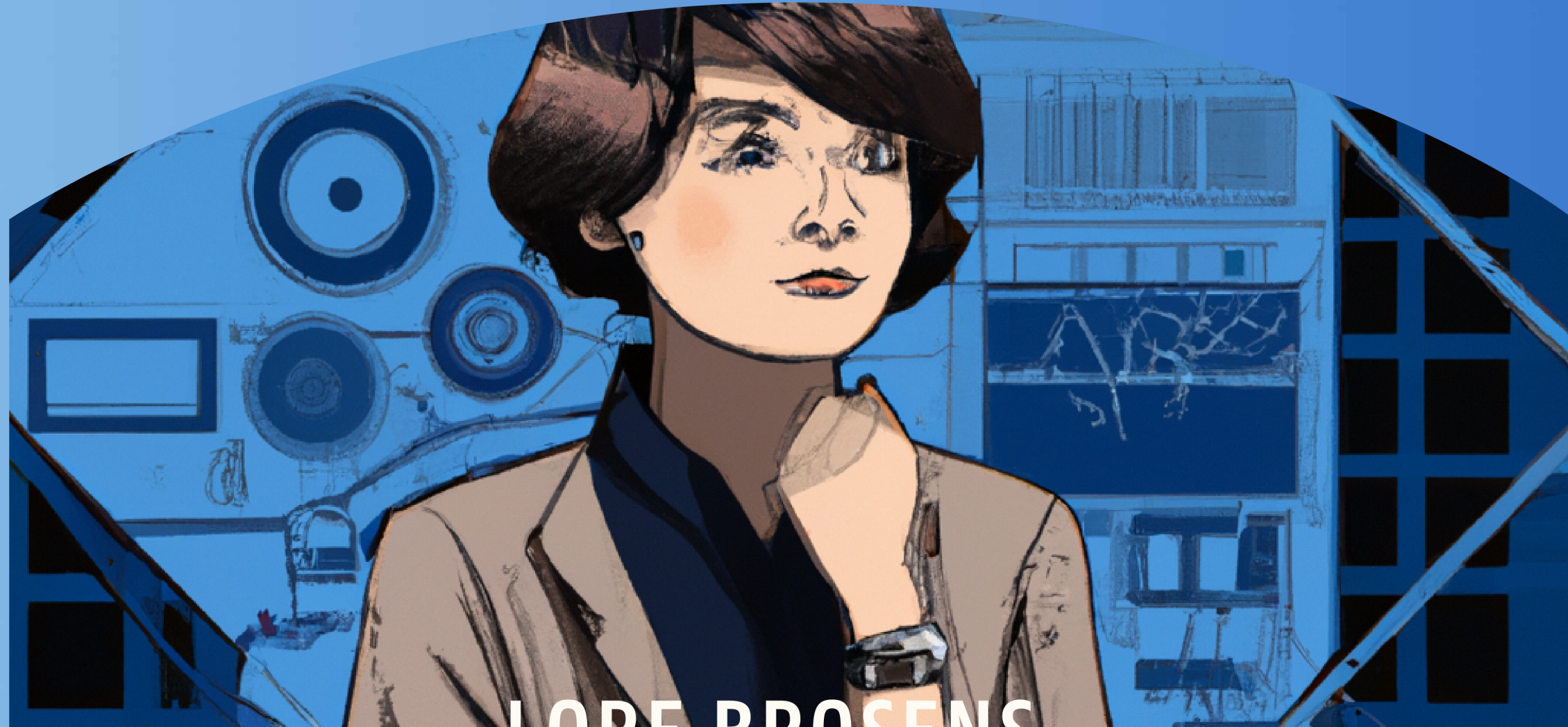


FUTURE PROOF ENGINEERS



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ARBEIDSMARKT

Tja, wat doet een ingenieur eigenlijk?

U weet niet wat een ingenieur precies doet? Heel wat pas afgestudeerde ingenieurs weten het zelf ook niet goed. Omdat ze zo gegeerd zijn op de arbeidsmarkt, laten ze zich daardoor vaak klissen voor jobs die hun niet liggen.

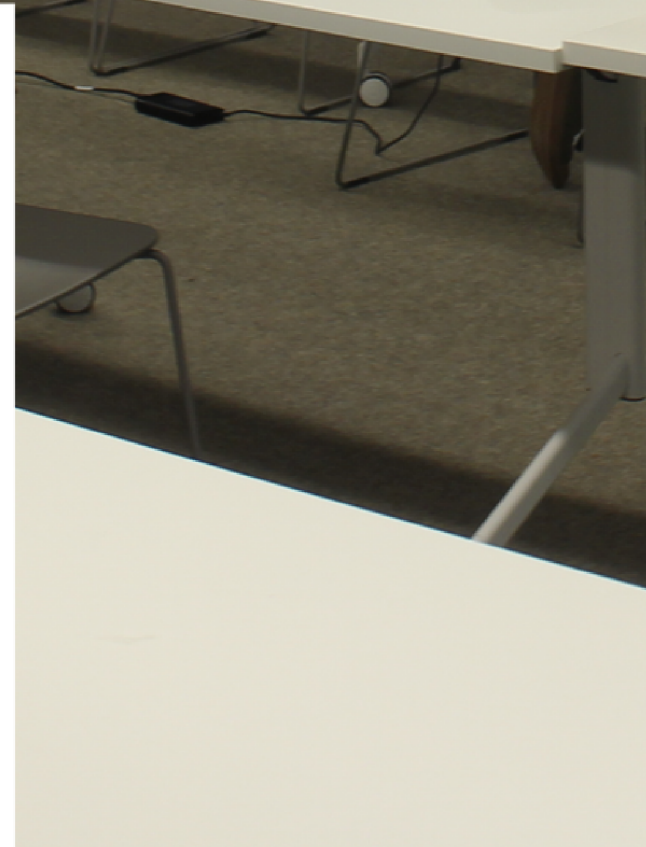
Klaas Maenhout

Maandag 2 januari 2023 om 3.25 uur

De Standaard

'As a student, I never found out about all the things you can do. The only image I had was that of a technical engineer: someone who develops or improves a machine. But that is only one of many possibilities, I now know.'

