Learning for yourself, not for the teacher

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"The paradoxes of lifelong learning"

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Introduce yourself to a new person sitting next to you

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Discuss with your pair

What are the most important skills you have needed in your professional life?

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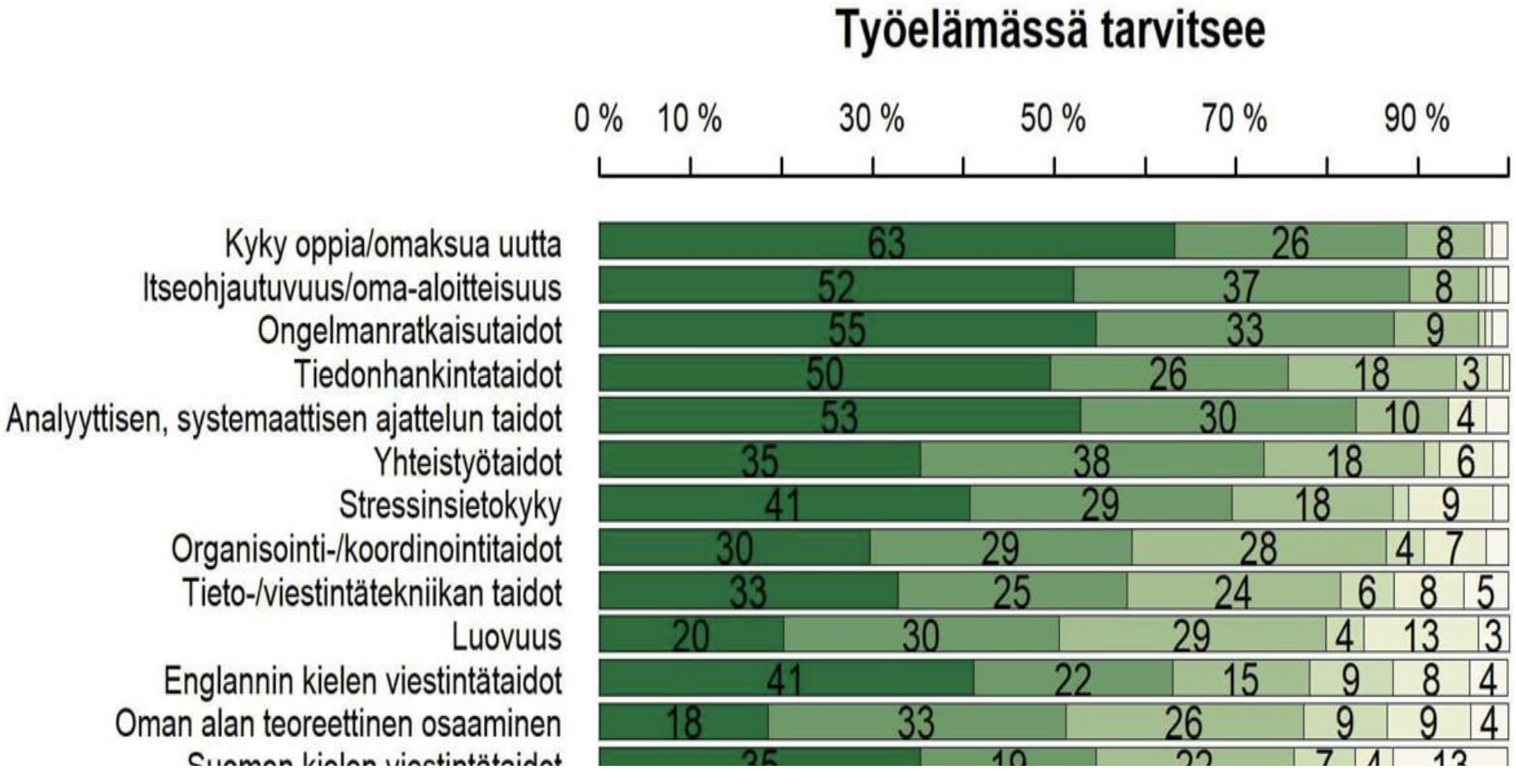
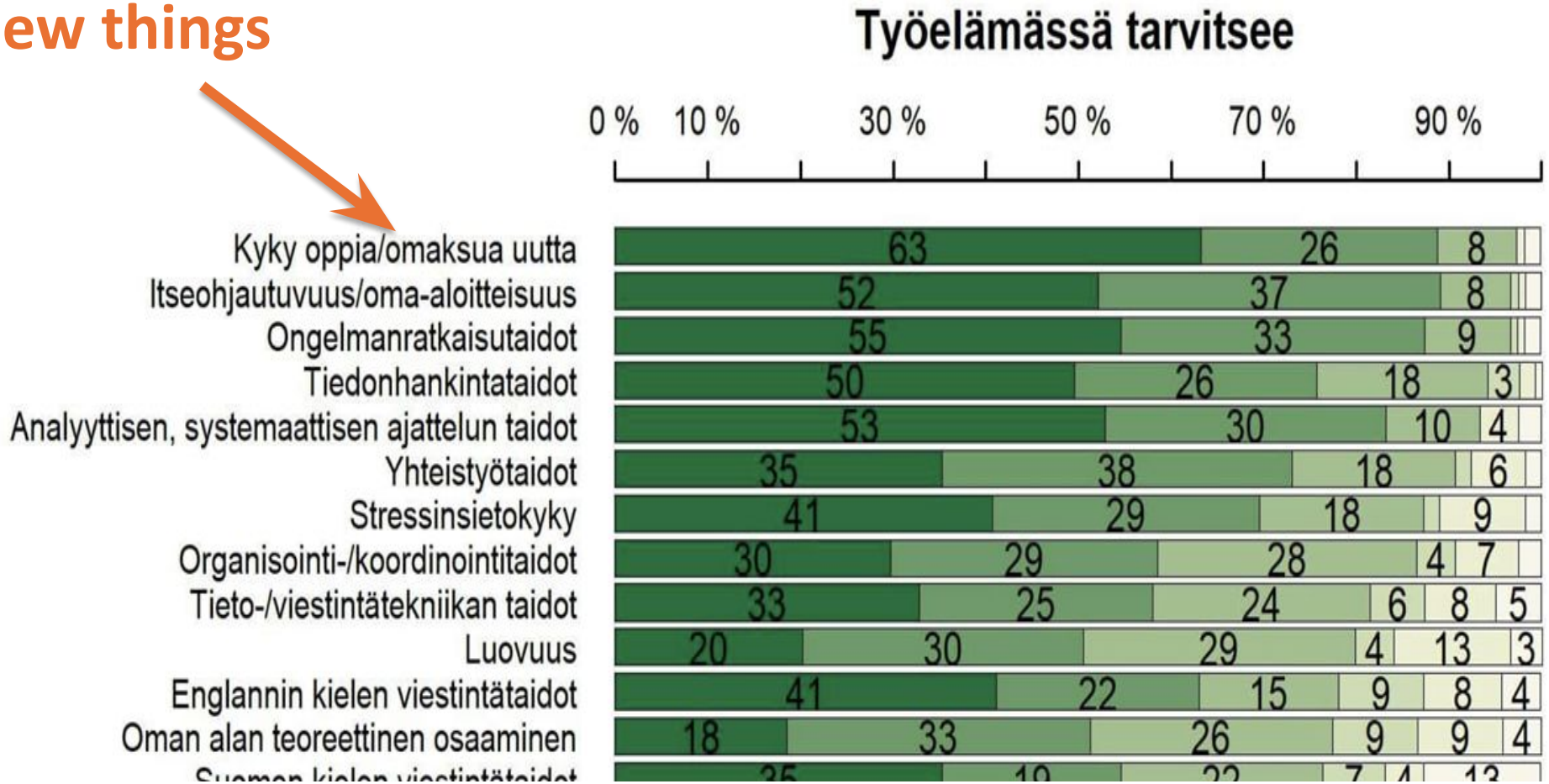
Most important skills in working life, according to Finnish alumni



