

## **Studio Properties: A Contribution to Knowledge in Design Education**

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## Studio Properties: A Contribution to Knowledge in Design Education

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## Studio Properties: A Contribution to Knowledge in Design Education

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**Abstract:** *In this paper, we present a critically reflective summary of a five-year collaborative project exploring the pedagogy of the Western design studio and the final output of that work, the book 'Studio Properties; A Field Guide to Design Education'. We initiated the project in response to the absence of a comprehensive description or definition of the educational studio, which researchers could use to orientate their work, and educators could use to inform their teaching practices. The project concluded by rejecting any explicit description or definition of studio. Continuing that work, we proposed an alternative approach to understanding studio. Rather than attempting to define studio, we focus on making its properties visible and reveal its complexity and significance as a pedagogy. In the paper, we outline the process behind our conclusions and discuss some of the key knowledge and issues surrounding studio pedagogy. These issues include critical conditions that educators and researchers should consider when engaging with studio knowledge, particularly its contextualised and entangled nature.*

**Keywords:** *Design education; Studio education; Studio Properties; Studio Matters; Studio; Education; Pedagogy; Defining Studio; Design; Studio; Education; Pedagogy;*



## 1.0 Context – the problem of studio.

*Studio Properties* is a co-authored book that explores the Western educational design studio written for studio educators and researchers. Studio is the cornerstone of design education in nearly all Western design curricula (Cuff, 1992; Schön, 1987; Hickman, 2019). This significance stems from the history of the studio and its relationship to design practice and education—design is both conducted, created, and learned in the studio (Oxman, 1999; Goldschmidt et al., 2010; Crowther, 2013; Salama, 2017).

While there is something uniquely special about studio as a place and pedagogy, the concept is also amorphous, fluid, and elusive, resisting a definitive or analytical description. Farías and Wilkie introduce studio as a ‘peculiar and remarkable lacuna’ (2016, p. 1); Orr and Shreeve describe studio as more than a place, considering it a ‘state of mind’ (2018, p. 91); and Jones observes that studio remains ‘messy, ill-defined, and open to (re)interpretation’ (2022b, p. 84).

Studio pedagogy depends on tacit, implicit, and encultured forms of knowledge, making it challenging to offer explicit definitions (Orr & Shreeve, 2018). Paradoxically, the same qualities that make studio hard to define also contribute to its value: what is being taught is also hard to define and is often uncertain, complex, and ambiguous (Schön, 1985); what students learn is diverse and often hidden; each student’s learning experience is personal and transformative; what needs to be taught or learned varies from individual to individual. This complicates efforts to define what we mean by “studio” and, despite its significance, the term continues to lack clear definitions or articulations. A quick review of educational literature reveals that even the concept of studio can vary significantly among different authors (Cennamo, 2016; Corazzo, Jones & Hudson, 2023). Few works consolidate these ideas in one place, and even fewer attempt to synthesise these disparate understandings (Jones, 2022).

Ultimately, we (as studio educators) recognise and know studio through experience and our disciplines, allowing us to readily replicate and maintain its culture(s), habits, and shapes. Pragmatically, educators regularly create, work with, and operate in studios regardless of their indefinable nature. However, we carry a responsibility as scholars to continually develop the field of studio education. This requires a better and deeper understandings of studio. Moreover, it is vital to be aware of *our* knowledge, bearing in mind that such knowledge is itself emergent, and acknowledging that “*how* an actual entity *becomes* constitutes *what* that actual entity is” (Whitehead, 1978). This is the ongoing challenge of studio: how to work with the type of knowledge(s) it requires to understand it, and how to better share that knowledge in a helpful way that maintains scholarly rigour. This paper addresses this challenge and outlines our response through two initiatives: the *Studio Matters* project and the subsequent writing that led to the book *Studio Properties*.

## 2.0 From *Studio Matters* to *Studio Properties*: collaborative narratives that respond to studio’s translation problem

During the COVID-19 pandemic, many design educators and students lost access to their physical studio spaces because of the emergency transition to online learning. This abrupt change highlighted various issues in design education, especially the challenges of sharing studio knowledge across different practices (Jones & Lotz, 2021). In response, some of the authors of this paper convened an international forum, *Studio Matters*, to bring together studio educators and researchers and discuss, reflect, debate, and write about studio pedagogy. The dialogues and writings that emerged from the *Studio Matters* project revealed the complexity and diversity of studio as a pedagogical form. Marshalsey and Lotz (2022) write how the “collaborative narratives” of studio that emerged from *Studio Matters* were perhaps the most significant realisations of the project. Instead of a singular set of considerations, the dialogic nature of the knowledge became the project’s most valuable outcome.

A key insight from the *Studio Matters* discussions is that the concept of studio is not singular, fixed, or clear. Instead, it represents an epistemological and ontological ‘messiness’ (Gray, 2016; Farias & Wilkie, 2016). This observation does not imply that describing the studio is futile or that efforts to articulate its nature are meaningless. However, as one participant in the *Studio Matters* project observed, experienced studio practitioners and educators face ‘a translation problem’ when it comes to discussing studio, exchanging insights, and conveying this understanding to those unfamiliar with the studio experience.

While efforts have been made to “provide a language that can examine what makes a studio what it is” (Cennamo, 2016, p. 253), the very qualities of studio seem to confound this effort. The challenge for what became the project and subsequent book *Studio Properties* was to stop asking “What is studio?” and instead ask “What have researchers,

scholars and expert practitioners said studio is?” and “How might this be useful to teachers, students, and researchers?” Our response to these questions was to begin identifying the properties of studio in the research literature.

## **2.1 Prototyping studio properties**

In the later stages of *Studio Matters*, a group of design educators prototyped and iterated different forms of writing to effectively communicate some essential facets of studio. This effort laid the groundwork for the *Studio Properties* project, comprising a team of seven international academics and a final team of six (the authors of this paper) who developed iterations to create the final book *Studio Properties: A Field Guide to Design Education*. These early prototypes enabled the authors to write iteratively about what we came to call properties of studio.