breadth of
experiences,
knowledge,
skills



depth of
discipline-specific
knowledge and
skills



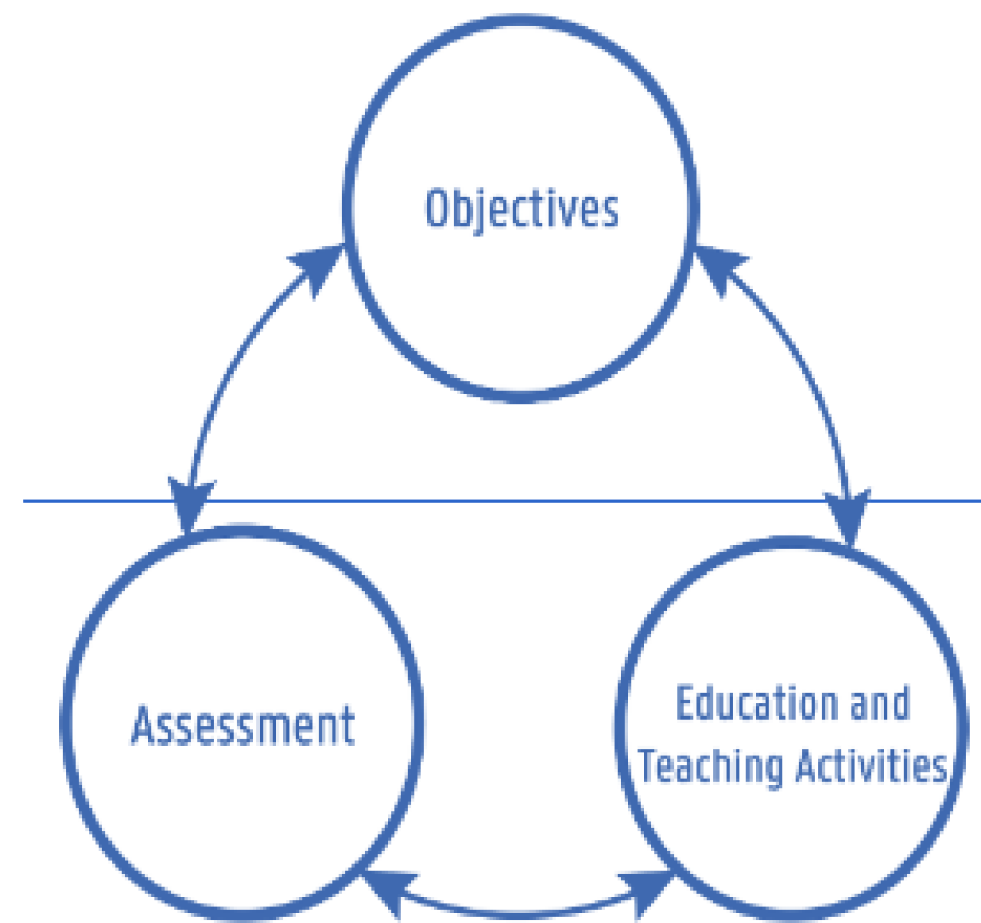
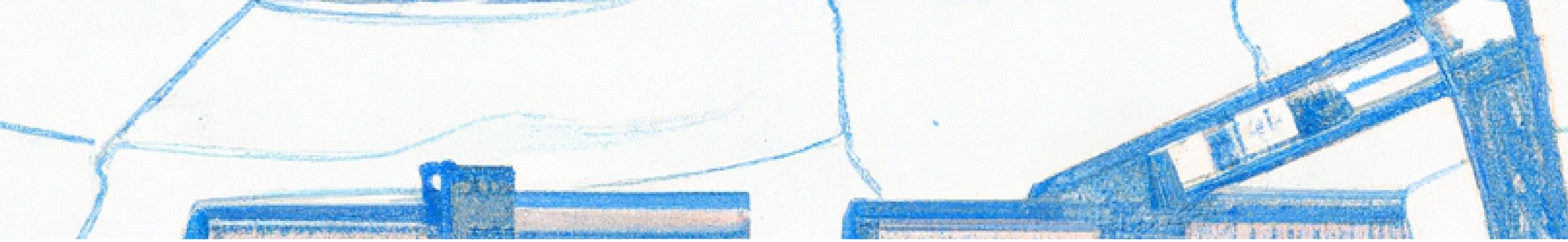
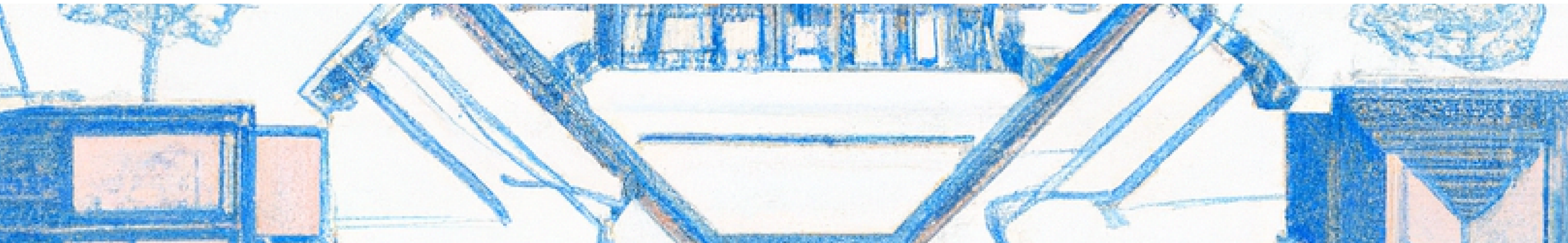


Figure 1: constructive alignment



**Who already incorporates Project,
Problem, or Challenge based education?**





Learning objective:

