

## Article

# “Living in the Discomfort”: Embodied Professional Learning for Transdisciplinary Higher Education

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## Abstract

Transdisciplinary higher education (TDHE) requires educators to integrate diverse forms of knowledge in their teaching and learning; however, professional learning pathways rarely support the embodied approaches essential to achieve this aim. Despite growing recognition that embodied knowledge sits at the heart of teaching and learning, educator learning continues to be dominated by disembodied approaches, limiting educators' capacity to navigate the complex and dynamic environments characteristic of TDHE. This paper examines a professional learning workshop codesigned and implemented across two international TDHE institutions to support educators in developing capacities for embodied approaches. We used reflexive thematic analysis of participant reflections and observations to demonstrate how an explicit focus on embodiment fostered four core sensibilities: (1) transdisciplinary integration, (2) embodied translation, (3) embodied experimentation, and (4) embodied expansion. Hopwood's conceptualisation of “attuning” was later applied, demonstrating how these sensibilities developed through the holistic processes of noticing, attending, and making sense of emerging practice, while demonstrating how the workshop design functioned as an extended attuning sequence. Our findings suggest that effective professional learning in TDHE should focus on embodiment, fostering educator sensibilities through embodied experiences and supported experimentation within safe, collaborative environments, and fostering relational expertise through transdisciplinary engagement. The workshop supported an initial attuning that opened pathways for continued professional learning, offering important considerations for the design and facilitation of professional learning in TDHE contexts.

**Keywords:** transdisciplinary higher education; transdisciplinary professional learning; embodied learning; codesign; attuning



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## 1. Introduction and Background

Transdisciplinary Higher Education (TDHE) is increasingly advocated for and valued as a means of educating people to tackle complex challenges, work collaboratively across fields, and develop the integrative and creative thinking necessary to address challenges that transcend disciplinary boundaries (Bernstein, 2015; Klein, 2004; McGregor, 2017; Nicolescu, 2012). Embodied teaching and learning (hereafter “embodied approaches”) emphasise physical, emotional, sensory and intersubjective ways of knowing (Nathan, 2021) and play an important role in TDHE contexts where “the role of the deeply rooted intuition, of the imaginary, of sensitivity, and of the body in the transmission of knowledge” are valued (Nicolescu, 2012, p. 1).

Embodied approaches are critical to ensuring transdisciplinary education “can take place and knowledge can be undone, (re)generated and made particular, beyond the usual dictates of prescribed curricula and can inform the transdisciplinary” (Middelow, 2017, p. 124). While approaches such as lecture-based instruction and knowledge transfer may find their purpose in settings where deep disciplinary expertise is the goal, TDHE requires more holistic and integrative approaches like embodiment that support multiple ways of knowing and integrative understanding to creatively address complex societal challenges (Allen et al., 2025, 2023; Henriksen et al., 2015; Middelow, 2017; Nicolescu, 2012).

Teaching and learning depend on the body—educators use movement and gesture, arrange learning spaces, and attend to physical presence to facilitate learning (Craig et al., 2018, p. 1). Despite this, higher education has long privileged abstract, conceptual knowledge over embodied ways of knowing (Macrine & Fugate, 2022; Nathan, 2021). As Beckett and Morris (2001) argue:

In Western education, the highest status is reserved for the most abstract and immaterial learning, irrespective of its utility, and the lowest status is accorded to concrete, material learning, much of which we learn in daily embodied action (p. 36)

This hierarchy reflects deeper assumptions about what constitutes valuable learning rather than an inherent devaluing of embodiment itself. Whereas embodied approaches are often central to vocational education, where hands-on, practical learning is the focus (Hyland, 2019), universities tend to prioritise conceptual and theoretical knowledge as the stamp of rigorous academic practice. This tendency reinforces a false hierarchy that positions abstract reasoning as more intellectual than embodied knowing, contributing to the devaluing of vocational studies compared to higher education as well as sidelining embodied approaches in universities (Hyland, 2019; Wagner & Shahjahan, 2015; Wheelahan, 2012). TDHE contexts challenge these hierarchies by valuing multiple ways of knowing and prioritising the development of both practical and conceptual understanding.

The bias towards conceptual knowledge extends to professional learning, where embodied approaches remain largely implicit rather than being explicitly developed. Educator professional learning is often based on disembodied views of human thinking, where embodied approaches are viewed as alternate and abstract (Lipson Lawrence, 2012; Macrine & Fugate, 2022). This pattern is evident across all educational levels, for example, in primary and secondary schooling, where Forgasz and McDonough (2017, p. 714) found, “embodied knowledge of practice is missing from documents such as the Australian Professional Standards for Teachers”. Many educators lack the understanding, confidence, and capacity to implement embodied approaches, facing barriers including time constraints, institutional resistance such as lack of resources and supportive frameworks, and personal discomfort (Nguyen & Larson, 2015; Skulmowski & Rey, 2018; Stolz, 2015).

These challenges are intensified in transdisciplinary contexts where, unlike routine disciplinary settings, TDHE presents complex, dynamic environments characterised by emergence and uncertainty (Allen, 2025; Fawns et al., 2021; Nerland, 2018). Teaching beyond disciplinary boundaries requires educators to expand their beliefs about knowledge, build collaborative practices, and evolve their professional identities (Chamo & Broza, 2025). This requires navigating between deep disciplinary expertise and broader integrative facilitation skills, developing flexible, creative approaches to support knowledge integration and real-world problem-solving (Gibbs & Beavis, 2020; Mishra & Henriksen, 2012). As Fawns et al. (2021) describe, “somewhere between developing pre-specified, discipline-based skills and knowledge, and adapting to situated, contextualised conditions, there must be a capacity for dynamically developing unpredictable practices” (p. 360).

Developing these unpredictable practices requires ongoing professional learning that supports educators' role shift from content experts to facilitators of collaborative, integrative learning (Klein, 2010; McGregor, 2017). In this regard, professional learning in higher education is largely insufficient, with research prioritised over pedagogical development in promotion criteria, workload allocation, and institutional reward systems (Czerniawski et al., 2018; MacPhail et al., 2019). Furthermore, few educators receive training that prepares them to teach across disciplines (Kozhabekova et al., 2025). Scholars agree that professional learning for transdisciplinary educators should be collaborative, integrate multiple disciplines, and focus on real-world application (McGregor, 2022; Williams et al., 2003). However, little is understood about the role of embodiment in these experiences. While research has been carried out to address the role of embodiment in educator capacity development (Hopwood, 2017; Macintyre Latta & Buck, 2008; McDonough et al., 2016), there is an opportunity to understand the specific learning experiences needed to support embodied approaches in TDHE.

