority across linguistic, cultural, and technical domains, reducing reliance on a single instructional voice and reinforcing the material-centered nature of learning.

Analytical attention focused on moments in which students’ habitual screen-based strategies proved insufficient. Instances of hesitation, repeated adjustment, and verbalized uncertainty were treated as indicators of perceptual transition rather than as errors. Observational records were produced during workshop sessions and expanded immediately afterward to capture not only physical actions but also shifts in pacing, peer interaction, and affective response.

Given the cross-cultural conditions of the workshop, particular care was taken to remain attentive to asymmetries of language, cultural expectation, and pedagogical authority. Encountering European wooden type within a Japanese studio context suspended familiar interpretive frameworks for participants. Rather than resolving this unfamiliarity through explanation, the workshop design allowed it to function as a productive condition that redirected attention toward material properties themselves.

Reflexive awareness was maintained throughout the workshop regarding how instructional structure, linguistic mediation, and cultural positioning shaped the learning environment. Rather than attempting to eliminate such influences, the study acknowledges them as constitutive elements of the pedagogical situation. Perceptual learning is thus understood as co-produced through the relationships among participants, materials, tools, and instructional conditions.

Data Collection Methods

As both facilitator and researcher, I employed three complementary methods:

- **Direct Observation**
Field notes documented students’ bodily interactions with materials, including how they handled type, adjusted spacing, and operated the press. Particular attention was paid to moments of perceptual shift, such as transitions from visual estimation to tactile judgment.
- **Material Artifacts**
Students’ printed works served as material evidence of design decisions made under letterpress constraints. These artifacts reveal choices related to spacing, hierarchy, and composition shaped by the physical limits of wooden type.
- **Student Reflections**
To trace both immediate and sustained effects, data were collected through group discussion immediately after the workshop, written reflections two weeks later, and

individual interviews conducted one month post-workshop. This temporal layering allowed examination of how embodied experiences informed subsequent digital design practice.

Analytical Approach

Data were analyzed thematically across observations, artifacts, and student accounts. Analysis was guided by three theoretical lenses: material dialogue (how materials shape thinking), perceptual frame-shifting through unfamiliarity, and multi-sensory learning and memory. Together, these lenses enabled identification of recurring patterns that constitute key dimensions of perceptual reconstruction.

Research Considerations

This study prioritizes depth over generalizability. Focusing on a small participant group allows close examination of perceptual mechanisms rather than statistical claims. Ethical approval was obtained, with particular attention to student wellbeing within a physically demanding, cross-cultural learning environment.

Findings

Analysis of workshop observations, student prints, and reflective interviews revealed three interconnected dimensions through which material engagement reconstructed students' perceptual understanding of typography.

Finding 1: Material Resistance Reshapes Typographic Judgment

Prior to the workshop, students approached typography primarily through digital interfaces, where spacing adjustments occur instantaneously through sliders and numerical inputs. Letterpress printing disrupted this habitual mode of working by introducing material resistance.

When adjusting spacing, students encountered constraints unfamiliar to screen-based practice. One student reflected:

“In Canva, I just drag the spacing slider until it looks right. Here, one millimeter took me ten minutes.”

Figure 2

Close-Up of Tactile Spacing Adjustment Using Metal Spacers, Illustrating How Typographic Judgment Emerges Through Material Resistance



Field observations documented a clear perceptual shift. Initially, students relied on visual judgment, repeatedly removing and replacing spacers while stepping back to assess results. Over time, however, decision-making moved from visual estimation toward tactile exploration. Students began running their fingers along the type, feeling spacer thickness and testing resistance before making adjustments.

This physical negotiation enabled students to “feel what spacing means.” As one student reflected two weeks later, “Spacing used to be just a rule. But when the wooden blocks physically wouldn’t fit, I understood that space isn’t just visual—it’s physical distance.”

