EPISTEMIC ENVIRONMENTS – WHERE KNOWLEDGE GETS BUILT



A model in collaborative field research

Last week **Connie Svabo** and I hosted a gathering of members of her STEM Education Research Center (FNUG at University of Southern Denmark) [Link] to explore epistemic environments in the Bay Area – spaces and places where knowledge gets built.

Our core team was **Dorte Moeskær Larsen**, Associate Professor of mathematics education, current Director of FNUG, and Head of Mathematics Learning Lab; **Maiken Westen Holm Svendsen**, Assistant Professor in mathematics and physics education; **Katrine Bergkvist Borch**, Assistant Professor in science-learning environments; and **Katrine von Bornemann Hjelmborg**, PhD fellow in mathematics. For four days we were joined by **Gitte Balslev**, Associate Professor in STEM education innovation and co-

director of FNUG, **Povl Balslev,** professional musician, and **Gabriele Characiejiene**, PhD fellow researching stakeholder perspectives in STEM education.

It was an intellectual roller-coaster! Connie and I wanted the week to be a model in collaborative, exploratory, and facilitated field research. We are gathering the insights through our field notebooks and follow-up synthesis.

Watch this space for future report and analysis.

In the meantime, here is a quick description of activities, with some personal comments at the end.

Agenda – how do environments shape experience? Onto-epistemic Design

The visit came in the wake of our book *Creative Pragmatics for Active Learning in STEM Education* (2025) [Link].

Connie poses the question – How do environments shape experience? She proposes *Ontoepistemic Design* – a research programme about how spaces, materials, media, technologies and institutional arrangements co-constitute experience, learning and knowing.

Some practical questions guide this work: What is an arrangement directing attention toward? What does it make perceptible? Which practices does it invite? Which forms of knowing does it enable? What happens if we rearrange it?

Orienting statements / prompts

Objects, tools, spaces, and technologies participate in organizing activity and shaping attention. Artefacts may gather people around a shared concern and make coordination possible. They may also unsettle familiar practices by introducing friction, ambiguity, or novelty. Artistic materials are especially relevant in

this respect because they do not always stabilize meaning. They may keep interpretation open and allow several experiences or perspectives to remain present at the same time.

Networks connect participants across institutional, professional, disciplinary, and geographical boundaries. They may contain different understandings of purpose, participation, knowledge, and professional development. Arts-based and design-based forms can make these differences perceptible without requiring them to be resolved immediately into a single verbal account. They can support polyphony: the coexistence of multiple voices, positions, temporalities, and forms of knowing.

Methodology – itinerary

We staged an intense itinerary of site visits, facilitated group discussion, documentation, presentation, and collaborative workshops on matters that arose through the week.

Sites

- Stanford and Berkeley university campuses – stark contrasts and parallels in campus architecture and design;
- Stanford d.school (the Petersen Building) – thanks to Creative Director, Hasso Plattner Institute of Design, Scott Doorley (MS came away with renewed enthusiasm for what our d.school might stand for under Scott’s vision);
- Studio Michael Shanks Stanford (my own experiment in studio as research and

learning space);

- Ng Humanities House, an upper-class undergraduate residence on Stanford campus, showcased by the architects [Link]. MS is resident faculty where we were also joined by Fred Turner to talk about his history of cyberculture and tech utopianism – thanks, Fred, and thanks to residents;
- Embodied Design Research Laboratory at Berkeley – thanks to its director, Dor Abrahamson;
- Stanford CESTA (Center for Spatial and Textual Analysis in Wallenberg Hall) – thanks to its director Mark Algee-Hewitt;
- the Peter Wallenberg Learning Theater (Wallenberg Hall) – thanks to Bob Smith, Director of Classroom Innovation at Stanford;
- San Francisco Exploratorium (art and design manifesting science);
- SFMoMA (Museum of Modern Art – formal spaces of display);
- Stanford Graduate School of Education (AI Tinkery and Classroom of the Future) – thanks to Director of the Tinkery, Gregory Wilson;
- Microsoft Mountain View Campus – thanks to Marc Wilkinson and Gizelle Baylon for showing us round, introducing to us the innovation Garage, and members of the AI hackathon, and for great insights into AI agents as coworkers;
- Computer History Museum Mountain View (highlights – slide rulers, Larry Leifer's robot arm from 1965 [Link], and Seymour Cray still looks like Liberace);
- San Francisco Terror Vault (interactive Halloween performance in (S)hellville);
- Stanford Faculty Club (scholarly gathering);
- as well as research conversations held in various Bay Area restaurants (commensality).