This study addresses the question: What kinds of experiences do educators need to explore the potential of embodied approaches in TDHE? By examining a codesigned professional learning workshop that centres on embodiment, we identify four key sensibilities that emerge through collaborative, experiential learning and demonstrate how structured yet emergent experiences can foster educators' capacity for transdisciplinary integration and embodied practice. Throughout this paper, we use "sensibilities" rather than "capabilities" to describe the responsive, embodied dimensions of professional learning—the attuned awareness that enables capacities for action (Hopwood, 2015; Merleau-Ponty, 1962). Unlike capability frameworks that emphasise measurable outcomes, sensibilities capture the dynamic and responsive nature of practice that is particularly important in transdisciplinary contexts (Klein, 2004, 2010; Nicolescu, 2012).

We begin by outlining our research methods, including the codesign process and workshop implementation. Next, we present our findings through four sensibilities that emerged from reflexive thematic analysis of participant reflections. We then apply Hopwood's (2015, 2017) conceptualisation of "attuning" alongside relevant scholarship to deepen understanding of how these sensibilities developed through embodied engagement. Finally, we identify implications for practice and future research directions.

## 2. Research Design

The professional learning experience presented in this paper was codesigned at Transdisciplinary School (TDS) at the University of Technology Sydney (UTS) in Australia before being implemented and evaluated at W.A. Franke Honors College (Franke Honors) at the University of Arizona (UA) in the United States. UTS and UA have a longstanding partnership spanning several collaborations. In 2023, a new partnership between TDS and Franke Honors was established to deliver the undergraduate transdisciplinary degree, the Bachelor of Creative Intelligence and Innovation (BCII), at UA. This research was undertaken as part of that collaboration and with support from both institutions. Ethics approval for the study was gained from the UTS Ethics Committee (ETH23-8242 and ETH24-9064).

### 2.1. Codesigning a Professional Learning Experience

The professional learning experience was codesigned by eight practitioners from TDS who, based on prior participatory research, had identified the need for formal learning opportunities to support educators to enact embodied approaches in TDHE (Allen, 2025). Codesign was chosen as an appropriate method to support the process of actioning these insights because it recognises that initiatives should be designed by those within a challenge situation. This codesign process allows participants to articulate their needs, aspirations,

and interests by actively cocreating their ideal future state, scenario, or solution tangibly (Sanders & Stappers, 2008).

Codesign is well aligned with transdisciplinary and participatory research in emphasising collaboration, reflexivity, and the integration of diverse perspectives (Cartmel et al., 2013; McGregor, 2022; Zafeirakopoulos & van der Bijl-Brouwer, 2018). A five-stage codesign process (Table 1) was designed and facilitated by the lead author to support educators in developing initiatives informed by their lived experiences and needs (Penuel et al., 2007).

**Table 1.** Codesign process.

Workshop Stage	Timing	Setting	Key Activities	Key Outcomes
Preplanning	April to June 2023	TDS	Planning of codesign process and workshop activities	Codesign process.
Design	July to December 2023	TDS	2-h codesign workshops held monthly with eight practitioners.	Design of professional learning workshop.
Implementation	January to April 2024	Franke Honors	Pre-workshop interviews, workshop and post-workshop reflective discussions with five participants	Implementation of workshop
Evaluation	April to June 2024	Franke Honors	Analysis of participant interviews, feedback and observation notes	Evaluation of workshop contribution
Sharing	June 2024 to present	TDS	Dissemination of workshop outcomes, revision of workshop design and further implementation	Refined workshop design, implementation × 3

## 2.2. Workshop Overview and Implementation

The codesign process resulted in the development of a professional learning workshop for transdisciplinary educators. The 2.5-h workshop was structured around six phases (Table 2) that actively engaged participants in transdisciplinary and embodied theory and practice. The *experience*, *apply*, and *enact* phases of the workshop were key aspects of the design. In the *experience* phase, participants engaged in an embodied transdisciplinary learning activity—the Great Game of Power. This embodied exercise, developed by Augusto Boal (1998/2002), a Brazilian theatre director, explores representations of power through the construction of a shared image made of everyday objects. The activity was chosen as it is inherently transdisciplinary—exploring power from multiple perspectives—and offers an accessible, evidence-based embodied experience (Diamond & Capra, 2008; Giesler, 2017). During the *unpack* phase, participants reflected on their experience of the activity through collaborative discussion before connecting emerging insights with relevant literature through the *grounding* phase.

Across the *apply* and *enact* sections of the workshop, participants were invited to experiment with and apply the insights generated in their practice. Firstly, participants worked collaboratively in groups of two to three to use emerging insights to re-imagine or create a transdisciplinary learning experience grounded in an embodied approach. Participants were then introduced to and provided with a three-act structure template (Appendix A), developed through the codesign process based on the three-act structure from storytelling and narrative fiction (Alterio & McDrury, 2003). Next, in the *enact* phase, participants shared their newly designed experiences collaboratively, testing aspects of the learning experience with other participants and receiving feedback to inform further development. The workshop closed with a final sense-making discussion of the experience.

The workshop was designed to provide sufficient structure to support learning while allowing for emergence and contextual adaptation. Following the codesign process with TDS educators, the professional learning experience was implemented three times over 12 months—firstly with five educators at Franke Honors and then twice more at TDS. While

specific activities and timings were adjusted for different contexts, the sequencing of the workshop remained consistent, providing a strong scaffold for contextual adaptation while maintaining pedagogical integrity. This paper focuses on and presents findings from the first implementation at Franke Honors, as this initial iteration provided critical insights into the workshop's design and effectiveness that informed subsequent adaptations.

**Table 2.** Professional learning workshop.

Phase	Aim	Activity
Open	Establishing workshop expectations, supporting connections with the body and others.	Name and gesture exercise that allows participants to introduce themselves and their intentions for the workshop while intentionally engaging and noticing bodies (via the offering of a gesture).
Experience	Engage participants in an evidence-based, embodied transdisciplinary learning experience.	An adapted version of the Great Game of Power, developed by <a href="#">Augusto Boal (1998/2002)</a> , to explore the transdisciplinary concept of "power" through active and embodied engagement.
Unpack	Reflect and make sense of the embodied experience.	Collaborative discussion and visual mapping of insights.
Ground	Connect experience and facilitation approaches with literature.	Presentation of scholarly literature and collaborative discussion to connect this with experience and insights.
Apply	Abstract and apply insights, tools and techniques in practice.	Participants use a three-act structure template to reconsider and design embodied, transdisciplinary learning experiences
Enact	Sharing, giving and receiving feedback from peers.	Share aspects or all of the developing learning experience with peers to receive feedback to inform further development.
Close	Sense-making of experience and closing of the workshop.	Collaborative discussion.