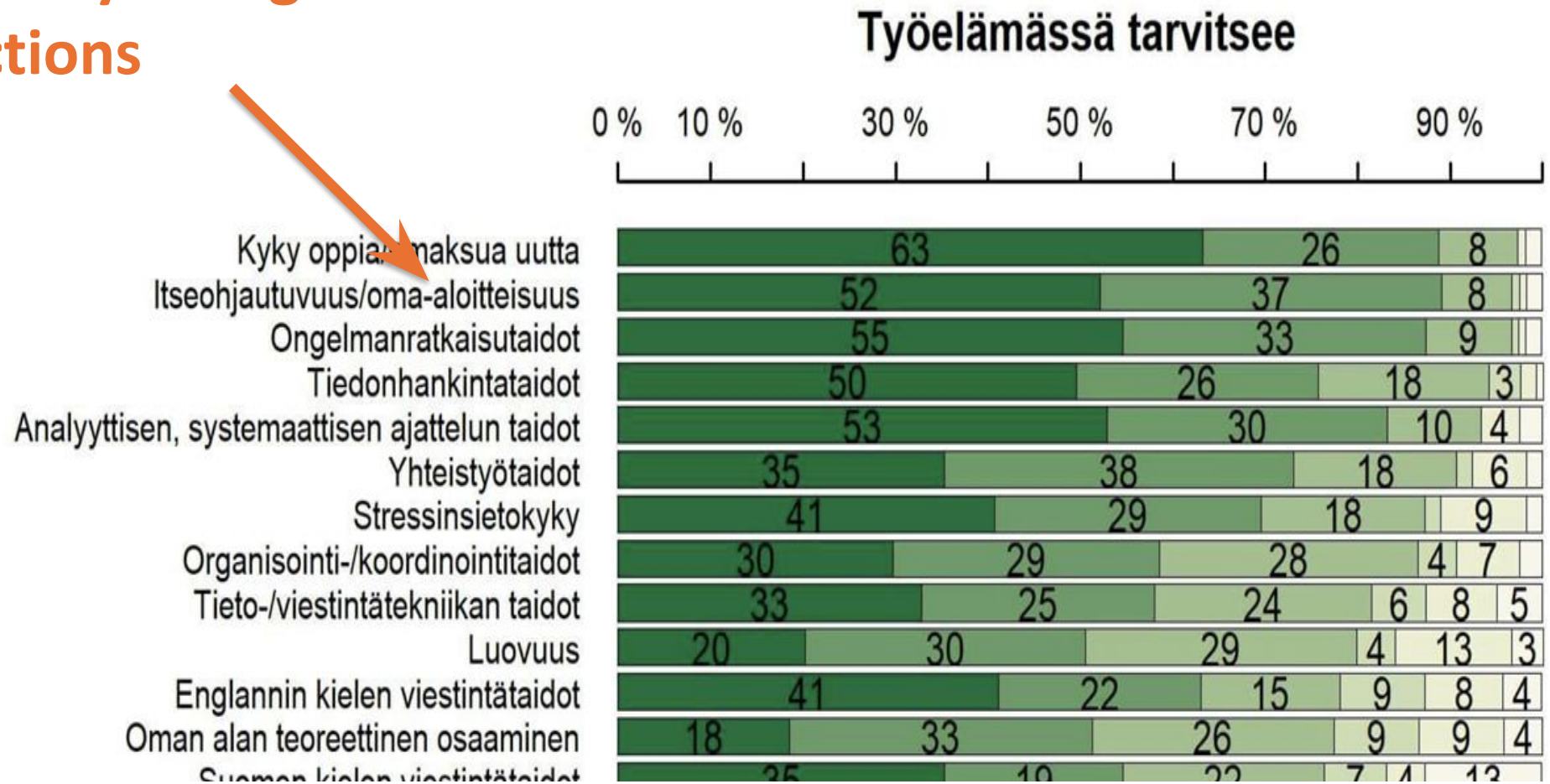
Most important skills in working life, according to Finnish alumni