Much of this work took place in online whiteboard spaces (see Figure 1 for an example), reflecting the constructivist process that we all agreed was necessary to avoid over- or under-constraining the knowledge types we were working with. From this process, we established a heuristic description of a property: ‘things, events, interactions, and experiences you may encounter as a student, educator, researcher, or observer in an educational design studio’. Additionally, each property needed to have an academic grounding within the existing literature, connect to other properties, and have significance to studio pedagogy, as determined by our collective, professional judgement.



Figure 1. One of many digital and online whiteboards used by the authors to explore, develop, and define what a property would become in the book.

## **2.2 Candidate properties**

We began with a list of 20 candidate properties in a shared Google Sheet, which quickly ballooned into over 130 potential properties. The second phase started with an iterative process of writing and discussion that helped us determine which properties would be retained, merged, or identified as missing. Exploratory writing became a crucial method throughout the process. Because the properties were initially relatively short (500–750 words), we were able to iterate quickly, completing numerous revisions to establish a property structure. We conducted a thorough editorial review of all properties, resulting in an intermediate list of properties that were selected to progress to the next review stage. At various stages, we questioned the salience of some properties but retained them to allow the subsequent writing and reviewing stages to confirm or eliminate them later.

We also added properties later in the process as we identified specific gaps. For example, “Creativity” was not included in the original list, which we realise was because it was implicitly assumed in so many other properties. This led us to create it as a distinct property. Observations like this underscore the implicit and assumed nature of many studio properties. This iterative process became the primary method for creating and validating the properties. During the editing phase, we generated thematic clusters of properties (see Table A), which helped us assess similarities and differences and evaluate the utility and validity of other properties.

## **2.3 Review process**

We developed a three-stage review process to engage with the messiness of both scholarship on studio and our own complex and subjective experiences of studio.

### ***2.3.1 Negotiation and Prioritisation***

The initial stage of the review process involved negotiating what a property is or is not, as well as what it might also be. Peer review among contributing authors was the first step in identifying relations between properties, including dependencies, similarities, or differences. In the first round of reviews, each draft property was assigned two authors who had not contributed to its writing, and they completed a review in a Google Form by answering a series of questions:

1. Is the property truly a "sole property," or does it represent a cluster of multiple properties?
2. Is the property grounded in existing knowledge from design education research, and if not, what suggestions could enhance it?
3. Does the property incorporate non-Western perspectives?
4. Does the property speak to one or more of the book's secondary audiences, such as the "studio curious" or "studio terrified"—those unfamiliar with the studio concept but interested or in need of it?
5. Does the property include relevant links to other properties, or are there additional links that should be added?

Two reviewers recommended accepting, revising, or discussing the property in a process similar to a double review (Figure 2). Finally, a collective editorial decision was made regarding whether to accept, reject, or revise the property based on the reviews. Based on a collective editorial agreement, a few draft properties (approximately 30) were abandoned at this stage.

Property Name	Is this a Property?	Is this a sole property	WRITING – Does the property read well and engage readers (tone of voice, flow, structure)?	INTELLECTUAL/KNOWLEDGE – Is the property grounded in, or makes use of, knowledge(s) in design education research? Or is rigorous in some other way?	CITATIONS – Are there any key citations and/or areas of research that should be considered?	POSITIONALITY – Does this property afford some inclusion of non-western perspectives?	AUDIENCES – Does it speak to one(?) or more(?) [The 'studio curious' / studio terrified – those that don't know about studio, but want or need to?]	AUDIENCES – Does it speak to one(?) or more(?) [Design educators, teachers, and scholars.]	AUDIENCES – Does it speak to one(?) or more(?) [Design education researchers]	AUDIENCES – Does it speak to one(?) or more(?) [Colleagues 'outside of studio, either academic, administrative, policy makers]	AUDIENCES – Does it speak to one(?) or more(?) [Students interested in understanding studio or seeing the potential learning and practice it may offer beyond curriculum]
<b>A place of identities</b>	Yes	Yes	The writing is clear and the tone is appropriate. The structure (1: identity is personal; 2: identity is collective; 3: identity is disciplinary) is compelling and provides a good armature. I wouldn't change this. However some paragraphs feel fragmentary and its unclear how the whole assembly comes together.	Yes.	No. But see next answer.	Some marginal perspectives are signposted (Berry et al. on the black experience, Bardzell & Bardzell on feminism, Haimsson et al on transgender experience. Given the broadly different ways in which different cultures understand personal and collective identities, I think more could be done here. This is still clearly written from a western / Global North understanding of identity.	Partly	Yes	Yes	Yes	Partly
<b>A place of identities</b>	Yes	Yes	Yes, a sole property.	Yes, and perhaps needs unpacked even further to reinforce the points made.	Not that I can think of.	No but should - identities are formed in multi-cultural ways and includes non-western perspectives	Partly	Yes	Yes	Partly	Partly

Figure 2. An example of a shared data sheet from the property review proforma, showing qualitative and criterion evaluation used to inform the decision-making process.

**Robustness and Multi-dimensionality**

We distilled an initial list of properties, which we then collaboratively drafted into a complete set of properties. The initial drafting of a property was typically led by a smaller group of one to three authors. This was followed by review passes, where multiple co-authors critically engaged with the draft text, suggested edits and comments with tracked changes in the document, and posed questions for the primary property author(s) to consider in making the property more robust (Figure 3). During this stage, we also worked together to determine whether each property addressed any problematic aspects of studio, whether it relied too heavily on specific advocacy position(s), and to identify relevant (counter-)examples for online studios.

## Editorial History

- **OVERALL**
  - "It is a bit dense (academically) in places but an editorial pass will help"  
**I did some clarifying (thanks for the notes,           ), but might be good for someone else to take a look and I can just confirm no meaning has been changed.**
  - "Remove all end notes and a little tidy up"  
**Tidied at the end.**
- **ADDITIONAL CITES NEEDED**
  - "Nic suggested this in addition to typology of knowledge: Gaia Scagnetti (2017) A dialogical model for studio critiques in Design Education, The Design Journal, 20:sup1, S781-S791, DOI: 10.1080/14606925.2017.1353024 offers a typology of feedback and meaning making, which two discouraged types (directive and judgemental)  
**Added this reference and summarised the typology.**
  - "Would be good to include the one referred to near end, if we can find it (EB's ref around harm in crits)." Ochsner, J. K. (2000). Behind the Mask: A Psychoanalytic Perspective on Interaction in the Design Studio. Journal of Architectural Education, 53(4), 194–206.  
<https://doi.org/10.1162/104648800564608> + "deficit model which is assumed in many models of critique - CG suggested .....I may have something to cite for this?"  
**Added the Oschner ref, but don't have another good reference yet for deficit model.**
- **LINKS TO PROPERTIES**
  - "More links between related properties needed"  
Suggestions of: Thinking by doing; Dialogical / conversational; Feedback; Reflective / Cognitive Practice  
**Added "dialogue/conversation"; reflective practice already included. I will need to review a more final "thinking by doing" to see where that might fit.**

Figure 3. An example of critical feedback was provided from a previous round of critique, along with indications of how the lead property authors addressed the feedback.