### 2.3. Workshop Feedback and Analysis

Five educators from Franke Honors participated in the professional learning experience and subsequent reflective discussions: three male (Henry, Ari, Sam) and two female (Maria, Jemima). Participants had diverse disciplinary backgrounds, ranging from early career to senior academics, and were newly involved in the design and delivery of the BCII at the college. The lead author gathered verbal feedback on participants' experiences of the workshop via semi-structured reflective discussions held two weeks after the workshop. Initially planned as a 60-min group discussion with all participants, the initial discussion group included three participants, with two additional 30-min one-on-one discussions held with two participants who were unable to attend the group discussion. All discussions were audio recorded and transcribed, and the lead author made hand-written observational notes during the discussions. This material was complemented by the lead author's workshop observations, including written notes, photographs and illustrations inspired by [Hopwood \(2015, 2017\)](#).

Data were analysed using [Braun and Clarke's \(2006, 2019\)](#) reflexive thematic analysis (RTA). RTA emphasises the importance of researcher subjectivity and reflexivity throughout the analytical process. It is particularly useful for exploring how meanings are constructed within a particular context and thus offers a valuable approach for examining data collected concerning the workshop experience and perceived impact. RTA was led by the lead author and involved:

1. Familiarisation with the data by re-reading transcripts and making notes of initial thoughts and potential codes

2. Generating initial codes by systematically coding and collating data relevant to each code
3. Constructing themes by collating codes into potential themes and gathering relevant data to support these
4. Reviewing themes to check they work in relation to coded extracts and the entire dataset, as well as generating a thematic map
5. Defining and naming themes through ongoing analysis and refinement of each theme to generate a clear definition and name

Emphasising research subjectivity and interpretive engagement, the RTA analysis approach allowed for theoretical connections to emerge through the analytical process rather than directing it (Braun & Clarke, 2019).

### 3. The Contribution of the Workshop: Fostering Sensibilities

Analysis of participant observations and feedback highlighted that the workshop experience supported the development of key sensibilities, including (1) *transdisciplinary integration*, (2) *embodied translation*, (3) *embodied experimentation*, and (4) *embodied expansion*. The following section presents these sensibilities individually for clarity while recognising they function as integrated capacities that mutually reinforce each other. Educators also brought existing capacities to the workshop and moved fluidly between them, with development in one area often supporting growth in others. Illustrations (based on workshop observations) and photographs demonstrate how sensibilities developed in practice, as inspired by Hopwood (2015, 2017).

#### 3.1. Transdisciplinary Integration

*Transdisciplinary integration* refers to educators' capacity to engage diverse perspectives of embodiment for collaborative sensemaking across disciplinary boundaries. Educators reflected on how, through a collaborative approach and structured activities across the *experience*, *apply* and *enact* phases, the workshop created opportunities for them to negotiate meaning through diverse disciplinary lenses. For example, the Great Game of Power (Figure 1) effectively fostered transdisciplinary integration through shared embodied experience.



Figure 1. Participants during the Great Game of Power.

During the activity, participants were instructed to work in silence to arrange the chairs so that one chair, in their opinion, had the most power. Between arrangements, the group discussed what they observed (i.e., which chair was most powerful and why) without requiring consensus. The cycles of silent creation and sense-making saw participants negotiate personal interpretations—informed by disciplinary and cultural backgrounds as well as lived experience—with collective interpretation, creating a space where multiple contradictory interpretations could coexist. The negotiation between individual and collective sense-making pushed participants beyond their disciplinary comfort zones into a space of productive uncertainty. As Ari described:

What I really loved was seeing all the different wacky interpretations that people came up with. . . I can like live in the discomfort of not getting something immediately. . . As far as learning goes, like that's a place we occupy in that process. And I felt like I really had to (laughs) occupy that process.

The activity encouraged participants to embrace uncertainty without discussing their understanding, challenging assumptions and facilitating collective meaning-making. Developing educators' capacity to "live in the discomfort" of not knowing emerged as central to engaging embodied approaches to support transdisciplinary learning. The workshop was intentionally structured to support a collaborative, cohort-based professional learning experience that transcended not only disciplinary boundaries but also hierarchical ones.

For early-career academics like Jemima, the collaborative, transdisciplinary environment provided crucial support and a rare opportunity to engage openly with more senior colleagues from diverse backgrounds:

Coming into a room of folks that I admire. . . might have been my hesitation and excitement, right? I was excited to be gathered. . . but everyone has different levels of experience with these topics. . . it's sometimes difficult to be a fully present participant when people aren't cared for, but I felt very cared for and I felt that it was really well-facilitated and I liked that we had the opportunity to both think individually and think together.

Jemima's experience illustrates how *transdisciplinary integration* requires attention not only to disciplinary boundaries but also to hierarchical ones. Her expression of both "hesitation and excitement" highlights the emotional dimensions of cross-hierarchical collaboration and emphasises the importance of creating inclusive and caring spaces where educators feel safe to express ideas regardless of their institutional position. The workshop dissolved traditional hierarchies and disciplinary boundaries, creating space for experimentation. It modelled *transdisciplinary integration* while developing educators' capacity to create similar environments, supporting uncertainty, questioning, and collaborative meaning-making.