- Broad complex skills (like reflection, critical thinking, and life-long learning)

Education & Learning activities:

- Project/ Problem/ Challenge based education

Assessment:

- Rubric's

OPDRACHT

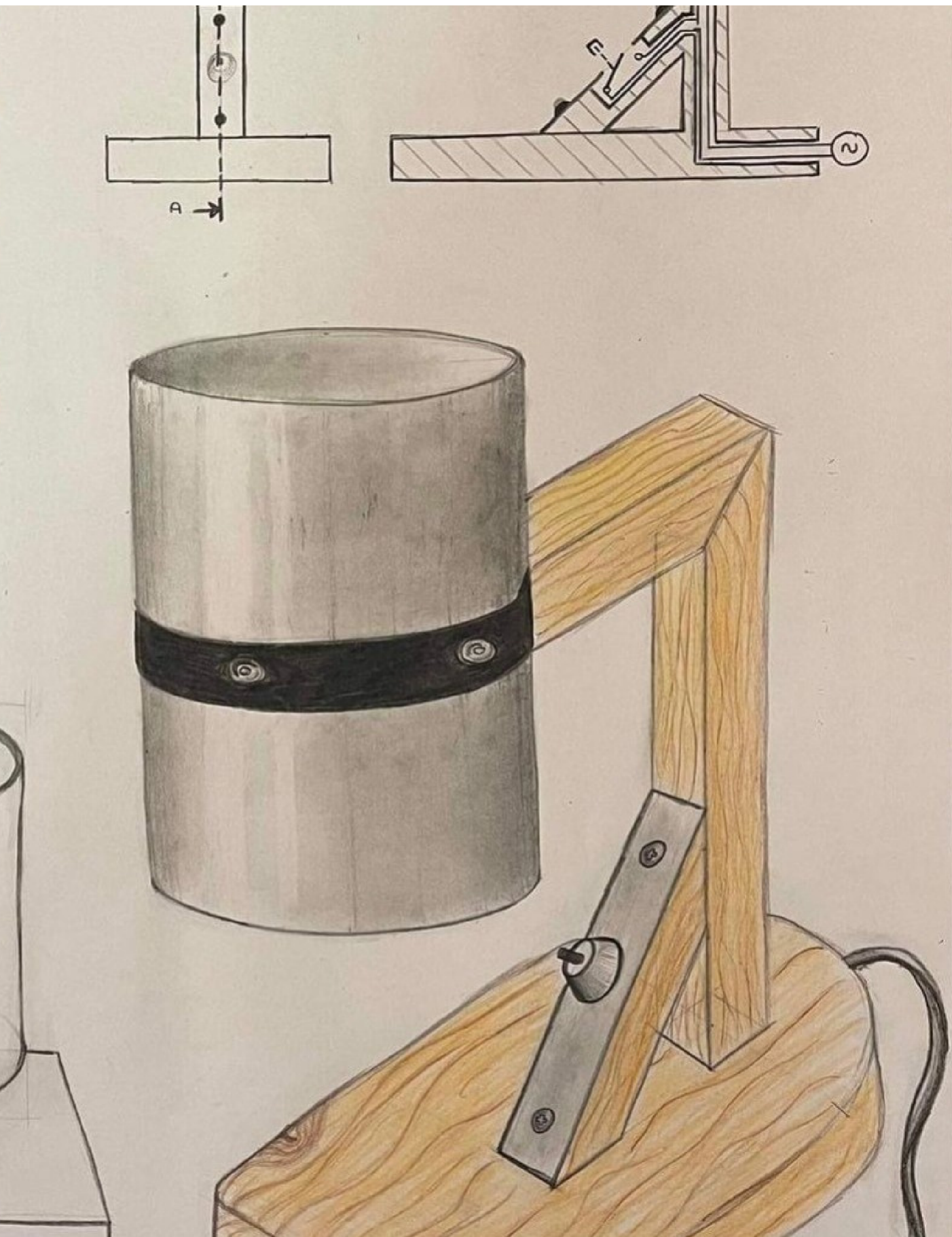
Als eerste opdracht tijdens je opleiding tot industrieel ingenieur industrieel ontwerpen ontwerp je een staande lamp.