Figure 3

Comparison of Early and Final Prints, Showing Shifts in Hierarchy Achieved Through Spacing and Layout Rather Than Scale



Material resistance also reshaped students’ understanding of hierarchy. Unlike digital typography, letterpress offers only a finite set of type sizes. Unable to rely on scale alone, students attended more closely to spacing, positioning, and white space. One student later reported applying these strategies in digital design, adjusting spatial relationships before increasing font size.

Most significantly, students’ evaluative criteria shifted. Initially, uneven ink coverage was perceived as failure. As students learned how pressure, ink viscosity, and wood grain shaped results, irregularities came to be understood as evidence of process rather than error. One student described his first print as “messy,” but later reframed it as “honest”—a visible record of material interaction.

Not all students adapted to material resistance at the same pace. For some participants, the physical slowness and effort required by letterpress initially produced frustration rather than insight. One student repeatedly expressed a desire to “just see it clearly” and attempted to resolve spacing issues by stepping back visually, avoiding tactile engagement for an extended period. Even after guidance encouraging hands-on adjustment, this student continued to rely primarily on visual judgment, treating material resistance as an obstacle to efficiency rather than as a source of information.

This hesitation highlights that material engagement does not automatically generate perceptual shift. For certain students, especially those strongly habituated to screen-based efficiency, resistance initially intensified reliance on familiar visual strategies. In these cases, perceptual transformation emerged only after prolonged exposure, repeated failure, and visible fatigue

with visual trial-and-error. This suggests that material resistance functions not as an immediate corrective, but as a condition that gradually destabilizes established habits of judgment.

Finding 2: Cross-Cultural Unfamiliarity Shifts Observational Frames

The workshop’s cross-cultural design—Taiwanese students, Japanese setting, and European wooden type—produced productive estrangement. With no familiar cultural scripts to rely on, students were compelled to attend directly to material form.

This unfamiliarity was evident in students’ initial encounters with physical letterforms. Although they had used Latin fonts extensively on screens, handling wooden letters revealed them as unfamiliar objects. One student noted:

“I’d used Helvetica countless times, but holding the wooden ‘H,’ I realized I had never really seen it.”

Figure 4

Worn European Wooden Type Showing Traces of Long-Term Use and Material History



While cross-cultural unfamiliarity often sharpened students’ attention, it also produced moments of detachment and uncertainty. A small number of students expressed difficulty forming any emotional or cultural connection to the European wooden type, describing it as “not related to us” or “too distant from daily life.” For these participants, unfamiliarity did not immediately invite curiosity, but instead risked disengagement.

This ambivalence suggests that unfamiliarity alone does not guarantee perceptual openness. In some cases, the absence of cultural reference initially limited students’ motivation to look closely. However, when unfamiliarity was accompanied by sustained material handling—particularly through noticing wear, weight, and repetition of use—detachment gradually shifted toward interest. This indicates that unfamiliarity becomes productive not as an abstract condition, but when anchored in tangible, sensory encounter.

Layered cultural distance intensified this effect. Had the workshop involved Chinese type in Taiwan, students might have relied on cultural heritage narratives. Instead, European type in Japan offered no such interpretive shortcut.

Students began closely examining wear patterns, ink adhesion, and variations between individual letters. One student compared two specimens of the letter “N,” observing differences

caused by decades of use. What initially appeared as imperfection gradually became legible as historical trace.

Figure 5

Comparison of Two Specimens of the Same Letter, Highlighting Variation Caused by Repeated Use Over Time



This shift transformed how students interpreted wear. Rather than viewing worn type as broken tools, they came to see it as evidence of real use in books, posters, and public communication. As one student reflected:

“The wear isn’t damage. It proves typography is something people actually do, not just something that appears on screens.”

Finding 3: Multi-sensory Engagement Creates Durable Embodied Memory

The most striking findings emerged in follow-up interviews conducted weeks after the workshop. Students recalled the letterpress experience with exceptional sensory detail, and these memories actively informed later digital practice.