Ability to learn new things



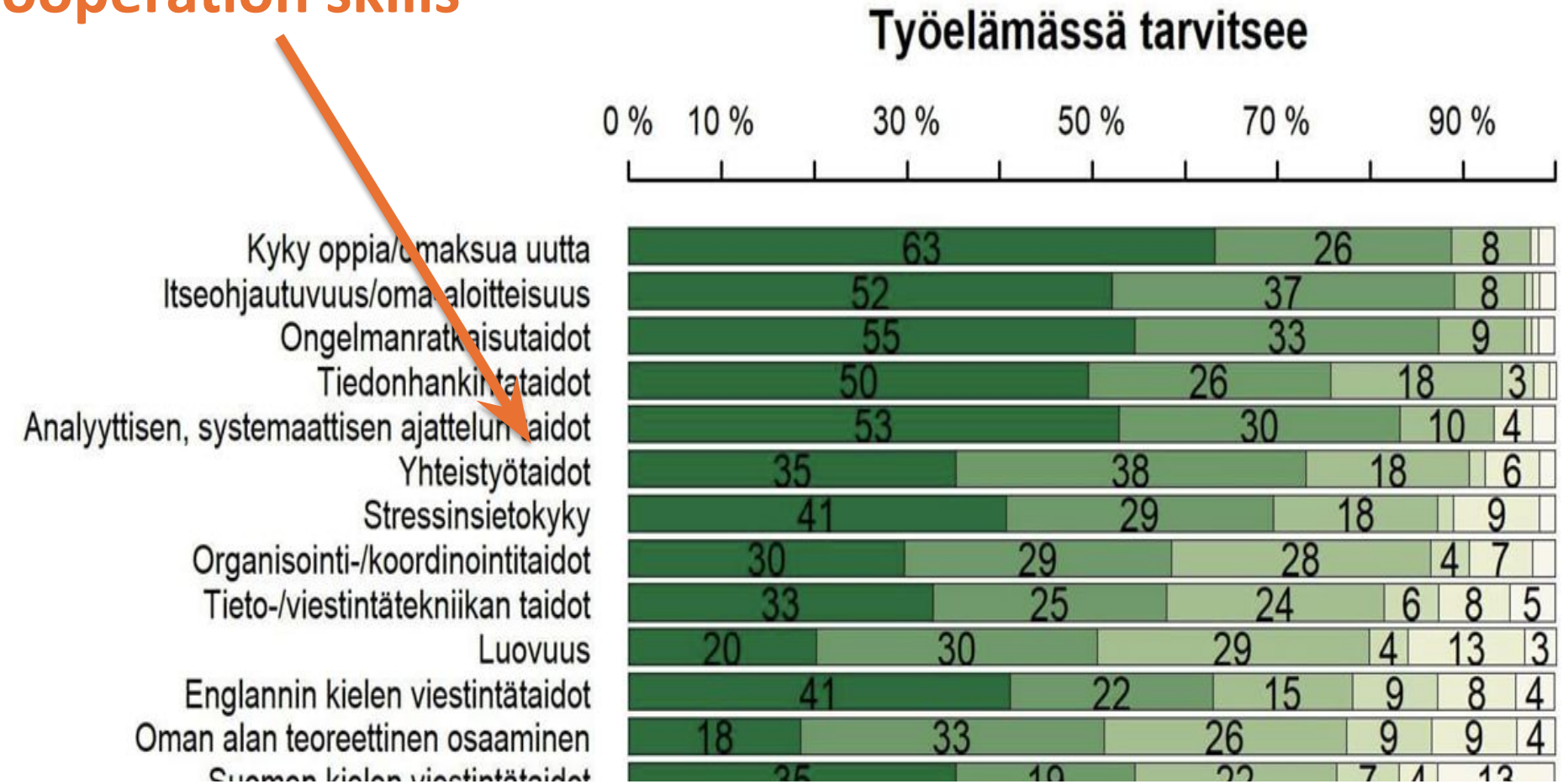
Most important skills in working life, according to Finnish alumni