### Legitimacy and Problematization

As a final set of properties emerged, the third review process tested each property's legitimacy, veracity, and consistency. Claims and references to other literature were thoroughly checked. Any statement that made a claim without supporting references or warrant was flagged for review. The original authors of the property then responded to these flagged comments by conducting small-scale literature reviews to verify or problematise the claims. In other instances, the authors acknowledged that support for certain statements was limited. Through this process, the initial group of around 50 properties expanded to over 130 potential properties and then narrowed again to the final 57 properties included in the book (Table A).

All the authors of *Studio Properties* have multidisciplinary backgrounds in design disciplines and are actively engaged in teaching and research. The writing and review process developed during the *Studio Properties* project closely mirrors the iterative, critical, and collaborative nature of the design process itself. In addition to providing academic rigour, the writing and review process enabled us to gain a deeper awareness of and involvement in the content of properties we hadn't directly authored, which was essential for the resulting interconnection of properties.

### 2.4 Some limitations

One notable limitation of our work stems from our internal biases, particularly our personal conceptions of studio, which are shaped by our memories and experiences. Some of these experiences are deeply personal and emotional (studio is a **Place of Affect** and **Transformation**), inevitably influencing our thoughts about studio. Additionally, design pedagogy scholars in this field, including ourselves, tend to operate in sub-spheres or 'bubbles' of knowledge regarding studio. Some of these bubbles result from the habitual and repetitive use of citations, while others emerge from personal or collective beliefs and preferences. To address these limitations, we instigated a series of checks and edits during the writing and reviewing processes.

In addition to personal biases, presenting a book on studio practice within a specific socio-historical context comes with its own limitations. This work is inherently rooted in the Western tradition of studio. This serves as both an

important boundary and an obvious limitation: it allows us to identify a bounded set of descriptions from a particular socio-historical context, and it serves as a limitation because it acknowledges and represents a dominant pedagogy (Hickman, 2019). *Studio Properties* is not presented as the only studio or design pedagogy, nor the best, or even a fully competent one. As van Amstel and Gonzatto (2020, p. 17) state:

[D]esign studio is not a universal, neutral, or a timeless approach to design education. It was developed by European schools and, thus, embodies European values and definitions of what design is and what a designer could be. When appropriated by the Global South, these values and definitions should be taken with a good grain of salt.

### 3.0 What we ended up with

*Studio Properties* is a book that provides useful and rigorous knowledge of studio while preserving the contextual complexity of that knowledge, in other words, the entangled nature of studio. The book comprises 57 properties, organised into nine thematic clusters (see Table A for the full list). The book also includes two narratives of imagined studios, illustrating how properties interrelate, overlap, and depend on one another in given contexts.

Table A. Contents of the book listing the properties, arranged by Clusters (bold).

<p><b>Visibilities and Proximities</b></p> <ul style="list-style-type: none"> <li>● Making Visible</li> <li>● Extended and Distributed Cognition</li> <li>● Informal Learning Spaces</li> <li>● No Front</li> <li>● Surfaces</li> <li>● Cost</li> <li>● Public and Private Spaces</li> </ul>	<p><b>Interactions and Sociality</b></p> <ul style="list-style-type: none"> <li>● Learning and Designing Collectively</li> <li>● Listening-in</li> <li>● Social Comparison</li> <li>● Confidence to Speak</li> <li>● Dialogue</li> <li>● Social Networks</li> <li>● Belonging</li> </ul>
<p><b>Foundations and Methods</b></p> <ul style="list-style-type: none"> <li>● Apprenticeship</li> <li>● Design Brief</li> <li>● Active Teaching</li> <li>● Feedback</li> <li>● Critique and the Crit</li> <li>● Reflection</li> </ul>	<p><b>Atmospheres and Place</b></p> <ul style="list-style-type: none"> <li>● Place</li> <li>● Affect</li> <li>● Informalities</li> <li>● Uncertainty and Ambiguity</li> <li>● Serendipity</li> <li>● Wellbeing</li> </ul>
<p><b>Expertise and Identity</b></p> <ul style="list-style-type: none"> <li>● Expertise</li> <li>● Identities</li> <li>● Judgement</li> <li>● Character</li> <li>● Journey</li> <li>● Performance</li> <li>● Transformative Pedagogy</li> </ul>	<p><b>Theories and Knowledge</b></p> <ul style="list-style-type: none"> <li>● Creativity</li> <li>● Risk and Failure</li> <li>● Simulation</li> <li>● Assessment</li> <li>● Discipline</li> <li>● General Education Concepts and Theories</li> <li>● Knowledge and Knowing</li> </ul>
<p><b>Time and Structures</b></p> <ul style="list-style-type: none"> <li>● Immersion</li> <li>● Time</li> <li>● Rhythms</li> <li>● Synchronicity and Proximity</li> <li>● Project Cycles</li> </ul>	<p><b>Culture(s) and Power</b></p> <ul style="list-style-type: none"> <li>● Habits and Rituals</li> <li>● Habitus</li> <li>● Hidden Curriculum</li> <li>● Critical Pedagogy</li> <li>● Power Transaction</li> <li>● Enculturation, Acculturation, and Indoctrination</li> </ul>
<p><b>Artefacts and making</b></p> <ul style="list-style-type: none"> <li>● Materiality</li> <li>● Learning by Doing</li> <li>● Making</li> </ul>	

- Artefacts
  - Play
  - Prototyping
- 

Each property stems from the rigorous writing and review process (outlined in section 2.0) and consists of a concise text grounded in the academic literature on studio education. While each property makes distinct and discrete observations, they are not isolated from other related properties or observations. For example, the three properties **Reflection, Critique and the Crit**, and **Dialogue**, are distinct, but they often occur together in studio. In fact, we argue that most forms of design review in studio rely on the interplay of co-occurring properties influenced by the specific nature of the studio or on the learning and teaching that takes place. An example extract from a property, along with links to other properties, can be seen in Figure 4.