Students described tactile sensations, weight, smell, sound, and bodily effort with vivid specificity. One recalled the density of the wooden blocks; another described the mechanical rhythm of the press, noting that the sound still surfaced during later design decisions.

These memories proved more durable than those associated with other workshop activities. While students struggled to recall details from calligraphy or craft sessions, letterpress experiences remained vivid—wood texture, metal resistance, ink smell, and physical exertion.

This durability reflects the multi-sensory nature of letterpress printing, which engages touch, sight, hearing, smell, and full-body coordination. Unlike screen-based design, which privileges vision and minimal hand movement, letterpress demands continuous bodily negotiation with materials.

Crucially, embodied memory transferred back into digital practice. Students reported “feeling” spacing problems on screen before identifying them visually. One explained:

“The spacing looked okay, but it felt wrong. I remembered the resistance when the type was too tight in letterpress, adjusted the spacing, and it suddenly felt right.”

Several students described imagining wooden blocks while adjusting kerning digitally. These tactile metaphors guided judgment beyond visual appearance alone, indicating that material engagement had reshaped perceptual frameworks rather than merely adding technical knowledge.

Figure 6

Student Operating the Letterpress Through Full-Body Engagement



Discussion: Rethinking Perception Through Material Engagement

The findings suggest that the significance of material engagement lies not in what students learned about letterpress printing as a technique, but in how their mode of perception was gradually altered through sustained contact with materials. Typography, which had previously appeared to them as a visual arrangement optimized on screen, began to emerge as a practice shaped by resistance, limitation, and bodily negotiation.

What became evident during the workshop was that perceptual judgment did not precede action, but arose through it. Students did not first decide what spacing should be and then execute that decision; instead, judgment formed through repeated adjustment, failure, and tactile exploration. Spacing was learned not as a rule to be applied, but as a relation that had to be worked out between hands, tools, and material constraints. In this sense, perception was not internal or cognitive alone, but distributed across bodies and materials, unfolding over time.

This shift also altered how students interpreted typographic “imperfection.” Uneven ink, worn edges, and inconsistent impressions were initially experienced as technical shortcomings, measured against the visual standards of digital design. Over time, however, these same features were reinterpreted as traces of process—marks left by pressure, grain, wear, and repeated use. What changed was not the material outcome, but the framework through which it was read. Typography ceased to be evaluated solely by visual refinement and came to be understood as the visible consequence of material interaction.

The cross-cultural structure of the workshop played a critical role in enabling this perceptual reorientation. Encountering European wooden type in a Japanese setting removed the possibility of relying on familiar cultural narratives or inherited meanings. Without a ready-made interpretive frame, students were compelled to attend to what was physically present: the

weight of the type, the softness of worn corners, the uneven absorption of ink. Unfamiliarity did not function as an obstacle to understanding, but as a condition that made perception more attentive, slower, and more grounded in material specificity.

Although many students reported lasting embodied memories, the degree of transfer back into digital practice varied. A few participants described the letterpress experience as memorable but compartmentalized, noting that time pressure and interface conventions in digital tools made it difficult to fully apply embodied awareness during everyday design tasks. For these students, bodily memory surfaced mainly during reflective moments rather than during routine production.

This variation suggests that durability of embodied perception is not uniform and may depend on opportunities for reinforcement. While multi-sensory engagement can anchor perceptual memory, its integration into digital practice appears contingent on repeated recall and contextual alignment. Embodied memory thus operates as a latent resource that may remain inactive unless conditions invite its reactivation.

Perhaps the most revealing aspect of the findings lies in the persistence of these perceptual shifts. Weeks after the workshop, students recalled the letterpress experience through bodily sensations—weight, resistance, sound, smell—rather than visual images alone. These memories were not isolated from subsequent practice. Instead, they reappeared during digital design work as a felt sense guiding judgment. Students described adjusting spacing on screen not because it “looked wrong,” but because it felt wrong, drawing unconsciously on memories of physical resistance and constraint.