Ability to regulate own actions



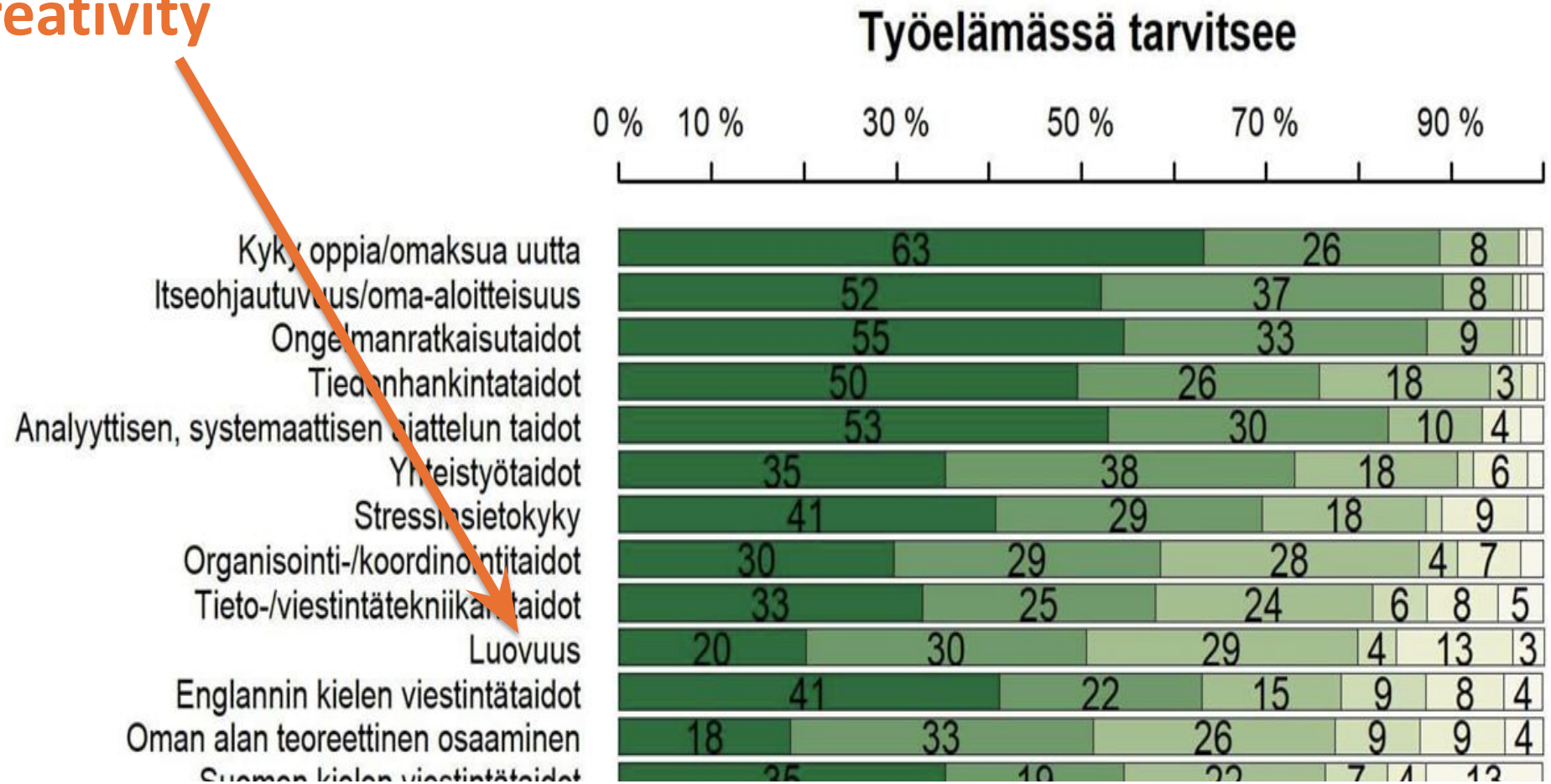
Most important skills in working life, according to Finnish alumni