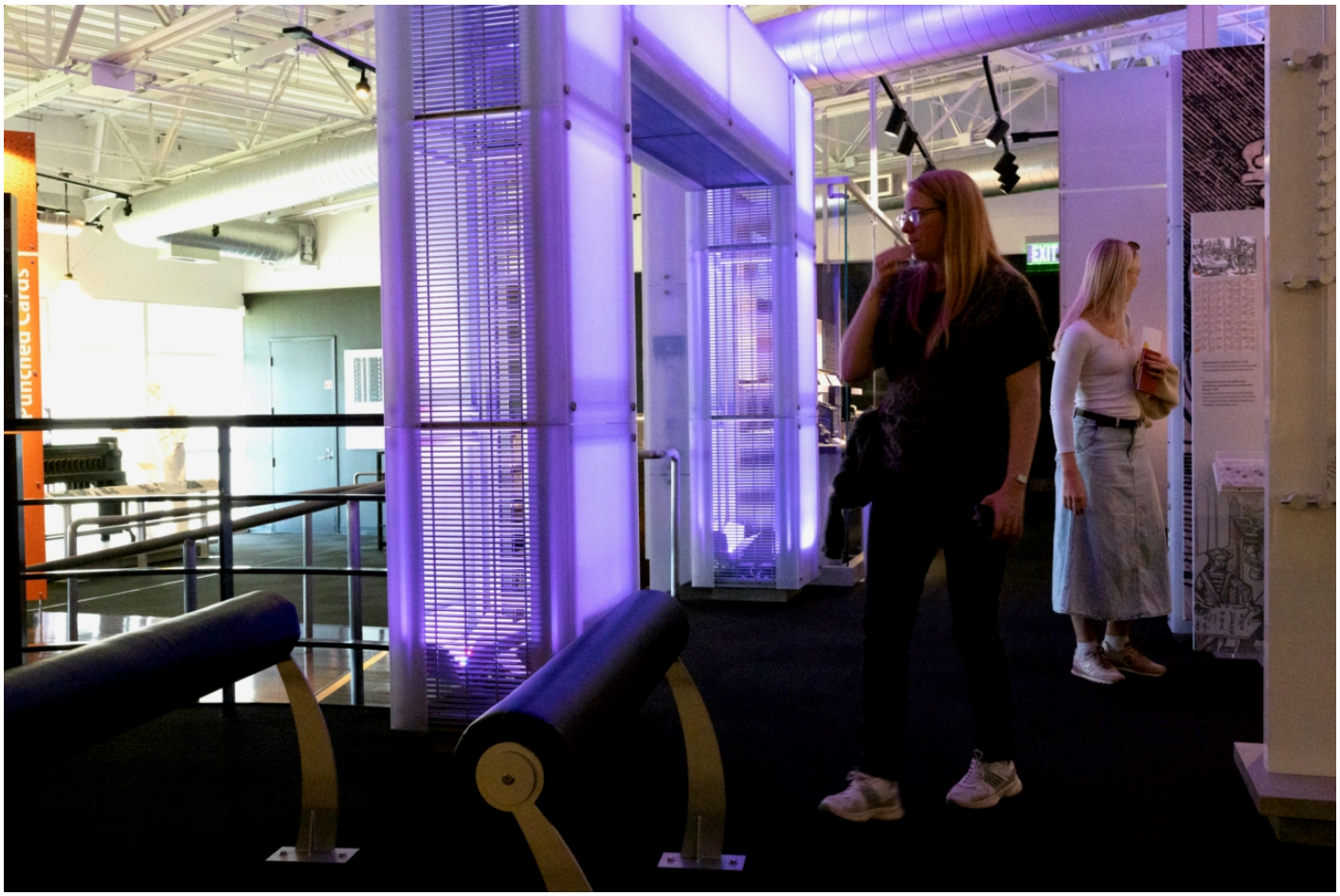
And we didn't just visit and watch. At Berkeley, the team rolled out the "FNUG Way" in science studies and education, and facilitated what is well-described as a performance of mathematical Group Theory (!).

At Stanford, in Ng House the team staged a manifestation of their research interests for residents, we held workshops in my studio, the group came to my dog-and-pony-act lectures on industrial design, and they joined a group crit of some wonderful ongoing projects in my seminar on environmental aesthetics.

Funding was from the ERASMUS Program in Europe.



