

Recap Webinar 1: How do students truly learn in the lab?

On Thursday, November 6th 2025, Present-day Practicals hosted its first webinar:

☀️ How do students truly learn in the lab? ☀️

The webinar began with a brief five-minute introduction of the organizers. Following this, Dr Hendra Y. Agustian from the University of Copenhagen explored the core pedagogical value of hands-on laboratory work, moving beyond the simple assumption that "hands-on" is enough.

Topic of this webinar

The central question addressed was: **How do actions and thinking link together when students learn in the lab?** Dr Agustian introduced the concept of "embodied epistemic cognition," which explores how the mind and body combine to build understanding in the lab.

The webinar focused on two key domains:

- **Embodied Cognition:** How students use their bodies in lab learning (Physical, Phenomenological, Ecological, and Interactional aspects).
- **Epistemic Cognition:** How students think about knowledge and knowing in science, including judging results ("Is this good?") and their own understanding ("How do I know that I know?").

Interaction with the international audience

The diverse audience of this webinar included participants from many different countries. Dr Agustian's presentation included interaction with the audience via a chat question and two breakout room discussions.

✓ Chat question: What makes lab learning special?

According to the audience, the core "specialness" of lab learning lies in its ability to transform and integrate knowledge and skills in a way that traditional lectures cannot.

☀️ The lab where students stop *hearing* about science and start *doing* it. ☀️

- **Bridging the gap:** It takes abstract, theoretical concepts and makes them concrete and real.
- **Doing real science:** It forces students into the messy, unscripted reality of the scientific process, beyond just following a recipe.
- **Active, embodied learning:** It is an active learning environment that builds complex, real-world skills and results in profound moments of understanding.

- **Career-ready experience:** It directly connects academic knowledge to professional careers and industry expectations.

The interactive phase continued with two rounds of breakout room discussions.

✓ **Breakout round 1: How do students use their bodies while learning in your lab?**

Participants shared examples like *feeling how much pressure to use* when handling pipettes, the subtle muscle memory required for *loading a gel or streaking agar plates*, and the difference between watching an instruction and the *practice of wearing gloves*. This discussion underscored that students truly learn with their bodies.

✓ **Breakout round 2: Which of these ways of engaging the body in knowledge co-construction did your students use?**

This discussion was based on two frameworks presented in the slides:

- **7 ways bodies play a role in lab learning:** Practice technical skills; Use senses to guide actions; Be aware of positioning and space; Use instruments to assist thinking; Gesture to explain or solve tasks; Divide tasks and thinking together; Support each other through hands-on help.
- **8 ways students think about knowledge and knowing in science:** Frame concepts and theories; Generate hypotheses/questions; Design experiments; Evaluate data; Explain results and build arguments; Validate findings; Acknowledge uncertainties; Collaborate and communicate.

The break-out room discussions led to two examples of **embodied epistemic cognition**. Dr Agustian explained how two dimensions intertwine:

- **Hands and minds intertwine:** When evaluating a chromatogram, students assess the physical separation of peaks (embodied experience) to determine if the resolution was "good" enough to proceed with analysis, thereby evaluating data and validating findings based on the criteria for their experiment.
- **Cognition and emotion intertwine (learning from mistakes):** Student quotes illustrated that errors that "stick" are often the most beneficial learning experiences, confirming a deeper understanding of the procedure.

Key take-home messages

Dr Agustian provided actionable advice for enhancing student learning in the laboratory:

- **Design lab experiences** that explicitly engage both the epistemic (how students think about knowledge) and embodied (how students use their bodies) dimensions of learning.
- **Provide opportunities** for students to engage in authentic scientific practices, such as experimental design and critical data evaluation.
- **Facilitate reflective practice** using prompts that help students connect their physical, hands-on experiences to their conceptual understanding of scientific concepts and procedures.

Additional input from the audience

Lab Pods at Imperial College London are year-long practical modules in biomedical degrees, anchored on authentic research. They provide students with time and support to master experimental techniques and professional skills by engaging with productive failure. Ana Costa-Pereira emphasised how this discovery-based immersive approach fosters academic and personal growth and helps students develop their professional identity.

Wrap-up: Enroll for the next webinars and/or a session about LabBuddy!

The webinar concluded with a **wrap-up by the organizers** and an invite to enroll for upcoming webinars in the Present-day Practicals series and a special LabBuddy session.

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| ➤ Refocusing labs: from cookbook to open inquiry | Tue 02/12/'25 |
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See you soon!

On behalf of the organizers

** LabBuddy provides an e-learning solution to support students in preparing before the start of the practical work, while working in the lab or field, and to guide them during the processing of their results after the practical work. Visit the website for more information, <https://www.labbuddy.net/>.*