Cooperation skills



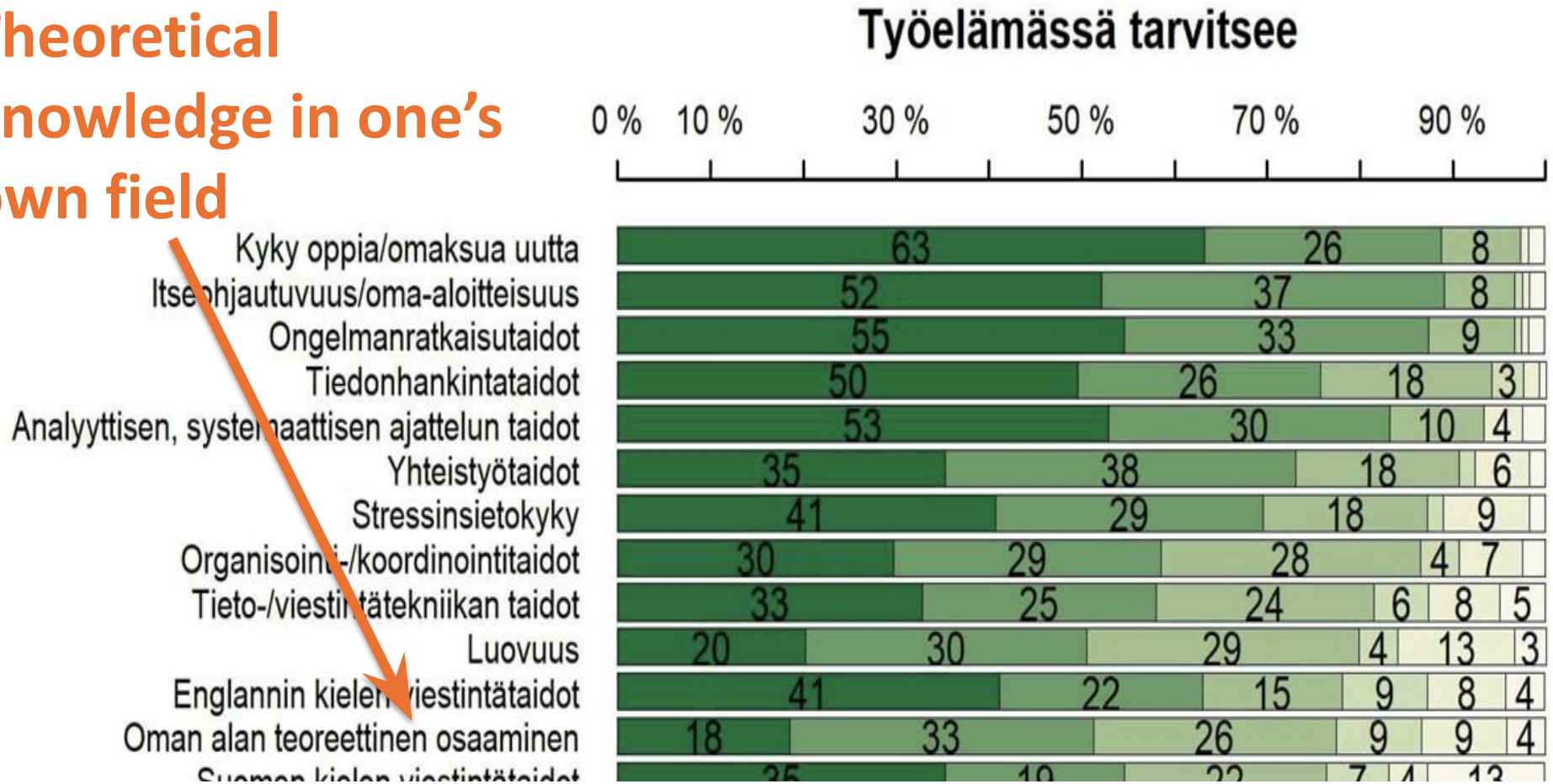
Most important skills in working life, according to Finnish alumni

Creativity



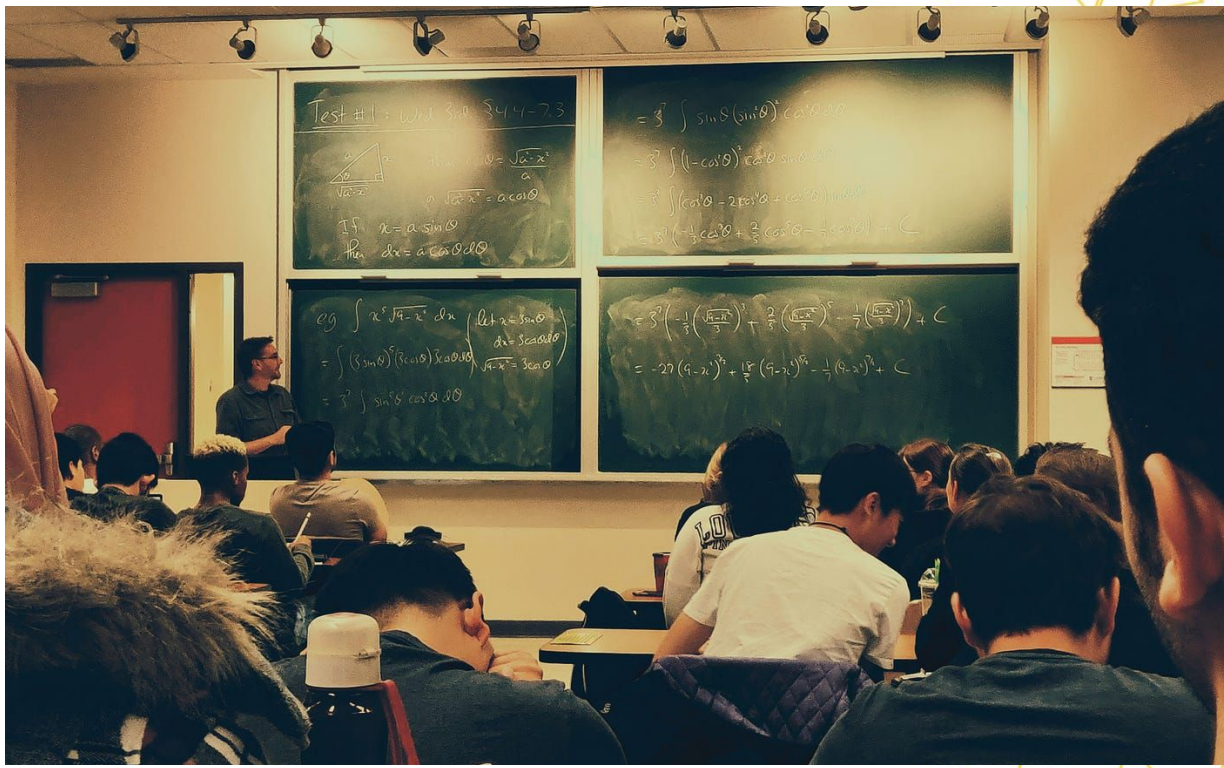
Most important skills in working life, according to Finnish alumni