## Visibilities and Proximities

### Studio makes people visible

Studio has the potential to encourage interaction between people. By making people and their actions visible to one another, studio can nurture and encourage social learning and provide opportunities for various interactions and sociality, such as *learning and designing collectively* [→166], *listening-in* [→170], or *social comparison* [→172]. The *apprenticeship* [→64] approach also depends on visibility, and Schön (1987) explicitly describes this model as students *watching* the expert, where, in its ideal form, students can observe and copy the processes of design. This model of learning, when compared to other forms of teaching, relies on the transfer of *tacit knowledge* [→248] and challenges the assumption that everything knowable is visible (Ashton & Durling, 2000; Kvan, 2001). For example, *listening-in* [→170] is a form of invisible learning that, for many educators, has a vital pedagogical role in studio, involving a far greater degree of cognitive engagement than is visible (Rogoff et al., 2003; Dannels, 2005), in both physical or online studios (Jones et al., 2021).

In the same way a congregation makes itself visible by gathering, studio provides ways to build a feeling of *affect* [→200], *belonging* [→189], and community amongst students. As communities become visible – often through different kinds of *performance* [→107] or *habits and rituals* [→262] – they can support and encourage shared activities and goals. Rieber et al. (2016) refer to the visible shared experience across studio groupings, such as study stages, and the importance of this to development and learning. Building cultures of *belonging* [→189] can contribute positively to the visibility of students who might be less visible in other learning environments, such as the different voices that emerge from students in online studios compared to physical ones and how this influences *identity* [→94] and *enculturation* [→285] (Gray, 2021).

Studio education tends to be underpinned by an expectation of presenteeism, i.e. that students must come into studio and be visible to others for a certain amount of *time* [→121] in order to develop *expertise* [→90]. Several researchers have reported educators' concerns and frustrations with students that don't frequently attend studio (Logan, 2006; Orr et al., 2014; Shreeve, 2011). The educators in Logan's study describe absent students as placing themselves at the margins of learning, limiting their access to design knowledge and interactions with others.

Yet an environment that purports to value the idea of making people and things visible can still render some invisible. S. Jones (2022), a black design educator, draws on his experience studying design to show how studio can make some students invisible. He describes how, as a design student, he presented work that drew on cultural and visual traditions

Figure 4. An excerpt from *Studio Properties* from the *Making Visible* property. The connections to other properties are indicated by a change in typeface and accompanying green arrow and page number.

Drawing on our experience as educators and researchers, along with extensive evidence from a wealth of research and scholarship, we identified thematic connections between various properties to form *clusters*. These connections helped us to understand how studio functions as a network of mutually intersecting, supporting and co-occurring phenomena. Some clusters emerged readily from our experiences of studio, while others developed through the writing process. Ultimately, we guided the formation of these clusters by the twin drivers of utility and rigour – aiming to make the book as useful as possible to educators and scholars while maintaining academic values.

The book also contains two narratives (see Figure 5 for an example of a narrative layout). These narratives are concise, story-like texts that provide readers with alternative entry points into the book. Studio, as noted, is something that we all ‘know’ in particular ways. Many of us know studio from experience, but might not know the scholarship that has built up around that experience. Each narrative offers a brief ‘story’ that describes a studio experience and connects it to the properties in the book.

## Isabella's first studio class

Isabella is quite nervous starting the first class of her design program. [A] To start, here in the studio space no one is sitting in neat rows of tables and chairs; in fact, she can't make out where the teacher might be going to stand [B]. A buzzing swarm of students, who must be ahead of her in the program, are chatting and working already which creates a kind of chaos; *there surely must be a structure to it?* she thinks [C]. Everyone seems to be doing something different – doodling ideas in notebooks, discussing objects with others, glueing stuff together or tearing it apart, all seeming to know each other well, and it does not appear that anyone is waiting for an instructor to get things going. [D] Their desks are filled with materials and tools, some familiar to her and many not, but all seeming to hold intriguing possibilities. [E] Around the walls of the classrooms, indeed on every vertical surface, are tacked sketches, notes, even what looks like finished projects. A couple people are standing near one of these, within earshot, discussing it using terms she does not understand. [F] *How am I going to know what to do here?* Isabella worries to herself. [G]

- [A] Studio is a place of *affect*, evoking a range of moods and emotions, which are both implicated in the learning and changeable across a student's individual *journey*. To some extent these affective states are anticipated and leveraged as part of the learning process, for example as a support for tolerating *uncertainty* and *failure* which are core to designing.
- [B] Studio has *no front* which encourages both *synchronous and proximate* engagement, as well as the *serendipity* of unanticipated interactions. The locus of attention may shift from place to place, diffuse across the space, or coalesce in one spot as during a formal *critique*.
- [C] *Social networks* develop and evolve within studio, providing opportunities for *learning and designing collectively* and promoting a sense of *belonging*. Through *immersion* in an environment which partially *simulates* their discipline, students are *enculturated* into studio and encouraged to develop designerly *identities*.
- [D] The *rhythms* of studio include those of *projects* which entail a good deal of independent *learning by doing*. This may take the form of *play and making*, taking *risks* and risking *failure*, as well as *making visible* one's ideas in the form of *prototypes* and *artefacts*. This independent action on the part of students complicates the *power transactions* in studio and requires *active teaching* from instructors who are continually adjusting and responding to what the students are doing.
- [E] *Materiality*, physical or digital, is central to studio, and can influence both the *cost* of studio in the form of tools, equipment, space, connectivity and other expenses, and the sense of *place* engendered within it.
- [F] The *surfaces* of studio, physical and digital, are a means of *making visible* what is being learned and created, a means of supporting *extended and distributed cognition*, and a means of affording *dialogue*, both formal and *informal*. During such dialogues, and in other situations, *listening-in* is a method of *acculturation* and building the *confidence to speak*.
- [G] As a complex site of learning, studio is not structured to resolve *uncertainty* but as a coherent cultural context, or *habitus*, it supports the emergence of *identity* and *belonging*.