Embodied Design Research Laboratory, Berkeley – Katrine explains how we have just acted out Group Theory in sorting some numbers on cards laid out on the floor



Computational devices at the Computer History Museum Mountain View



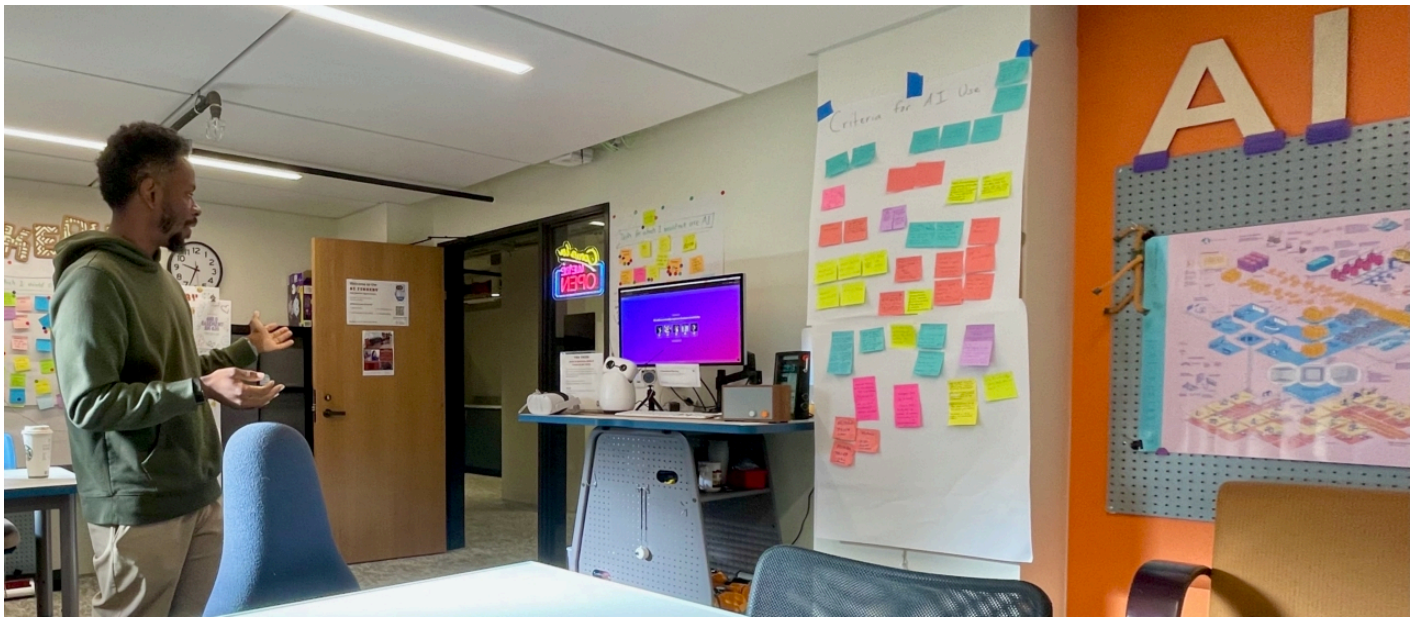
Visiting Microsoft Mountain View Campus

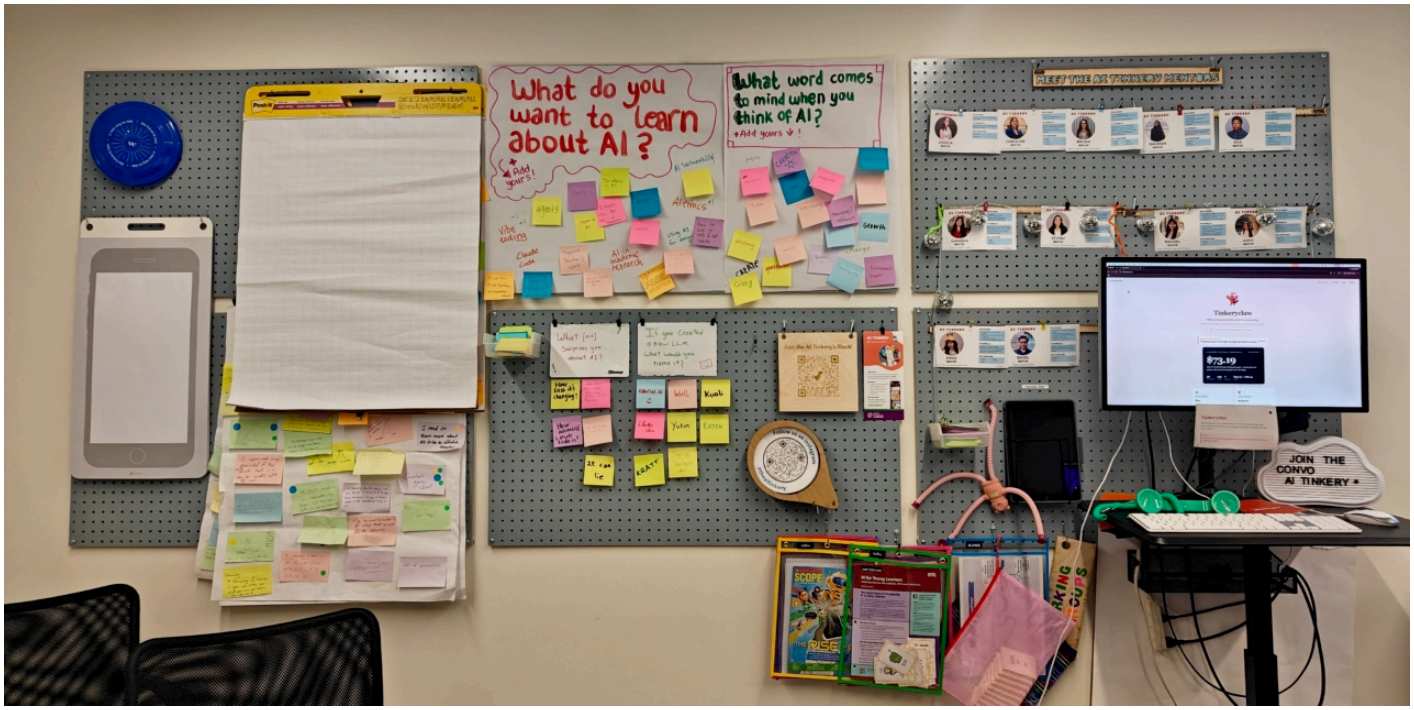


Interactive exhibits at the Exploratorium



Embodied cognition – seeing like a bug, bat, and frog, with masks and artists at the Exploratorium





Stanford Graduate School of Education – Greg Wilson's AI Tinkery



Maiken, Connie, Dorte, Katrine H, Katrine B

Some personal comments and notes

The week brought forward again for me the efficacy of performance as a frame for understanding science, and the vitality of four related concepts in building knowledge – **itinerary – studio – scenario – re-configuration**.

Concepts

To conceive science as performance is to direct attention to the dramaturgy (plots of experiment, discovery, persuasion), to the choreography (the movement of actors and agents in the drama of science), the props and costumes (instruments, protective clothing), and to the staging (the institutional epistemic environments of lab, studio, field).

Specifically this week we explored four components of this onto-epistemic model:

Itinerary – studio/lab – scenario – re-configuration.

Itinerary – one moves through a field of interest. Our plan this week was for peripatetic visiting. For me, itinerary has always been such a central feature of theatre/archaeology (defined as the rearticulation, the reconfiguration of remains as real-time event), iterative encounters, in melodies (this then this then this – syntagmatic chains) and harmonies (this and this and this superimposed – paradigmatic associations).

Studio spaces, laboratory spaces, classroom, and field are classic epistemic environments. They may be saturated with things, evidences, traces that prompt reflection; my studio is like this. They may be changing, fluid, re-configurable; the d.school studios are meant to be reset to a default after every gathering, opening them to multiple use and purpose.