Theoretical knowledge in one's own field



Traditional mathematics teaching in universities

- Lectures
- Homework
- Homework sessions
  - students take turns in presenting their solutions on the blackboard
- Assessment
  - exam



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Traditional teaching in universities

- What skills do students learn?
  - Theoretical knowledge
  - Some problem solving but also lot of memorising
  - Not enough communication or cooperation skills

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Traditional teaching in universities

- What skills do students learn?
  - Theoretical knowledge
  - Some problem solving but also lot of memorising
  - Not enough communication or cooperation skills
- What practices students take part in? Are they authentic in any way?
  - Sitting in a lecture for several hours
  - Working alone

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  - Theoretical knowledge
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- What practices students take part in? Are they authentic in any way?
  - Sitting in a lecture for several hours
  - Working alone
- What is assessed?
  - Theoretical knowledge

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Aims

A lot of development here in recent years!

- We need to teach students skills that are important to them in the future
- We need to assess those skills, not only theoretical knowledge

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Aims

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Assessment has been more difficult to change

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How have we tried to change the assessment culture?

Assessment should be viewed as a part of the learning environment

This is what our learning environment looks like:

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Extreme Apprenticeship (XA)

- Students participate in **activities that resemble those of experts**
- Based on Cognitive Apprenticeship (Collins et al., 1991)