Met deze opdracht willen je kennis laten maken met de verschillende stappen in het productontwikkelingsproces. Je start met een grondige studie van de opdracht/ probleemstelling.

De productarchitectuur van de staande lamp vormt het uitgangspunt. Deze heeft een voet, een lampenkap/ diffuser en een element dat beide hoofdelementen met elkaar verbind.

Als ontwerper krijg je verregaande vrijheid in de manier waarop je deze elementen vormgeeft. We stellen wel enkele voorwaarden.

- Gebruik verschillende materialen;
 - resthout, kunststof plaat, aluminium plaat.
 - Kunststof of aluminium mag een decoratieve functie vervullen. De overige materialen moeten een structurele functie hebben.
- Verplicht gebruik van een aantal machines. Vergeet dit niet toe te lichten in het schetsboek.
 - Paneelzaag
 - Lintzaag
 - Schuurband
 - Afkortzaag
 - Kolomboor
- ALLE verbindingen moeten losneembaar zijn. Je gebruikt m.a.w. geen lijm of nagelverbindingen.
- Voorzie de mogelijkheid om een lampfitting of ledetrip te monteren. Je zal dus moeten rekenen



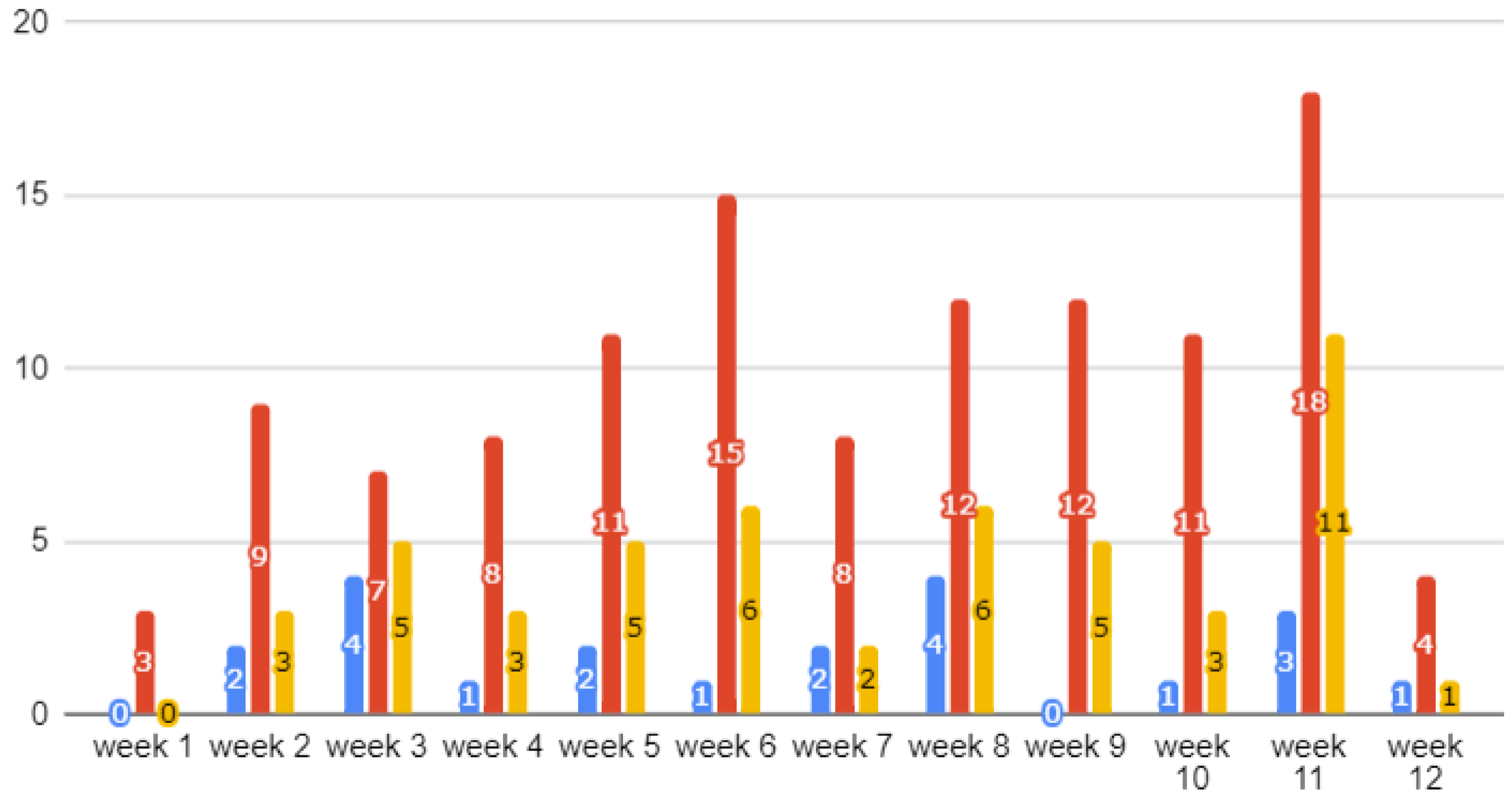




Reflection on theory

Reflection on actions

Making link between action + theory explicit



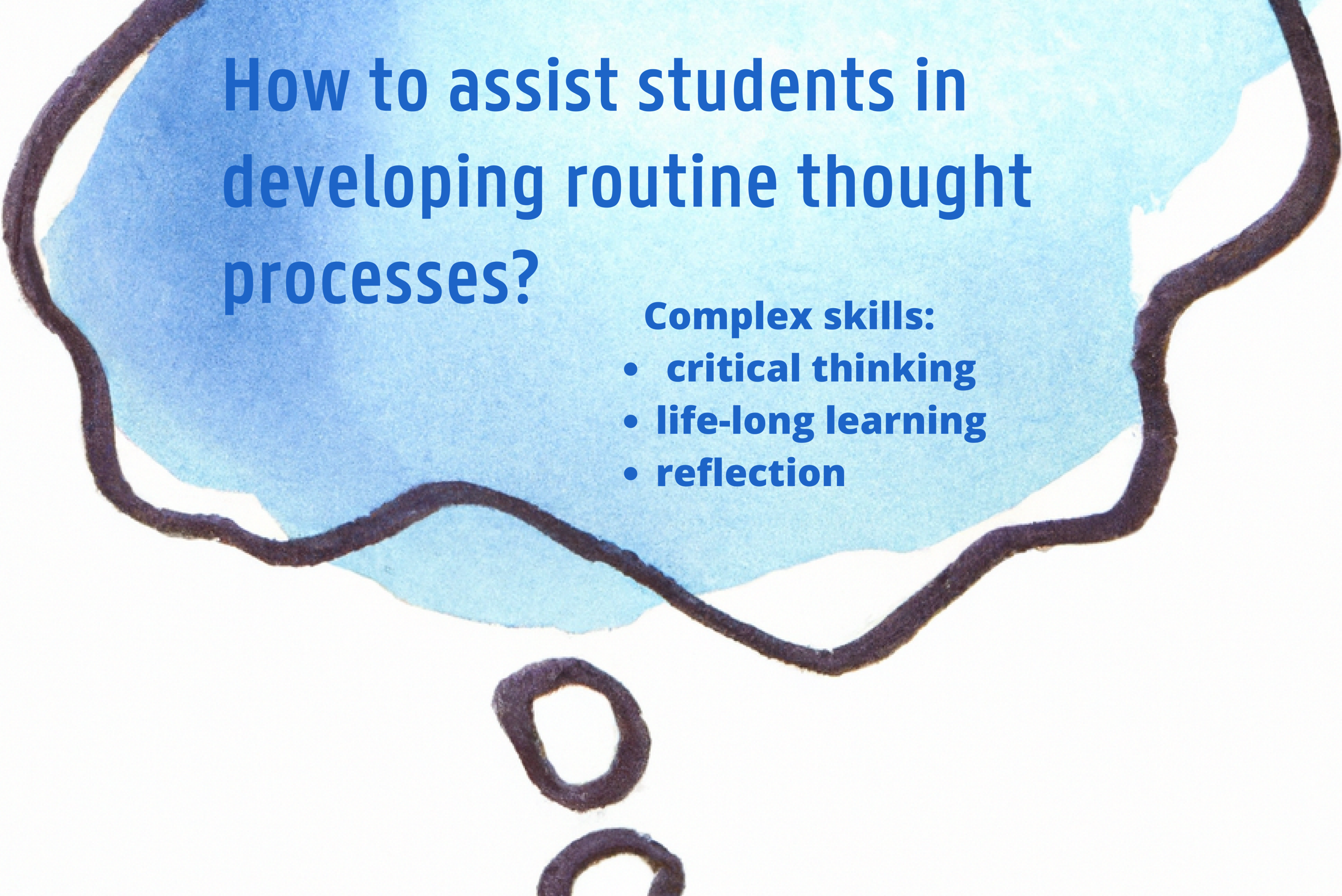
Q's of teachers during feedback:

"You remember from injection molding why you need draft angles?"

"Why would I ask that if that is a functional size?"

"So, Wizard of Oz testing, how did you apply it in your project?"

"I do not think you understood what we saw in class,
can you explain what you did here?"