This suggests that material engagement does not simply add another layer of experience to design education. It reconfigures how perception itself operates, introducing bodily memory as an active component of visual judgment. Digital tools remained central to students’ practice, but they were no longer the sole reference point. The screen became one site of design among others, informed by experiences that originated beyond it. From this perspective, material practice does not oppose digital design; it expands the perceptual ground upon which digital decisions are made.

Conclusion

This study set out to examine whether material engagement—specifically through cross-cultural letterpress practice—can reconstruct how digital-native students perceive typography and visual form. Rather than treating letterpress as a nostalgic return to craft or a technical supplement to digital design education, the study approached material practice as a site where perception itself is negotiated, reshaped, and relearned.

The findings suggest that perception is not a stable faculty carried intact across media, but something continually configured by the conditions under which making occurs. When typography is encountered primarily through screens, it tends to be understood as a visual outcome optimized through parameters. When encountered through material resistance, bodily effort, and temporal process, it becomes legible as a practice—one that involves distance, pressure, limitation, and consequence. What changes, therefore, is not only what students know about typography, but how they come to judge, evaluate, and feel typographic form.

This shift has important implications for design education. As digital tools continue to dominate creative practice, the risk is not simply the loss of traditional techniques, but the narrowing of perceptual repertoires. Screen-based fluency can coexist with a diminished sensitivity to material difference, process, and constraint. The study suggests that material engagement, especially when intensified through unfamiliar cultural and technological contexts, offers a way to interrupt this narrowing—not by rejecting digital tools, but by expanding the perceptual ground on which digital decisions are made.

Crucially, the effects of material engagement did not remain confined to the workshop setting. Students carried embodied memories—of resistance, weight, sound, and effort—back into digital environments, where these experiences continued to inform judgment in subtle but persistent ways. This indicates that material practice functions less as an alternative medium and more as a recalibration of perception that endures beyond its original context.

The contribution of this study lies in reframing material practice as a pedagogical strategy for perceptual reconstruction rather than skill acquisition. It argues that learning to design is inseparable from learning how to perceive, and that perception itself can be redesigned through carefully structured encounters with materials. Future research might extend this inquiry by exploring other forms of material engagement, longer-term pedagogical integration, or comparative studies across cultural and technological contexts. As design education continues to evolve, the challenge is not to choose between digital and material practices, but to cultivate designers whose ways of seeing remain responsive, embodied, and open to transformation.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In the preparation of this manuscript, AI-assisted tools were utilized for English translation and text proofreading. Specifically, Google Gemini and ChatGPT were used to refine grammar, punctuation, and phrasing for clarity and conciseness, and to check for spelling errors.

References

- Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.
- Classen, C. (2012). *The deepest sense: A cultural history of touch*. University of Illinois Press.
- Crawford, M. B. (2009). *Shop class as soulcraft: An inquiry into the value of work*. Penguin Press.
- Gallagher, S. (2005). *How the body shapes the mind*. Oxford University Press.
- Harland, R., & Bohemia, E. (2021). COVID-19, design education, and the shift to online making. *Design and Technology Education: An International Journal*, 26(3), 1–10.
- Heller, S. (2015). *The education of a graphic designer* (3rd ed.). Allworth Press.
- Ingold, T. (2013). *Making: Anthropology, archaeology, art and architecture*. Routledge.
- Malafouris, L. (2013). *How things shape the mind: A theory of material engagement*. MIT Press.
- Merleau-Ponty, M. (2012). *Phenomenology of perception* (D. A. Landes, Trans.). Routledge. (Original work published 1945)
- Mirzoeff, N. (2015). *How to see the world*. Pelican Books.
- Pink, S. (2015). *Doing sensory ethnography* (2nd ed.). SAGE Publications.
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- Sennett, R. (2008). *The craftsman*. Yale University Press.