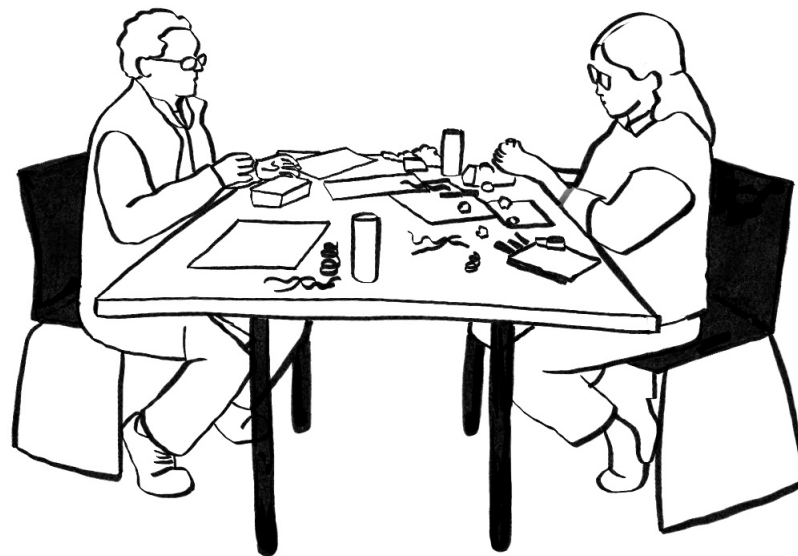
A key tension emerged between participants' desire for continued community learning and the workshop's bounded nature. Maria reflected on the value of learning with and from others and expressed a desire for these interactions to continue:

[The] opportunity to share with all of you. . . not only ideas for my class, but also ideas like you have for your class. . . that was very refreshing and made me think about other spaces like faculty meetings. . . I feel it will be good for me to continue being in community. . . to continue learning.

Maria's reflection highlights the potential for *transdisciplinary integration* to extend beyond formal professional learning into ongoing, informal learning communities. Her suggestion of repurposing existing institutional activities (like faculty meetings) offers a practical pathway for sustaining collaborative practice. *Transdisciplinary integration* provided the foundational context for developing the other three sensibilities through collaborative engagement across disciplinary and hierarchical boundaries.

### 3.2. Embodied Translation

*Embodied translation* emphasises educators' developing capacity to notice and translate embodied understanding into concrete teaching practices through material engagement, structured tools, and enactment opportunities. Educators spoke about how the workshop's embodied activities, material engagement, structure and tools, particularly in the *apply* and *enact* phases, contributed to this capacity. Participants reflected on how working collaboratively with tools such as the three-act structure template (Figure 2), provided a direct and shared experience of embodiment from which participants could derive meaning and later apply this in practice. Participants' physical interaction with objects, visual mapping, and collaborative discussion during the apply phase required them to externalise and make tangible their emerging understanding—a key aspect of embodied translation.



**Figure 2.** Participants using materials and the three-act structure template to design learning experiences.

Henry reflected on how these experiences supported meaning-making while pushing him to explore new possibilities for practice:

...the materiality aspect is powerful. . .setting down the abstract and a chance to engage in the act of doing, the act of engaging others and the act also of making. . .took me from my usual lecture, lectern.

Participants' engagement with the embodied and material aspects of the workshop emerged as powerful aspects, engaging educators' bodies in diverse ways—feeling objects in the hand, the physical act of moving around a space and collecting items, and visual and tactile feedback. Henry later spoke about how these aspects of the workshop supported a shift from “talking in the abstract” to “something that you can understand and relate to. . .I can see it, I can touch it, visualise it”. He went on to describe moving from abstract to tangible understanding as a “battle”, illustrating the fundamental challenge of bridging theoretical and practical understanding in *embodied translation*.

The three-act structure template (Appendix A) functioned as a practical translation mechanism, helping participants translate understanding into practice. Jemima reflected on how the tool operated as a translation mechanism that enabled her to connect with her existing understanding and intentions:

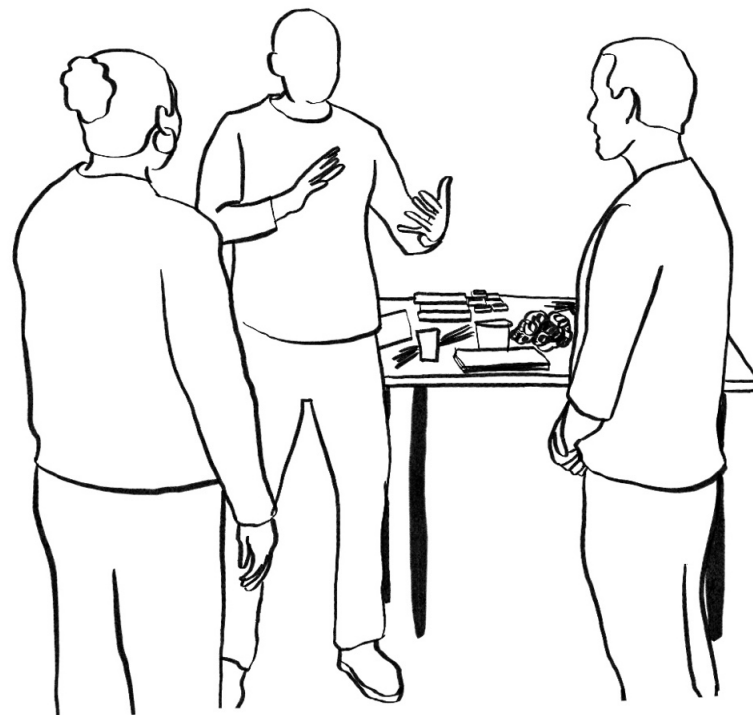
The thing that I keep coming back to and something that stuck with me was the work we did towards the end for the three-act structured worksheet specifically, thinking about learning experiences as a three-act story. . .I feel like I have a lot of

jumping off points to go off of now, like “Oh, these are things I’m interested in, these are the things I care about and want to integrate into my practice” . . .there’s other people that also care about it . . .

Jemima’s reflection shows how the workshop supported opportunities for personal validation (i.e., “there are the things I care about”) and community validation (i.e., “other people that also care about it”) while providing the frameworks to support practice enactment (i.e., “I have a lot of jumping off points”). This balancing of structured tools with emergent learning proved important, allowing participants to experience, analyse and apply embodied transdisciplinary approaches to their practice.

### 3.3. Embodied Experimentation

The sensibility of *embodied experimentation* highlights educators’ capacity to creatively experiment with embodied approaches to develop understanding and transform practice. Educators reflected on how the supportive, collaborative and creative workshop environment (Figure 3) supported them to take risks and experiment with embodied approaches in new ways. The iterative structure of the workshop—moving from experiencing embodied activities (*experience*), to designing new ones (*apply*) to sharing and testing with peers (*enact*), created multiple opportunities for low-stakes experimentation.



**Figure 3.** Participants sharing and receiving feedback.

The workshop’s *enact* phase created a low-stakes environment for testing embodied approaches with peers, scaffolding risk-taking through supportive sequencing from experience to analysis and facilitation. Participant reflections demonstrate how this manifested in two key ways: first, in the reflexive and improvised adaptation of embodied learning experiences and second, in the intentional implementation of experimental practice.