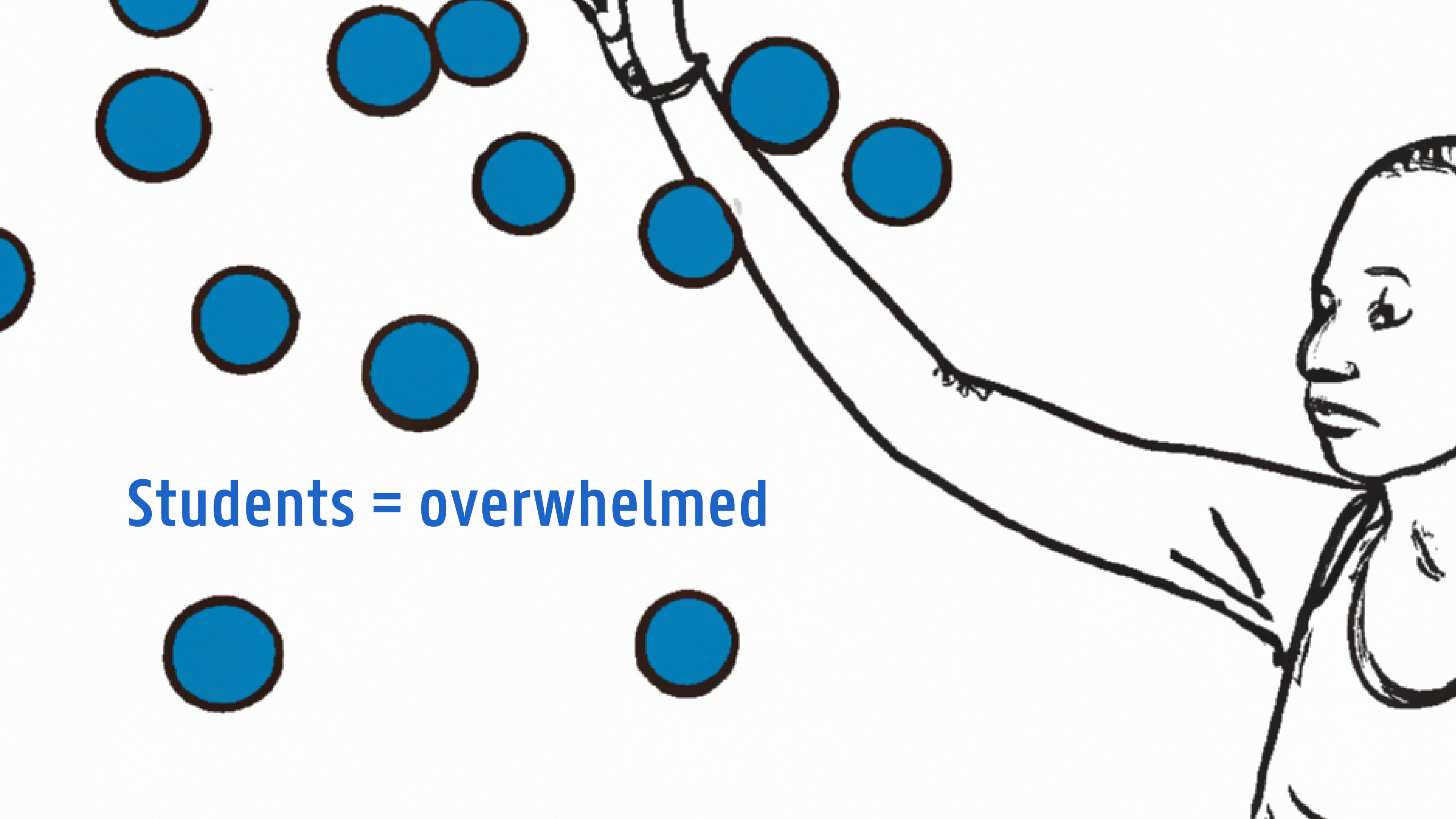


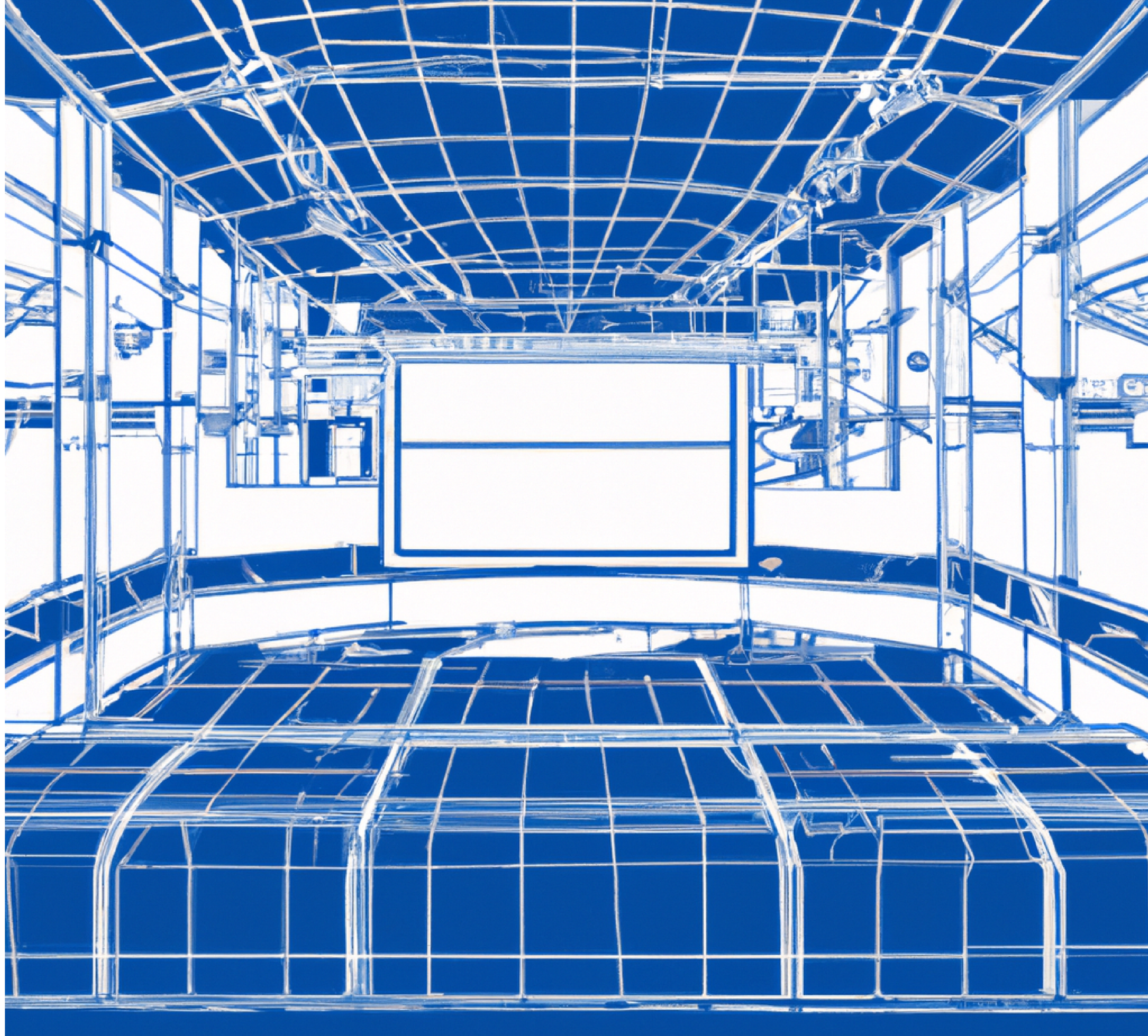
How to assist students in developing routine thought processes?

Complex skills:

- **critical thinking**
- **life-long learning**
- **reflection**

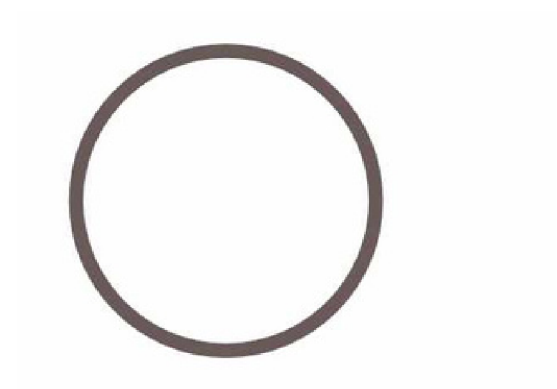
Students = overwhelmed

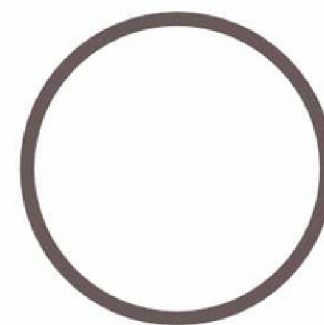
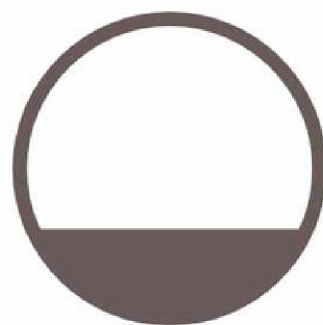
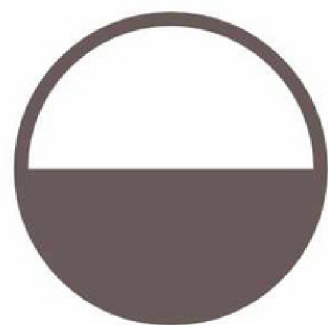