Figure 5. Example layout of a narrative annotated with relevant properties

### 3.1 Analysing the property connections

The book contains over 970 unique connections and 1523 cumulative connections between properties. On average, each property has 23 connections to others, with a typical range of 6–31 unique references and 6–89 cumulative references. What is particularly interesting is the interconnections between properties. Figure 6 illustrates the number of connections by showing the properties ranked by the frequency that property is referenced ‘inwards’, or *FROM other properties*. Meanwhile, Figure 7, ranks the properties based on the number of ‘outward’ references TO other properties within that property.

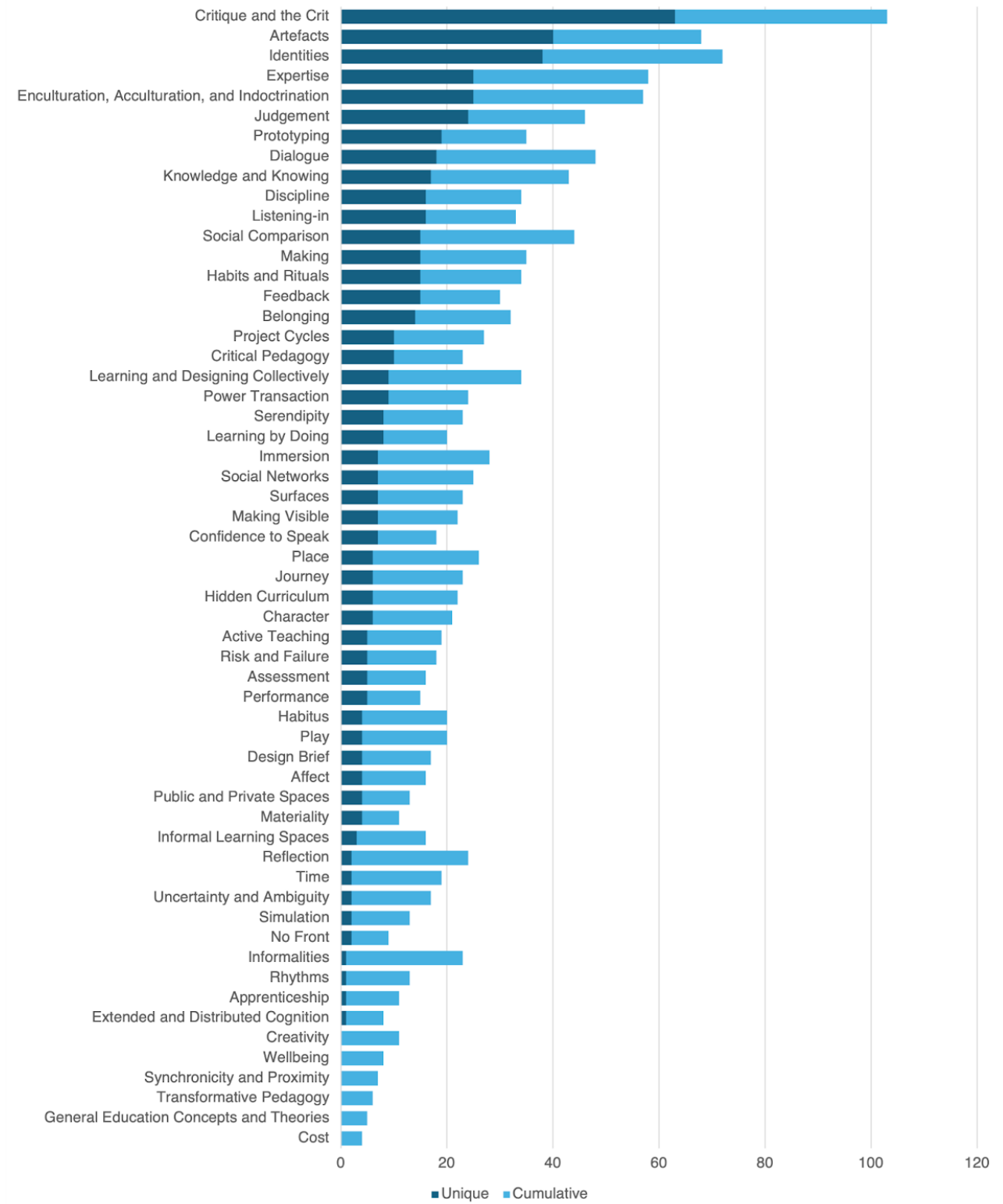


Figure 6. Number of cross-references FROM other properties (unique and cumulative, ordered by unique references)