Participants were supported in engaging in reflexive, improvisational adaptation as part of the *apply* and *enact* phases of the workshop (Table 2). During the *enact* phase, participants shared their emerging ideas with peers, often surfacing unexpected insights that required creative responses. Sam designed an activity where students were asked to engage in collaborative conversation with their eyes closed, paying attention not just to

what is said but also to how they feel and respond emotionally to the topic of discussion. Sam described the moment of enacting the activity with a partner (Jemima) and needing to rapidly adapt the exercise and improvise on the spot:

...we're standing there [in the workshop], and I was like, "Oops" (laughs) I hadn't thought about that communication part. So, then I just stuck up my hands and I said, "Touch my hands if you wanna say something". And luckily, [Jemima was] close enough and it actually worked. . .I got to be creative in (laughs) this situation.

Sam's experience demonstrates how the workshop supported him in testing and adapting aspects of the learning experience that had yet to be fully considered. This led Sam to reflect on important considerations for enacting embodied approaches in practice, particularly when considering cultural and social dynamics in the classroom, where "having to touch another person. . .is another little barrier".

While Sam's experimentation occurred within the workshop itself, Maria's experience demonstrated a different aspect of embodied experimentation—intentional implementation in her everyday practice. Maria initially expressed hesitance: "My classes are very theoretical. . . I'm not a performer, you know?" While Maria recognised that educators are "always on stage and ready to perform", hesitance arose from previous professional learning experiences where educators' existing personalities and practices weren't accounted for. The workshop created an inclusive space for integrating educators' teaching identities with new approaches. After experimenting in the workshop's supportive environment, she implemented a new embodied learning activity the following week:

I integrated the next week. . .this is great, even for me, to give space to the students when my teaching style is [I don't] talk all the time. . .this workshop it's also helped me. . .put something together that actually aligned with my teaching style.

The workshop's capacity to honour participants' existing identities and strengths while experimenting with different embodied activities (e.g., working with artefacts) supported Maria in authentically incorporating new practices, moving from a primarily discussion-based approach to incorporating more embodied engagement.

The workshop provided a safe environment for creative risk-taking, as Ari reflected on the importance of experimentation spaces:

I feel like as long as we're in a safe space where we're comfortable being criticised, which I certainly felt that way in the workshop. . . I had this sense of "if I completely fail (laughs) people aren't going to think I'm a complete idiot" . . . I think it's really helpful to have an opportunity to get criticism and feedback and its stuff that you can do differently, stuff you can do better.

By creating a structured yet flexible environment for low-stakes risk-taking across the *experience*, *apply* and *enact* phases, the workshop enabled participants to develop essential capabilities for *embodied experimentation* through improvised adaptation and intentional implementation. This capacity proves particularly valuable in TDHE settings where, as Henry noted, "trans-disciplinarity is a risky business. . . it's really worth it to be able to take risks". However, tensions emerged between participants' newfound experimental approaches and institutional constraints, as Maria noted the difficulty of maintaining innovative practices alongside "duties. . .and all the expectations".

### 3.4. Embodied Expansion

*Embodied expansion* involves recognising existing practices and identifying opportunities for enhancement, building from implicit to explicit approaches. Educators spoke about how the workshop supported them in building awareness through their own embodied

experience, which validated practice and facilitated deliberate integration. The *apply* and *enact* phases of the workshop, with their structured tools (particularly the three-act-structure template) and peer feedback processes (Figure 4), helped participants identify both the existing embodied elements in their practice and strategic opportunities for expansion and integration. Jemima’s reflection captures this shift from implicit to intentional practice:



**Figure 4.** Workshop artefacts showing planning and experimentation processes.

I get students out there moving, but it’s not necessarily tied to the learning outcomes. . . that’s something I really focused on in my redesigning of how I’ll facilitate next time, asking. . . how is it coming back around and really driving back home the learning outcome?

Jemima’s experience illustrates a key aspect of *embodied expansion*—the recognition that embodied approaches may already exist in one’s practice, but their pedagogical impact can be amplified through more deliberate alignment with learning design and outcomes. For her, the workshop provided “validation of some of the ways I already teach” while offering the “motivation and kind of push to redesign some of the lessons to centre information that our students are getting from their body”.

Across all phases, the workshop alternated between collaborative embodied experiences, reflective discussions, and practical applications—helping participants discover connections between embodiment and their disciplinary expertise. This iterative process through experience, reflection, and application created opportunities for participants to recognise aspects of embodied learning they had been engaging with unconsciously. For Ari, this revealed connections between embodiment and his disciplinary knowledge that had previously gone unrecognised:

I didn’t have such an explicit sort of understanding of [embodiment] as an approach before. . . whatever I do in my practice already is sort of like (laughs) a happy accident that’s maybe approaching something bordering on embodied learning. . . but there’s so many different ways to teach something. . . And I was really struck in our first

conversation just how, you know, embodiment plays such a big part in the field of linguistics. Right? Language is so much connected to our bodies.

This laid the foundation for Ari to expand his practice by using embodiment to connect disciplinary expertise with TDHE teaching practices. He went on to reflect how embodied approaches would be “supremely effective” for his students, highlighting how educators’ capacity for *embodied expansion* can bridge disciplinary and pedagogical boundaries.

Despite participants’ positive experiences, differences emerged in terms of *embodied expansion*. Where Ari speaks to the “happy accident” of practice expansion, Jemima addresses the need for more intentional integration, illustrating the vital role professional learning experiences play in supporting TDHE. This contrast illustrates the varying stages of embodied awareness among educators and highlights the critical role that structured professional learning experiences play, particularly in TDHE.

As discussed in *embodied translation*, participants recognise the value of incorporating and enacting embodied approaches in practice but may face limitations in their capacity to do so. The workshop addressed these tensions through its deliberate sequencing that first provided a shared experience and validated existing practice elements (*experience* and *unpack*) before introducing strategies for intentional expansion (*apply* and *enact*). Through this process, participants developed their capacity to recognise embodied aspects in their own practice, connecting this to disciplinary expertise and intentionally expanding practice through more deliberate embodied approaches.