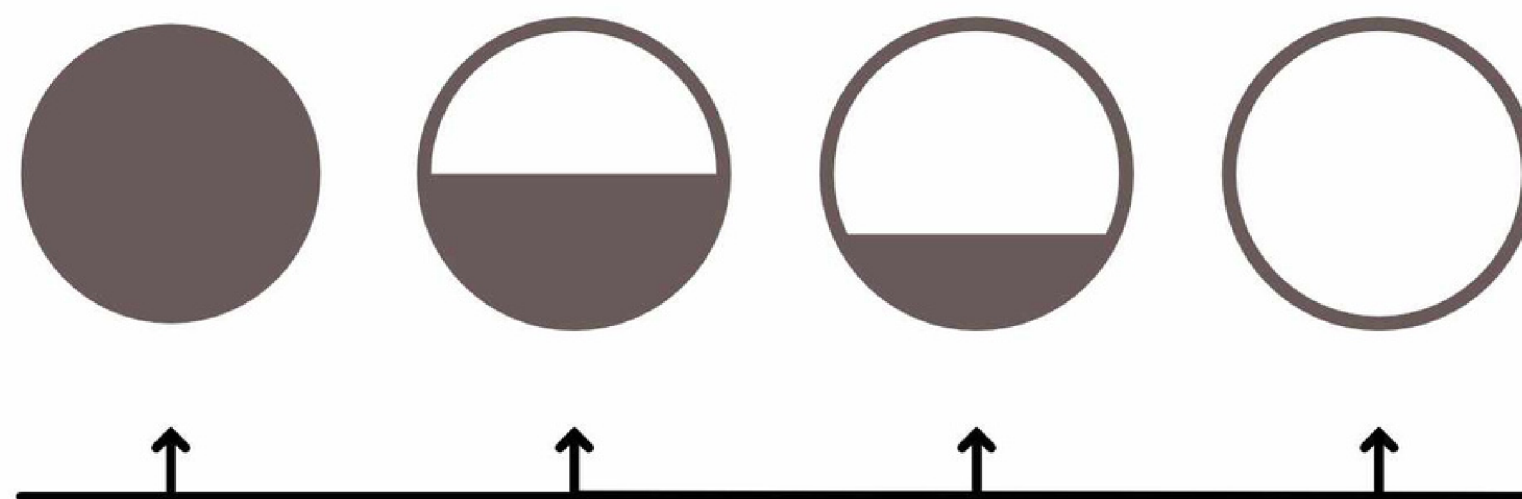
Blueprint for complex learning?

van Merriënboer, J. J. G., Clark, R.
E., & de Croock, M. B. M. (2002).
Blueprints for Complex Learning
: The 4C / ID-Model. 50(2), 39–61.



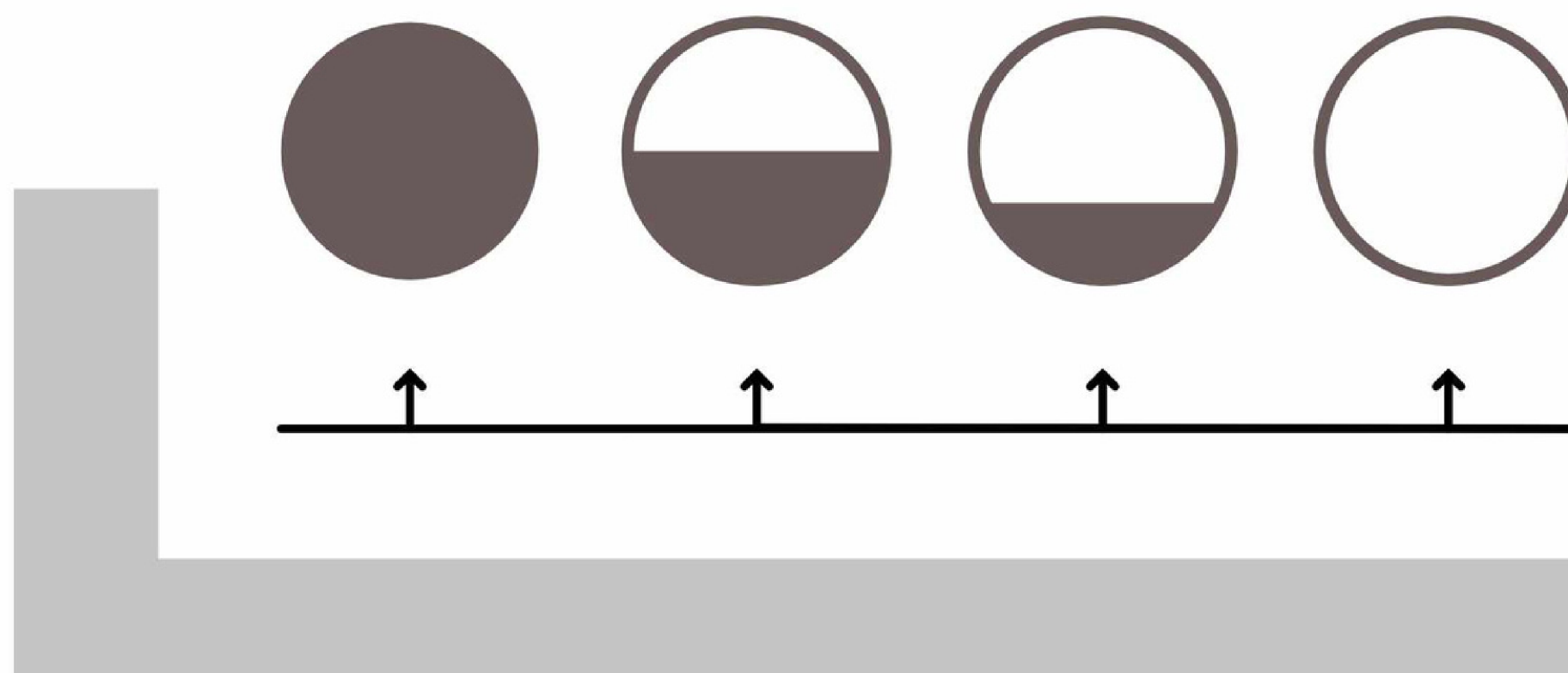


Learning tasks (a)



Learning tasks (a)

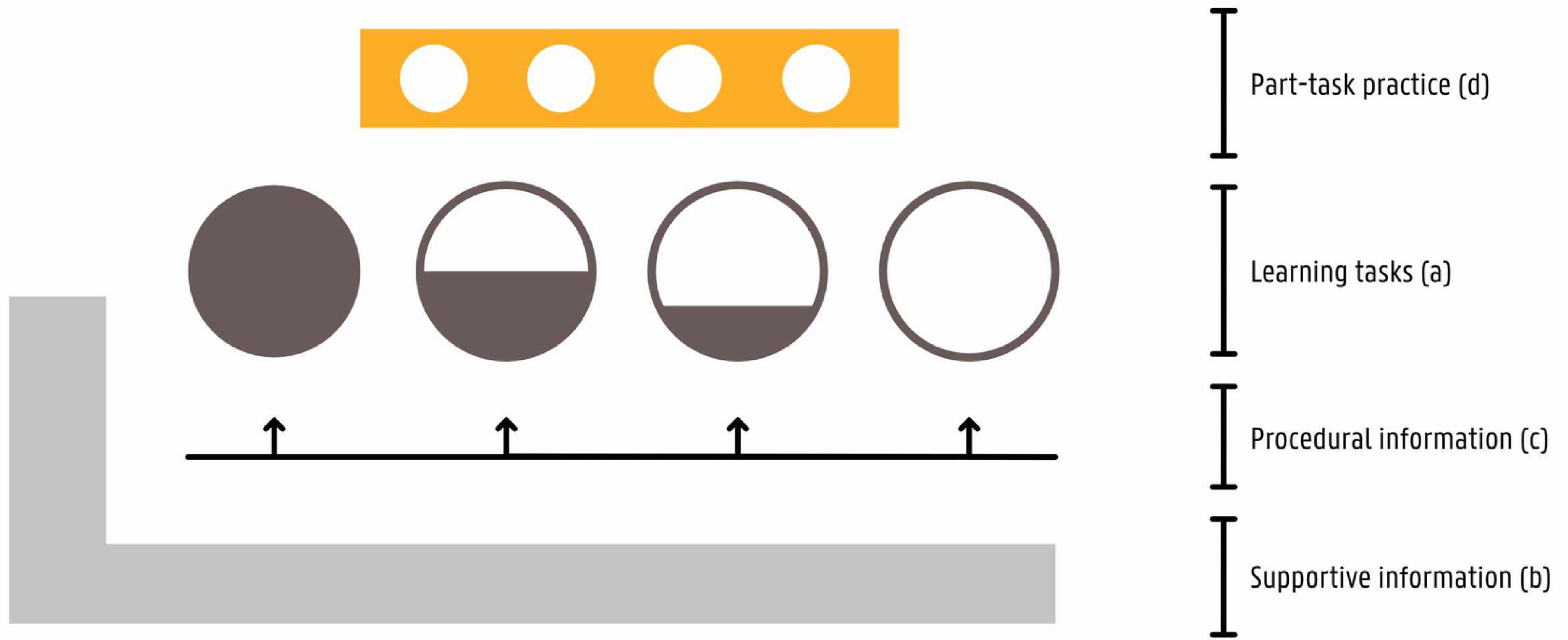
Procedural information (c)