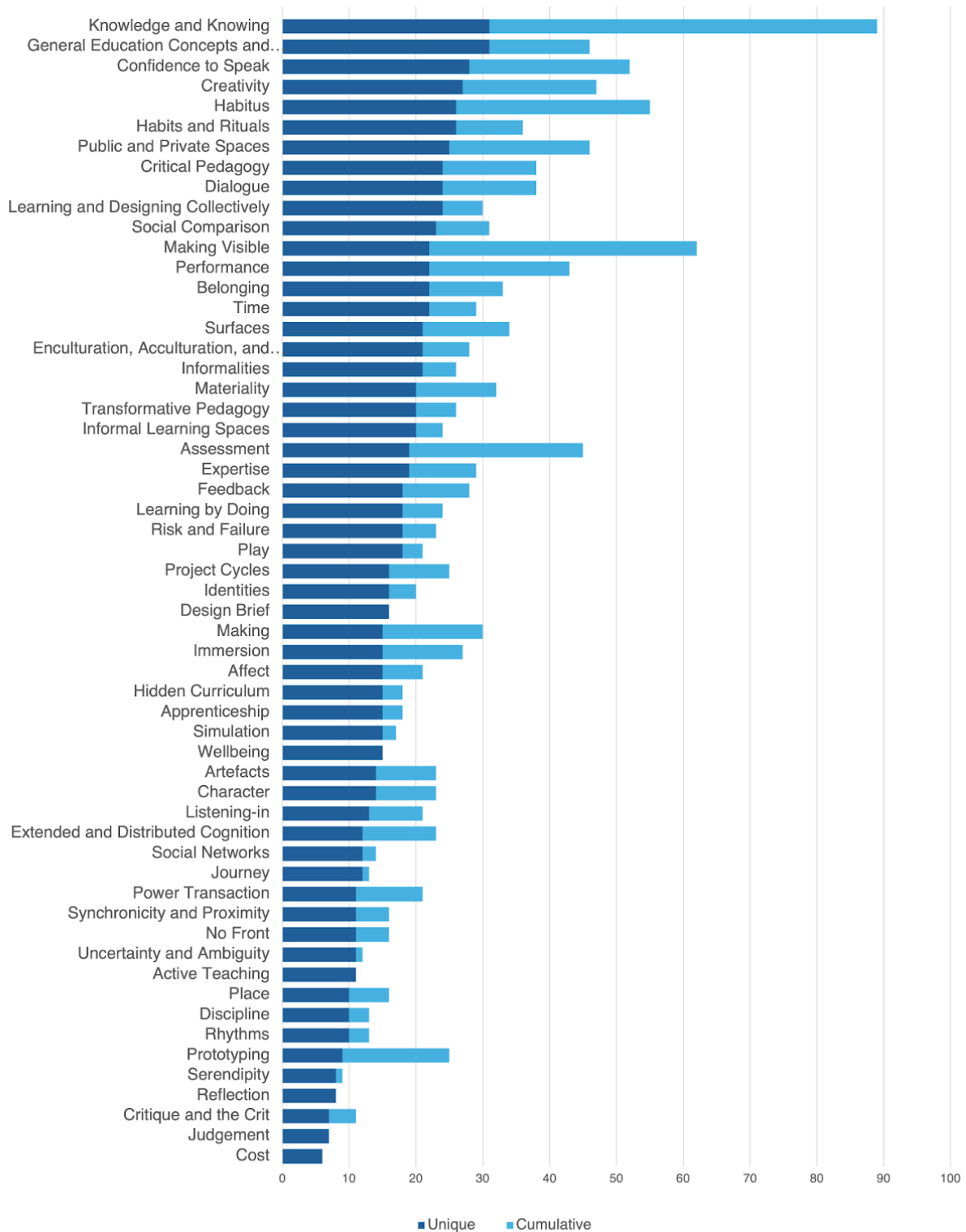


Figure 7. Number of cross-references TO other properties (unique and cumulative, ordered by unique references)

Of the 57 studio properties, 41 have a relatively equal number of references TO and FROM each property (no difference greater than 10 references). This means that 70% – the majority – are substantially reciprocal in their connections with others. The nature of these cross-references can be characterised by the following six relationships:

1. The referred-to property may explore further some aspects of the source property; (e.g. the source property **Assessment** contains references to many other properties (like **Feedback**, **Dialogue**, **Critique and the Crit**) that inform, define and enable it).
2. The referred-to property is partially engendered by the source property; (e.g. **Serendipity** in studio is engendered by studio being a place of **Informalities** but it does not depend on this alone).

3. The referred-to property can be brought about to the source property; (e.g. **Power transactions** in studio tend to lead to other power-related properties, such as the **Hidden Curriculum or Enculturation, Acculturation, and Indoctrination**).
4. The source property contains cross-references to some aspect of itself; (e.g. **Making** and **Prototyping** depend on there being **Artefacts** in studio).
5. The source property contributes to or supports aspects of the referred-to property; (e.g. developing **Judgement** and **Character** are all part of a designer's **Journey** in studio).
6. The current and referred-to properties are frequently co-occurring, even though they may be understood and described as distinct. (e.g. **Feedback** and **Assessment** are very often interconnected in the studio but they are very different properties in terms of purpose, mode, and intent).

Figure 8 shows a side-by-side comparison of how many references TO and FROM each property has. The general numbers suggest a high degree of connectivity between properties, reflecting the nature of the knowledge found in studio.

Further analysis reveals a striking pattern: a small number of properties are referenced by many others, while they themselves reference relatively few. For example, **Critique and the Crit**, is referenced by numerous properties but reference only a handful of other properties, making it somewhat self-contained. In contrast, **Knowledge and Knowing** cross-refers to many other properties, possibly reflecting the fact that studio is a place for the construction of knowledge, even though very few other properties refer to it directly.