#### 4. Discussion: Attuning to Sensibilities

The workshop’s collaborative approach, embodied experiences, and balance of structure with emergence proved significant in cultivating the four sensibilities outlined above. To deepen our understanding of how these embodied sensibilities can be developed through professional learning experiences, we turn to Hopwood’s (2015, 2017) conceptualisation of “attuning”. Hopwood, writing on professional learning in the context of healthcare, emphasises that attuning constitutes “the embodied performances of noticing, attending, and sense-making enacted as professionals go about their work” (Hopwood, 2015, p. 274). The concept of attuning has diverse lineages across multiple fields, including psychology (Stern, 1985), philosophy (Heidegger, 1962), cultural anthropology (Ingold, 2020) and theories of practice (Kemmis et al., 2014; Schatzki, 2002). Hopwood draws strongly on practice theory to understand how attuning emerges through social practice, emphasising the body’s central role in professional learning and practice development rather than treating embodiment as separate from or supplementary to cognitive processes.

Hopwood conceptualises attuning as a pedagogical approach that supports practitioners in navigating the epistemic challenges of practice, where situations and relationships evolve in unexpected ways and what is to be learnt cannot always be pre-determined. TDHE is characterised by similar epistemic challenges whereby the context and content of learning are constantly evolving. Collaborative relationships between learners, academics and partners are emergent and exactly what students will learn emerges from these complex dynamics (Baumber et al., 2020; Klein, 2004). Hopwood (2017) argues that the process of attuning is central to the “ways in which professionals resolve the epistemic dilemmas associated with pedagogies of the unknown” (p. 3).

Rather than treating embodiment as separate from cognitive processes, attuning positions the body as central to how professionals learn through practice (Hopwood, 2015, 2017). Figure 5 illustrates the three-step pedagogical sequence of attuning, as described by Hopwood (2017) and adapted for TDHE contexts. While Hopwood observed attuning as a spontaneous learning process in healthcare practice contexts, it is applied in the following discussion to deepen understanding of how the sensibilities were developed through

embodied performances of noticing, attending, and making sense of TDHE practice. By highlighting the body-mind-environment integration central to the workshop design, the lens of attuning demonstrates how the workshop challenged and overcame the “disembodied views of human thinking” (Macrine & Fugate, 2022) that typically characterise educator professional learning and practices (Forgasz & McDonough, 2017).



**Figure 5.** Three-step pedagogical sequence adapted for TDHE (Hopwood, 2017).

#### 4.1. Understanding Sensibility Development Through the Lens of Attuning

The workshop supported educators in developing four key sensibilities for enacting embodied approaches in TDHE practice. Applying Hopwood’s concept of attuning helps illustrate how this development occurred through integrated mind-body-environment engagement rather than the disembodied approaches typically characterising professional learning (Macrine & Fugate, 2022). The workshop didn’t *equip* educators with these sensibilities but cultivated them through a scaffolded experience that enabled educators to notice, make sense of and experience the kind of responsive and embodied practices needed in transdisciplinary classrooms.

By prioritising embodied experience over conceptual instruction, this approach aligns with Nicolescu’s (2012) vision for transdisciplinary education that “revalues the role of the deeply rooted intuition, of the imaginary, of sensitivity, and of the body in the transmission of knowledge” (p. 11). The workshop realised this vision by creating conditions where educators could develop sensibilities through integrated embodied engagement rather than cognitive instruction alone.

Ari’s experience during the Great Game of Power demonstrates how the workshop developed his sensibility for *transdisciplinary integration*. When he encountered his peers’ “wacky interpretations” of power, his physical discomfort became a pathway for learning rather than a barrier. The attuning lens reveals how this sensibility emerged through the simultaneous engagement of body (discomfort), mind (confusion) and environment (multiple bodies and physical objects).

Rather than being told about the importance of transdisciplinary knowledge integration and tolerance for uncertainty in TDHE (Klein, 2004, 2010; Nicolescu, 2012), Ari was able to experience it directly. He noticed his discomfort, made sense of its meaning, and connected it to both current and future practice. This suggests that professional learning for TDHE cannot be achieved through discussion of theory alone; it requires that conditions be created whereby educators experience TDHE practice firsthand, attuning to disciplinary differences, knowledge integration, and epistemic uncertainty with their whole

being. This supports practice-based approaches to professional learning that emphasise learning through authentic engagement rather than abstract instruction (Boud & Brew, 2013; Kemmis et al., 2014).

Henry's engagement with materials during the workshop illustrates how *embodied translation* developed through attuning to transdisciplinary bodies and objects, thereby supporting collective meaning-making. His reflection on "the materiality aspects" as being "powerful" reveals how touching, moving, and making enabled him to translate the abstract concepts of his peers into a concrete understanding. The attuning lens highlights how this wasn't achieved by simply adding physical activities but by creating conditions for educators to attune to bodies and materials, engaging these as mediums for learning.

Sam's improvisation when his planned activity encountered spatial constraints demonstrates *embodied experimentation* through real-time attuning. His body's immediate response—offering his hand when no table was available—illustrates what Hopwood (2017, p. 88) calls "practical intelligibility" as Sam made meaning of unfolding bodies (Jemima's presence and interaction), materials (the lack of a table) and interactions (offering a hand to signal with). The lens of attuning reveals this intelligibility developed through the workshop's integration of embodied experience, reflection, and application rather than through instruction in specific techniques.

Sam's *embodied experimentation* and subsequent consideration of the cultural implications of touch for practice demonstrate the reflexive, flexible and creative adaptation essential for transdisciplinary education (Mishra & Henriksen, 2012). It is essential that professional learning provides educators with opportunities to experiment with embodiment in supportive, collaborative environments, allowing them to take risks and make meaning of practice in relational ways. Building confidence through direct, collective experience rather than individual experience or theory alone is key.

The collaborative, transdisciplinary nature of the workshop saw "multiple bodies attuning with and for each other" (Hopwood, 2015, p. 278), developing collective sensibilities that transcended individual disciplines and expertise. The workshop created conditions where notions of power were challenged, both through the Great Game of Power and the dissolving of traditional hierarchies, as shown when Jemima noted feeling "cared for" as an early-career academic among more senior colleagues. Unlike healthcare contexts where professional identities remain relatively stable, TDHE requires educators to temporarily suspend their hierarchical and disciplinary expertise to become learners again, attuning to the transdisciplinary.

Maria's transformation from initial resistance to authentic implementation demonstrates how *embodied expansion* developed through collective attunement and relational expertise. While initially hesitant, like many educators approaching embodied approaches (Nguyen & Larson, 2015), Maria opened up and began exploring possibilities when working with materials in a more intimate collaborative setting during the workshop's *apply* phase. Through tactile engagement with materials, the three-act structure, and peer feedback, she came to understand the pedagogical relevance and alignment of embodiment with her existing practice. As she reflected, sharing "not only ideas for my class, but also ideas you have for yours" enabled her to discover possibilities through a relational attuning process where educators were "learning from, about and with such others" (Hopwood, 2017, p. 5).