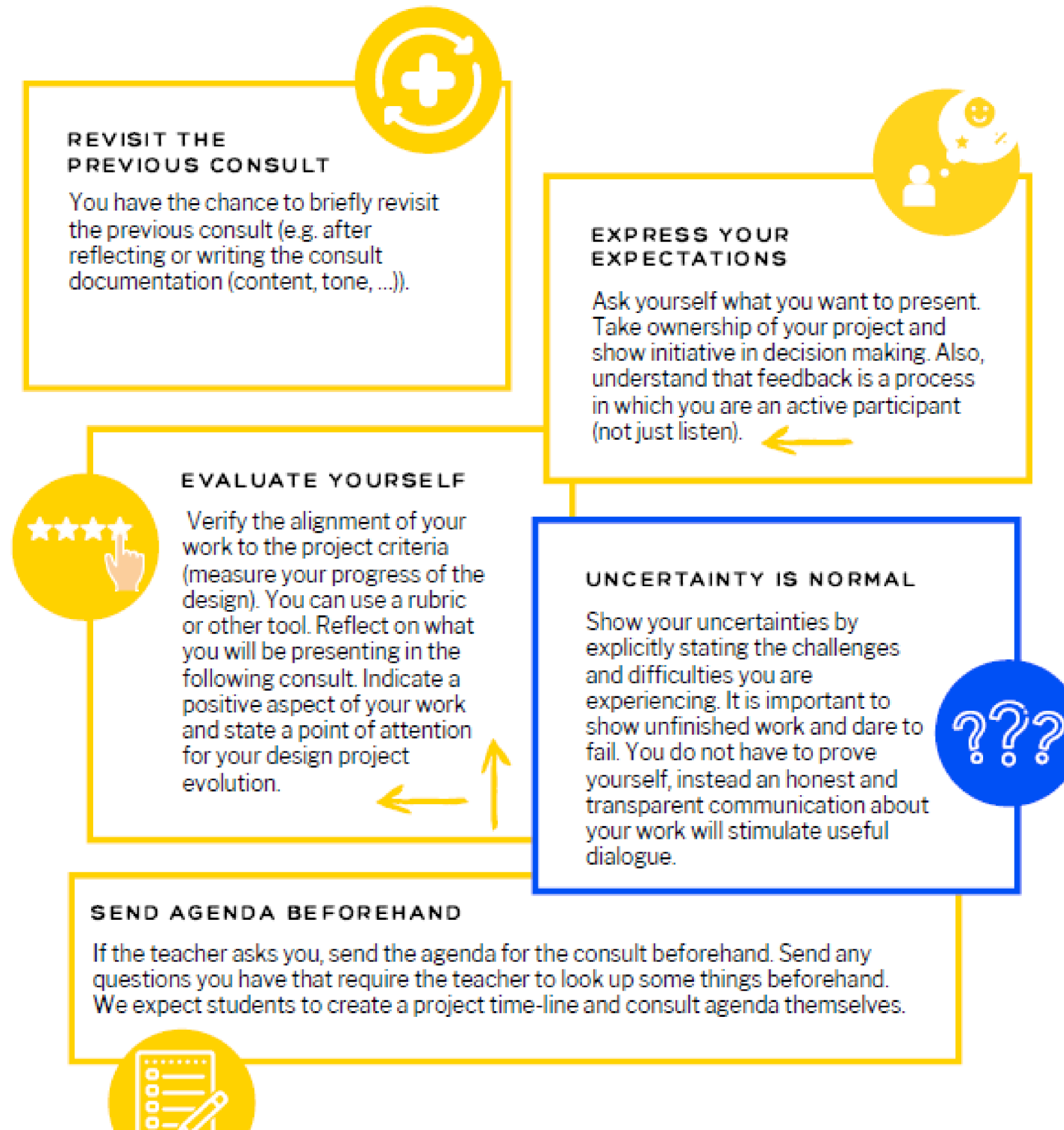
Learning tasks (a)

Procedural information (c)

Supportive information (b)



What to do before a consult?





Situation: Design of a folding bike

Automatic transport has become an everyday reality and in recent years has become increasingly more sophisticated. As a result, the popularity of folding bikes among commuters is increasing. They are the folding bike as a convenient to public transport. Despite this, many folding bikes are not optimal. At the start of the design process, these flaws and limitations, along with user experience requirements and desires, were uncovered using a number of user tests.



Concept A



Concept A - folded

- Concept A - detachable basket frame
- Positive (concept A)
 - Only one locking mechanism for the three parts of the frame
 - Very compact after folding
 - Removable bag/basket
- Negative (concept A)
 - No high performance look & feel
 - Less smooth folding motion due to three parts folded relative to each other

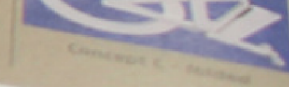


Concept B

- Positive (concept B)
 - Removable integrated case
 - Clear tray function: the bicycle can be pulled by the saddle when folded
- Negative (concept B)
 - Not compact after folding
 - Only limited volume in the integrated case