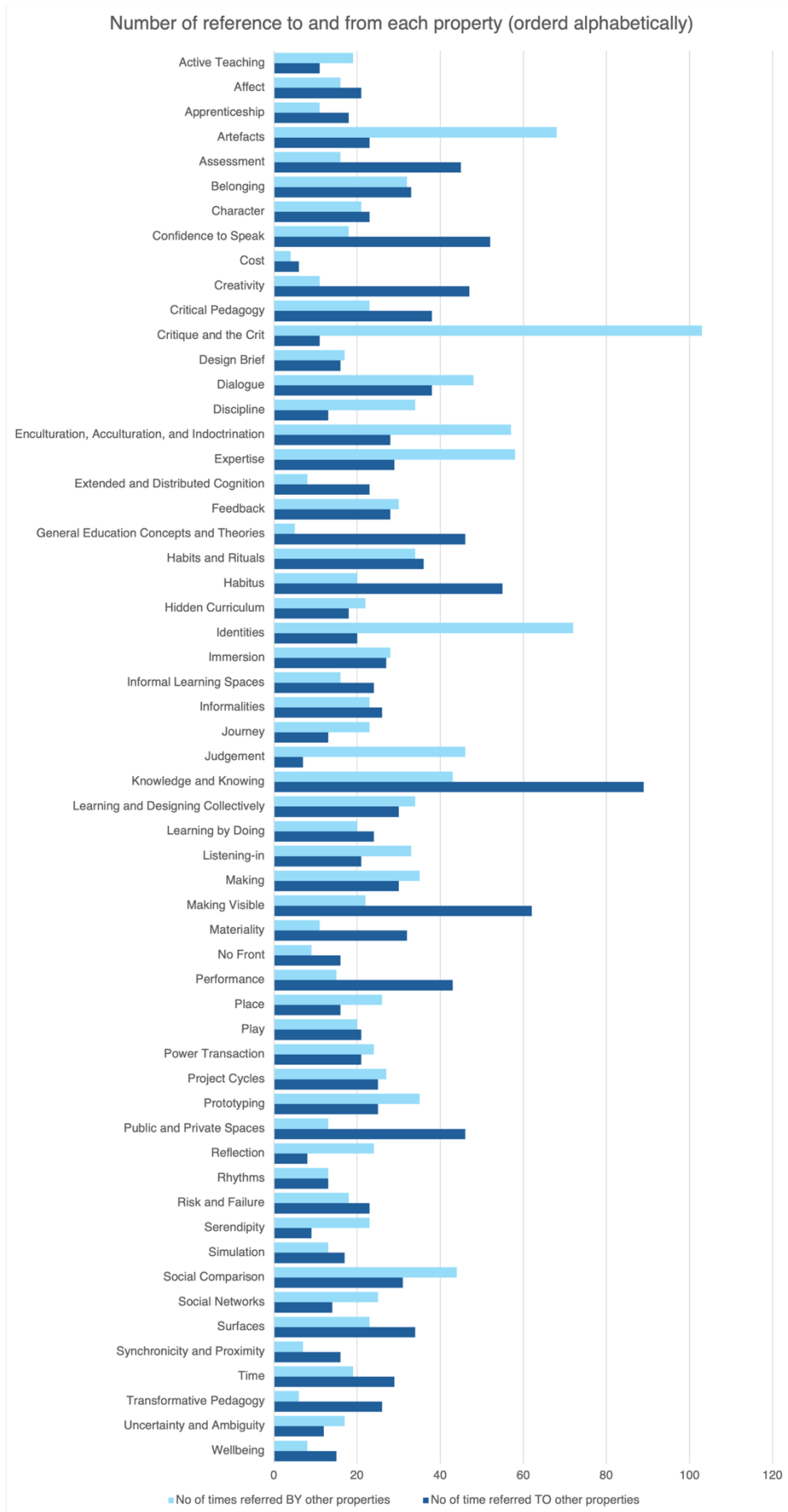


Figure 8. Side-by-side comparison of cross-references to and from each property (ordered alphabetically).

## 4.0 Sense-making and emerging knowledge

### 4.1 Entanglement

In this section, we present several key observations for educators and scholars engaged in design education. While many of these insights may align with educators' and scholars' experiential knowledge, they also highlight specific details that are important to consider in our teaching and research practices.

#### ***4.1.1 The challenge of isolating individual properties or aspects of studio***

There is a risk of isolating a single property without considering its many connections to other properties. Although it may be easier to focus on a specific component to understand the studio, doing so can lead to important related aspects being either overlooked or treated in isolation. For instance, during a studio critique (**Crit and the Critique**), tutors may focus solely on the critique process and key aspects such as **Assessment** or **Feedback**. However, this focus can result in neglecting other important connections to **Crit and the Critique**, such as the role of **Social Comparison**, the importance of **Listening-in**, and the dynamics of **Making Visible**.

#### ***4.1.2 The challenge of applying educational theory to studio***

Understanding studio as interrelated complexities can be problematic in research and scholarship. A common challenge that can arise is the application of simplified mainstream educational theories to studio that fails to address its complex interconnectedness. For example, mainstream educational theories often do not translate well to studio environments. Festinger's (1954) influential research on social comparison highlights this issue; in studio settings, social comparison operates as a dynamic mode of learning. Students typically learn through formal and informal comparisons with peers. The nature and effects of social comparison in studio diverge significantly from the linear and static models commonly presented in mainstream educational literature. In studio, the type and mode of social comparison both vary as students develop as designers and respond to contextual changes. Standard theoretical frameworks are inadequate for explaining the complex behaviours observed in a studio context (Jones et al., 2021).

#### ***4.1.3 The challenge of describing studio***

In *Studio Properties*, we name an extensive array of items, events, interactions, and experiences that students, educators, researchers, and observers encounter in an educational design studio. This book aims to illuminate the pedagogies, values, and actions often implicit in studio. Many terms we use—such as **Crit or Critique**, **Design Brief**, **Creativity**, and **Learning-by-Doing**—will be familiar to studio scholars and educators. However, some terms need clarification because they describe things familiar to those already active in studio, but which may be misunderstood when referred to without reference to the literature. Examples of these include **Reflection**, **Project Cycles**, **Judgement**, **Expertise**, and **Character** – each of which is significantly more nuanced and complex than the normal definition of the terms. Additionally, we introduce new terminology for concepts that are under-articulated in studio education literature, such as **Listening-in**, **Confidence to Speak**, **Synchronicity and Proximity**. Finally, some terms reflect new or emergent ideas not yet fully represented in the literature, such as **Public and Private**, **Making Visible** and **Active Teaching**. By defining these terms and their meanings in relation to studio properties, we aim to create a useful lexicon that facilitates more precise discussions about studio practices and fosters a richer shared understanding.

#### ***4.1.4 Narratives are easy and concise, but the descriptions of what is actually happening are thick, tangled, and lengthy.***

*Studio Properties* contains two narratives (see Figure 5 for an example layout). The narratives serve as descriptive stories, providing entry points that illustrate as entry points illustrating how properties are manifested in studio life. As we crafted the narratives we realised it was relatively straightforward to write these because the properties could be easily identified and referred to. For example, *Isabella's first studio class* is described in a short paragraph, yet we identified 35 unique properties within it. This highlights the inherent and persistent complexity of studio: while it is often easy to describe the surface activities, the underlying mechanisms and forces are entangled, complex and challenging to describe. In some respects, this aligns with Shulman's observation that "signature pedagogies simplify the dauntingly complex challenges of professional education because once they are learned and internalized, we don't

have to think about them; we can think with them” (Shulman, 2005, p.56). *Studio Properties* is an attempt to think *with* and *about* studio simultaneously.

## 5.0 Summary

The writing process of *Studio Properties* and its outcome reveal significant insights and lessons around the current state of design education knowledge and studio pedagogy. Our journey is visually summarised in Figure 10.