Maria's transformation emerged through collective embodied engagement that validated her existing practice while enabling expansion. This supports McGregor's (2022, p. 7) insight that educators must be "disciplinary before transdisciplinary" through collaborative recognition of possibilities rather than imposed change. This exemplifies what Hopwood (2017) terms relational expertise, where knowledge is "socially and materially distributed" (p. 90) rather than being contained within individual capacity building. This distributed ap-

proach aligns directly with TDHE practice, which is characterised by collaborative teaching and curriculum development (Cartmel et al., 2013; Zafeirakopoulos & van der Bijl-Brouwer, 2018). Maria's experience suggests that fostering sensibilities can be thoughtfully integrated into these collaborative structures, forming purposeful professional learning pathways that extend beyond individual workshops.

#### 4.2. The Workshop as Hopwood's Three-Step Pedagogical Sequence

While the workshop wasn't designed with Hopwood's (2015, 2017) conceptualisation of attuning in mind, applying this lens to the workshop design (Table 2) using Hopwood's (2017) three-step pedagogical sequence (Figure 5) helps deepen our understanding of how and why it created the conditions for fostering key sensibilities. Where Hopwood's original conception of attuning focused on brief moments lasting seconds or minutes, our analysis reveals how professional learning can systematically create conditions for such moments to emerge across extended timeframes, both within and beyond the 2.5-h workshop. Applied to these extended timeframes, the three-step sequence demonstrates how attuning as professional learning can function at a broader level, providing a pedagogical framework to guide the design and facilitation of formal professional learning that informs ongoing educational practice.

Within the workshop, the *open* and *experience* phases of the workshop supported the first step of the sequence by engaging educators in low stakes, embodied introductory activities before they participated in the Great Game of Power. The scaffolding of these experiences supports a gentle process through which educators first become aware of their bodies and objects in the space before collectively attuning to the bodies of others through collaborative activities and the use of objects (i.e., chairs). Next, in the *unpack* and *ground* phases, educators unpacked their experiences via collaborative discussion, identifying emerging insights which were captured and responded to by the facilitator. This exemplifies the second step of Hopwood's pedagogical process, where educators enter the "space of reasons" (Hopwood, 2017, p. 100) as the facilitator supports a process through which actions and experiences are linked to pedagogical purpose. The workshop's structured tools, particularly the three-act template, functioned to support educators in entering the space of reasons by helping them "explain the significance" of what they'd noticed and offering a mechanism to communicate insights (Hopwood, 2017, p. 100).

The *Apply* and *Enact* portions of the workshop realised the third step by attributing agency to educators, providing an opportunity to apply the developing insights in their practice and work collaboratively with peers to enact, test, and refine personal and collective practice. Hopwood described this sequence as supporting professionals in becoming "an agent of change" (Hopwood, 2017, p. 101) in the context of healthcare. Indeed, the same can be said for educators becoming agents of change in their TDHE context. Maria's experience exemplifies this process: when she integrated the embodied activities into her classroom despite her initial hesitation around their relevance to her teaching style and class, Maria transforms from a workshop participant to an agent of change in her practice.

The extended sequence of attuning demonstrates how each phase of the formal professional learning experience fostered sensibilities that support educators' ongoing growth and professional learning. This speaks to notions of educative practice and professional learning in and for practice where the act of engaging in professional activities inherently develops practitioners' abilities and understanding (Dewey, 1997; Salo et al., 2024). Unlike professional learning that separates learning from doing (e.g., online learning modules, lecture-based conferences, webinars etc.), learning is embedded within authentic professional engagement, supporting educators to adapt to emerging contexts and reflexively improve practice (Salo et al., 2024).

#### 4.3. Implications for Professional Learning in TDHE

The workshop's success in fostering educator sensibilities for embodied approaches in TDHE practice reveals several critical implications for how professional learning should be designed and facilitated in these contexts. Rather than treating embodiment as an add-on or "nice to have" in TDHE practice, the lens of attuning demonstrates how embodied engagement becomes the foundation for educator learning and practice development as they navigate the epistemic challenges of TDHE.

Fundamentally, professional learning in TDHE should explicitly focus on embodiment. Building on existing literature that challenges the notion of the body as separate from learning (Forgasz & McDonough, 2017; Macrine & Fugate, 2022), findings demonstrate that effective TDHE educator learning requires direct, embodied experiences, not just theoretical discussions. Ari's capacity to "live in discomfort" and Sam's real-time improvisation developed through bodily engagement, not cognitive analysis. This embodied approach enables educators to build the practical intelligibility needed to make sense of unfolding bodies, materials, and interactions that characterise the emergent, collaborative nature of TDHE classrooms, as evidenced by Maria's immediate implementation and Jemima's plans for redesign. The workshop offers an example of how the body can be re-integrated into professional learning (Forgasz & McDonough, 2017; Lipson Lawrence, 2012; Macrine & Fugate, 2022) while suggesting that in the context of TDHE, embodiment serves as a bridge between disciplinary depth and transdisciplinary expansion.

The sensibilities developed through the workshop also suggest a need to move beyond competency-based models of professional learning. Unlike capability frameworks that focus on measurable, predetermined outcomes, the four sensibilities demonstrate the type of responsive foundations for learning in contexts where knowledge is changing, fragile and ever-unfolding (Hopwood, 2017, p. 5). The epistemic challenges of TDHE demand that educators are not taught specific techniques or competencies but rather develop sensibilities that support ongoing capacity building for learning things not yet formalised (Fawns et al., 2021; Nerland, 2018). Rather than fixed capabilities, these sensibilities represent dynamic, responsive awareness that continues to inform learning and practice beyond the bounds of the workshop.

Findings demonstrate how educators develop these sensibilities through attuning processes that support them to notice, make sense of and act on the visceral experiences of uncertainty and emergence; for example, Ari makes sense of diverse disciplinary interpretations and his discomfort, and Jemima navigates power dynamics. Facilitators can use the three-step pedagogical sequence to support educators in attuning to uncertainty and developing the holistic capacities, not just analytical understanding, required in TDHE.