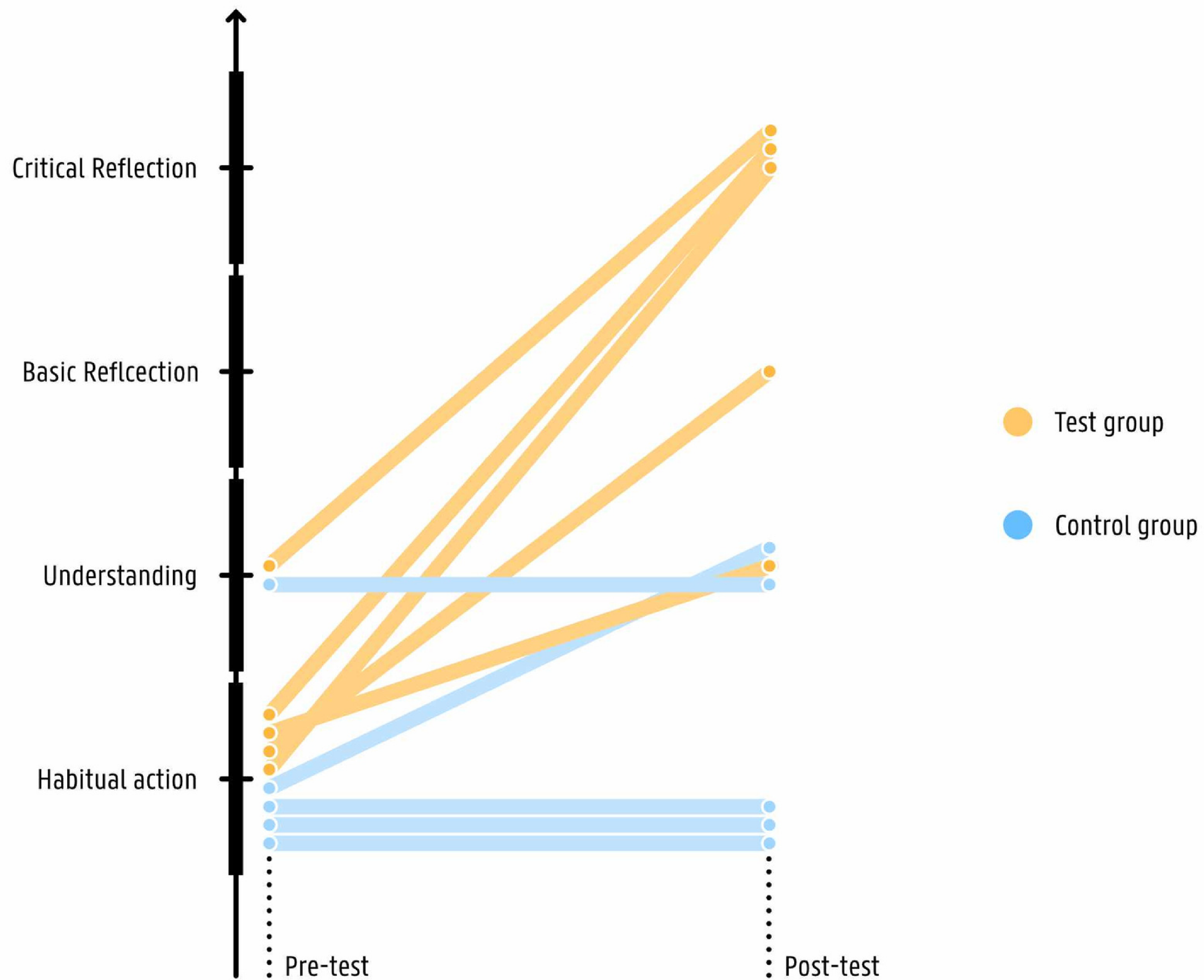


Concept C



Concept C - folded

- Positive (concept C)
 - Already compact after movement
 - When folded, the bike is pulled by the handlebar
 - Removable
 - Great look & feel
- Negative (concept C)
 - Dimensions after folding

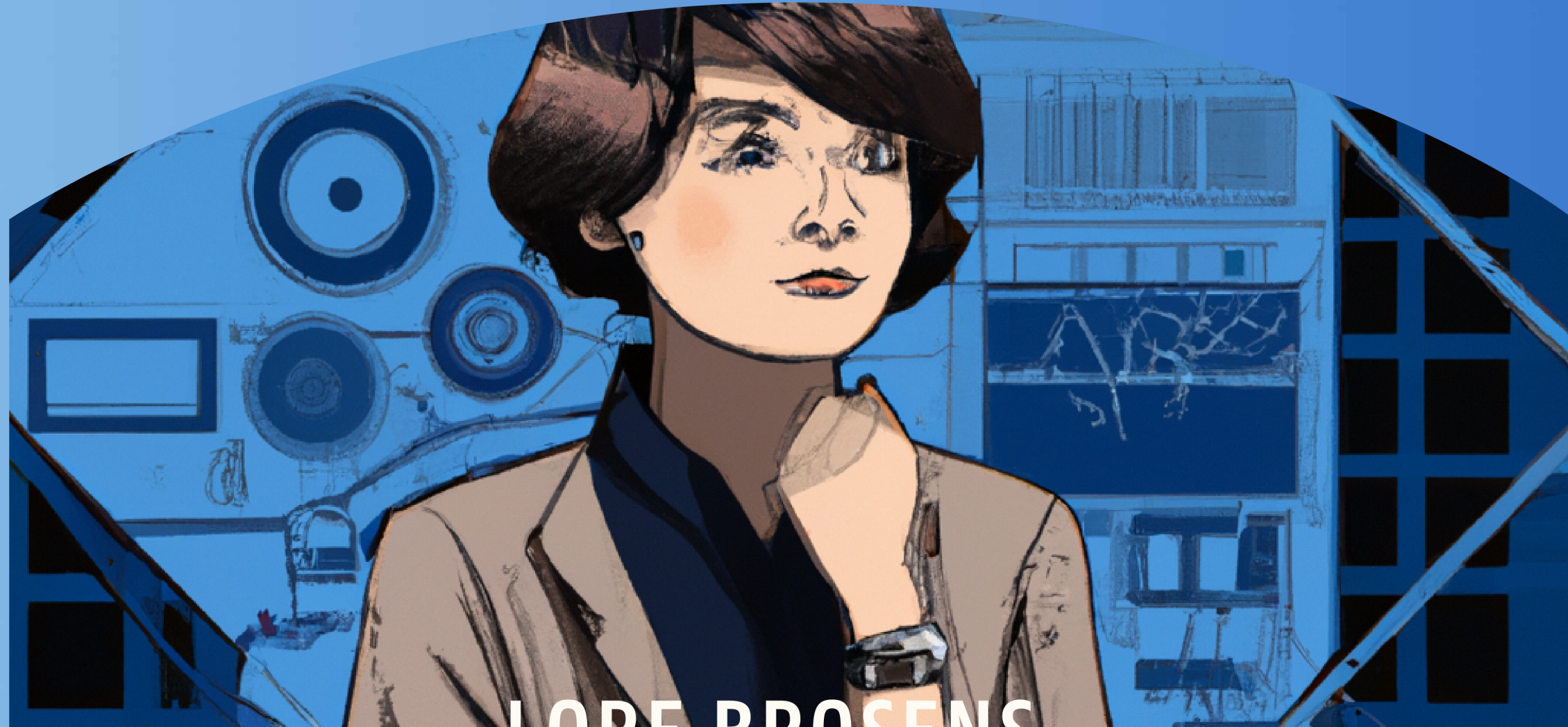




What do you think are part-task practices of engineers?

How do you think we can better assist engineers in complex skill development?

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