And the concept of scenario. The way an environment is (re)configured is suggestive; one might ask – what might happen here, what scenario is possible? My studio offers prompts, memories, associations. A studio in the d.school offers the potential, in the invitation to rearrange props, furniture, staging, to encourage certain preferable behaviors, such as group discussion and collaboration, over introverted distraction.

Active engagement. I arranged for us all to have a special notebook for the week – Japanese accordion, so flexible in its application. Pens, pencils, colors too. That we might take note to ruminate and record. Notebooks as prompts, media to think in and through, as well as documentation and archive. Epistemic environments are always media ecologies.

Hindsight can involve personal clarity. The week took me back to my times as a high-school teacher in the 80s and the challenges of curriculum design and classroom management (scenarios). Foundational encounters with science studies in Paris in the early 90s with Bruno Latour and Madeline Akrich had me see the performative significance of Greimas's concept of actant. The itinerant conferences I curated with Mike Pearson for the Center for Performance Research (Aberystwyth) in the 1990s combined place, performance, tourism, visiting, hauntology (hosting, ghost, visitor). As department chair I oversaw the design of a modular (reconfigurable) transdisciplinary curriculum in archaeology at University Wales Lampeter. Then on to Stanford Humanities Lab – configuring projects that combined research with learning. Running design studio in Stanford d.school with Bill Moggridge, Bernie Roth, Meghan Dryer. Developing my archaeological curriculum in project-based active learning. And throughout this last 20 and more years – re-configuring my studio at Stanford for collaborative cocreating.

The argument of our book *Creative Pragmatics* for Active Learning in STEM Education is that science studies is well conceived as art/science studies – STEM (science technology engineering math) is intimately associated with the skills and competencies of arts and design. In all then, this was a week that affirmed the fertility of associating performance, art/design, science studies, and, for me, an archaeological sensibility (encounter, gathering, mediation/entropy).