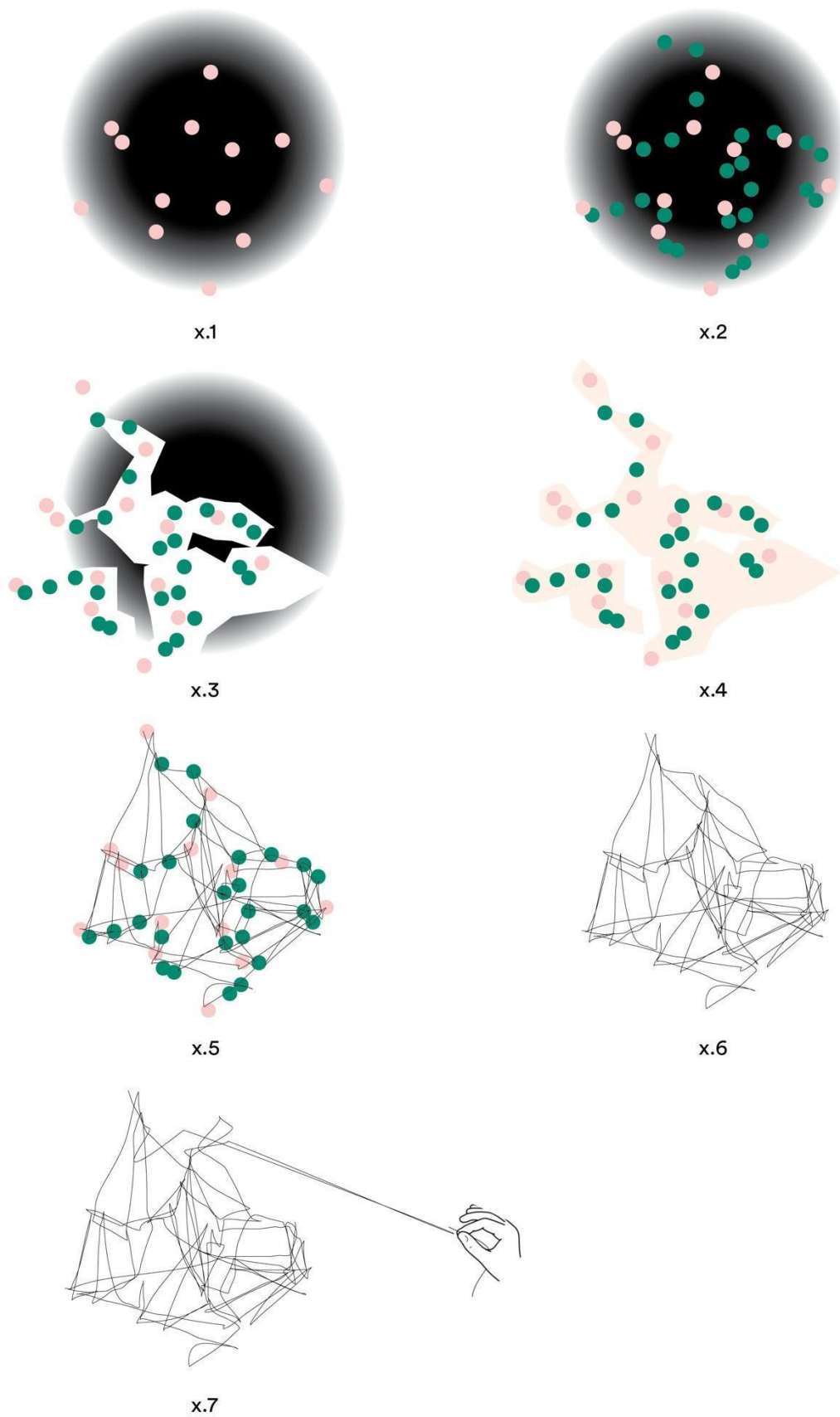


Figure 10. A visualisation of the conceptual stages of our understanding of studio knowledge

Figure 10 x.1: Research on studio is abundant ( ), and it has done much to highlight knowledge and build theories and problematics of studio. However, an overarching conceptualisation of studio remains elusive, with the literature often appearing disconnected or fragmented.

Figure 10 x.2: Studio remains challenging to know. To address this, we set out to identify and describe a range of studio properties that would contribute to the existing spotlights of knowledge and build connections within the existing literature.

Figure 10 x.3: Our initial ambition was to create focused knowledge about studio to highlight areas of the 'black box' of studio.

Figure 10 x.4: Over time, our focus evolved as we realised that we could develop an understanding of studio by exploring its properties and recognising the connections between properties. It also became clear that studio is not an objective or independent entity. Instead, the studio we describe constructs itself into particular shapes

Figure 10 x.5: As we advanced with the project, our focus shifted from the properties themselves to the relationships between them. Analysing 970 unique connections and 1,523 cumulative connections revealed a high degree of connectivity.

Figure 10 x.6: Moreover, we began to perceive the studio as an entanglement of relations rather than the properties themselves or a simple set of relations. This shift in perspective reflects the nature of both experiential and theoretical knowledge found in studio practice.

Figure 10 x.7: In the book *Studio Properties*, we build a comprehensive understanding of studio by identifying relevant properties and visualizing their relationships. We approach this conceptually, presenting a thematically grouped collection of 57 properties, and narratively, through descriptions of fictional design studio situations. To borrow Gharajedaghi and Ackoff's (1984, p. 293) distinction, studio is not the sum of the behaviour of its properties; rather, it is the product of their relations

Therefore, *Studio Properties* does not define or describe studio in traditional terms. Instead, it reflects the nature of studio through the knowledge it conveys. Two main aspects characterise this knowledge: 1) Entangled: Individual properties exist only in relation to one another, making them dependent, contingent, or predicated on other properties. If one property is removed, many others will be affected, often without this being apparent; 2) Contextualized: The properties gain meaning and relevance only when applied to a real studio context – whether it is remembered, imagined or actual. Until then, any property exists only in potential or abstract form.

*Studio Properties* captures the essence of studio knowledge while recognising its intricate entanglement and contextual significance. It provides a scholarly framework for engaging with studio knowledge while preserving its complexity, richness, and value.

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