Beyond individual embodied experience, TDHE professional learning should prioritise collective rather than individual learning through collaborative engagement and collective attunement across disciplinary boundaries. The workshop's success stemmed from creating conditions where educators could learn "from, about and with" diverse others (Hopwood, 2017, p. 5), thereby developing the relational expertise essential for TDHE. This method requires institutional commitments to cross-disciplinary learning communities that support both personal and collective capacity development (Gibbs, 2015; McGregor, 2022). The process recognises that transformative professional learning occurs through "alternative professional learning spaces" that challenge "the orthodoxy of competence and compliance" (Appleby & Hillier, 2012, p. 41). As they observe, "it's not just what you do it's who you do it with" (p. 41), emphasising that embodied, collaborative experiences foster collective attunement across disciplinary boundaries—addressing a dimension rarely examined in higher education professional learning.

Supporting this ongoing development requires a focus on the expansion rather than replacement of existing practices, helping educators from diverse disciplines recognise and

amplify existing embodied elements within their disciplinary practice. This addresses the resistance that many educators, such as Maria, experience towards embodied approaches while enabling authentic integration. As Hopwood (2017) emphasises, attuning as professional learning is not a one-off experience or skill but a continuous process of learning, noting that “the quest for knowledge needed to practice is never finished” (p. 90). In alignment with theories of practice (Boud & Brew, 2013; Kemmis et al., 2014; Webster-Wright, 2009) the workshop did not serve as a comprehensive learning experience but rather as a platform that initiated awareness by attuning educators to the complex aspects of TDHE practice. By engaging educators in a structured approach to developing the capacities necessary to enact these approaches in the classroom, the workshop provided a framework for educators to apply, refine, and extend their knowledge through professional learning as practice.

## 5. Conclusions and Future Directions

This study demonstrates how an explicit focus on embodiment in TDHE professional learning can foster key sensibilities that enable educators to navigate the epistemic challenges of TDHE practice so they can support students in doing the same. The four sensibilities that emerged through this research—*transdisciplinary integration*, *embodied translation*, *embodied experimentation*, and *embodied expansion*—function as integrated capacities developed through embodied awareness, sense-making, and collaborative engagement, equipping educators with essential capacities for building upon their disciplinary expertise while expanding their transdisciplinary facilitation.

These sensibilities emerged through attuning processes that support educators in developing ongoing capacities for noticing, sensemaking, and responding to the complex, emergent dynamics of TDHE practice. Applying Hopwood’s conceptualisation of attuning shows how fostering these sensibilities requires collaborative learning experiences that provide safe spaces for experimentation, structured progression from embodied awareness to practical application, and ongoing communities that support creative risk-taking across disciplinary boundaries. Critically, the workshop functioned not as a complete professional learning experience but as an initial attuning that opened pathways for ongoing professional learning through practice. Educators developed sensibilities that supported ongoing attunement and embodied engagement with aspects of TDHE practice beyond the workshop itself.

Together, the four sensibilities and workshop design offer a practical pathway for designing professional learning that explicitly centres embodiment while developing capacities for TDHE practice. For TDHE practitioners and institutions, this research demonstrates that transformation requires, firstly, collaborative rather than individual learning experiences; secondly, scaffolded progression from embodied awareness to practical application; and thirdly, ongoing learning communities that support creative risk-taking across disciplinary boundaries. The workshop model offers a replicable framework adaptable across diverse institutional contexts for supporting educators in attuning to different aspects of practice while developing sensibilities that support ongoing learning in and through practice.

The study’s focus on a single workshop with five participants enabled situated insights into how embodied sensibilities develop within a specific TDHE context. However, this context-specific approach with a small cohort size also highlights a limitation of the study and an important pathway for future inquiry. Future research could examine how these sensibilities manifest across diverse TDHE contexts with larger, more varied participant groups, to examine how different institutional cultures, disciplinary backgrounds and teaching experience influence the sensibility development. Such research would strengthen understanding of both the transferability and context-specific adaption of embodied professional learning experiences. In addition, future research could investigate how these sensibilities

are fostered in other forms of professional learning, rather than a single workshop, deepening understanding of how formal professional learning experiences can transition into integrated, everyday practice transformation in TDHE.

The reliance on participants' self-reported experiences through group and individual discussions two weeks after the workshop provided rich, first-person accounts of how they made meaning of the workshop experience, alongside observations of participants during the workshop. While RTA acknowledges and values the subjective nature of such data, future research could expand this through complementary data sources such as classroom observation or analysis of artefacts (e.g., teaching materials, student work, etc.), to further mitigate social desirability influencing findings. Longitudinal studies could examine practice and the value of such professional learning experiences over time. This would provide an opportunity to examine how professional learning through practice translates and scales to classroom settings, where educators facilitate embodied learning experiences for students. In conclusion, this research makes an important contribution to education theory and practice by demonstrating how embodied professional learning in TDHE provides a promising pathway for educational transformation that moves beyond disciplinary silos and disembodiment towards integrated, embodied approaches.

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## Abbreviations

The following abbreviations are used in this manuscript:

TDHE	Transdisciplinary higher education
TDS	Transdisciplinary School
UA	University of Arizona
BCII	Bachelor of Creative Intelligence and Innovation

## Appendix A. Three-Act-Structure Template

### ABSTRACTING AND APPLYING INSIGHTS

Expand an existing learning activity or session for a transdisciplinary teaching and learning context by abstracting and applying the approaches, principles and ideas explored. You might like to select an activity or session you'll be running in an upcoming subject!

#### 1. Identify a learning activity, experience or topic

/ What is the learning activity, experience or topic?

/ Who is it intended for?

/ What domains, space or discipline is it based in?

#### 2. Brain and bodystorm

/ How might you use the approaches and insights explored to adapt or expand the activity for a transdisciplinary teaching and learning context?

/ Use this digital space, the physical space in the room and available materials to explore different ideas.

### PLANNING AND ENACTING

Use the three-act template to plan out the learning experience, focusing on how you might set-up, actively engage and resolve the learning experience. Use the props, materials, space and peers to prepare a short enactment of your activity/session—a pilot that you can test and get feedback on in a safe environment with your peers. You could test all or one aspect of the experience.

#### Act 1: The set-up

/ How will you begin the experience?

/ How will you welcome and prepare participants?

/ How will you introduce the activity or content?

#### Act 2: The confrontation

/ How might you engage participants in an experience?

/ How might you create stakes i.e. personal interest and involvement?

#### Act 3: Resolution

/ How will you finish the experience?

/ How will you bring participants out?

/ How will you support sense-making and reflection?

Beginning

Rising action

Descending action

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