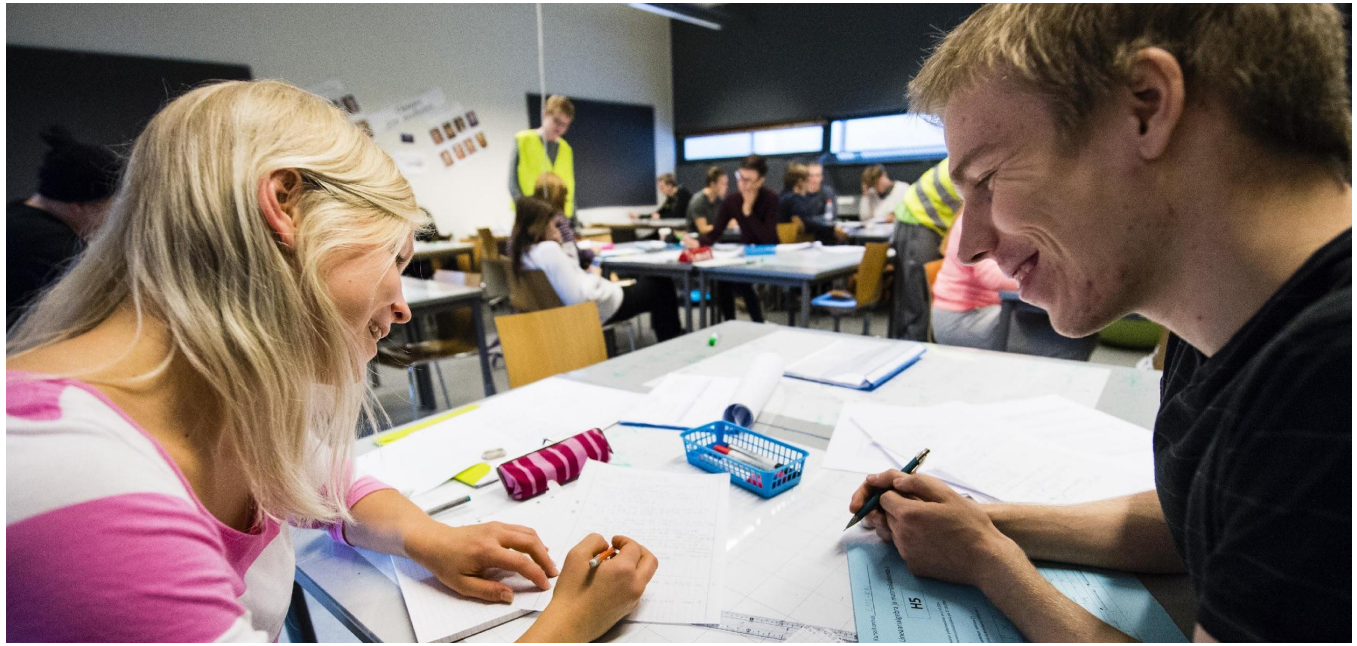


Image credit: Veikko Somerpuro

Extreme Apprenticeship (XA)

The methods scales up to courses with hundreds of students

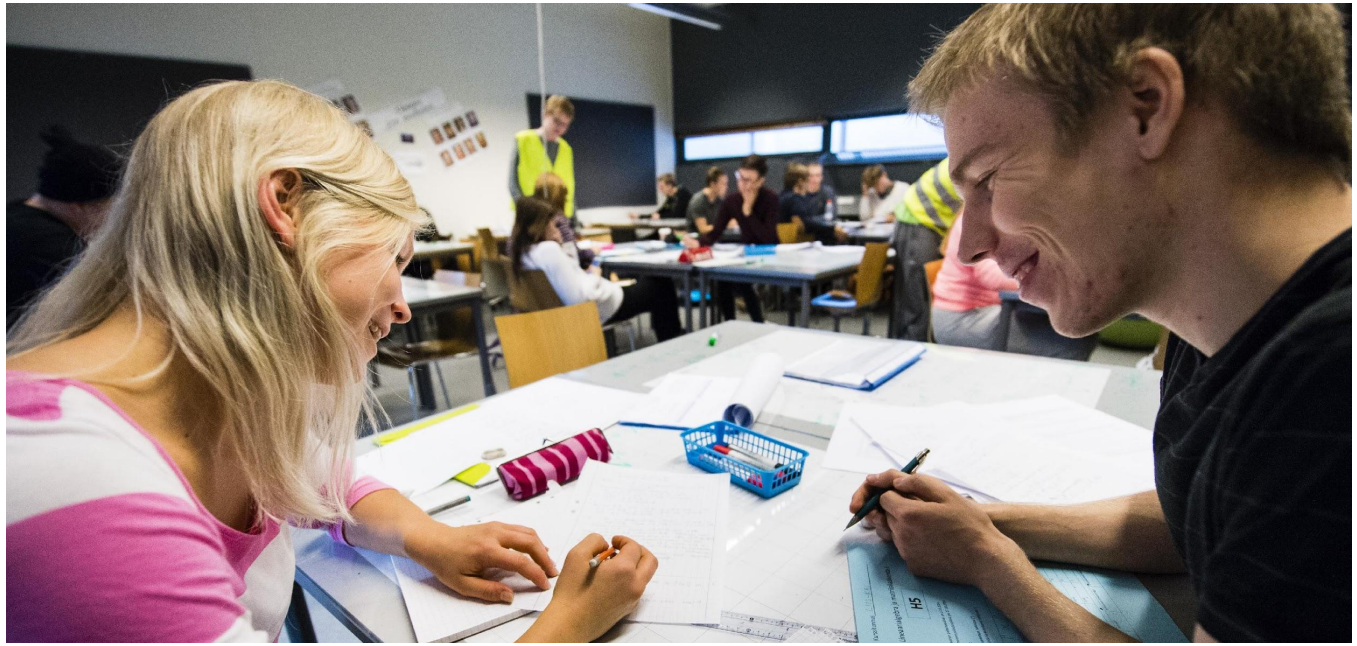


Image credit: Veikko Somerpuro

Collaborative drop-in sessions several days a week

Image credit: Veikko Somerpuro

Tutors are undergraduate/graduate students

Guide by asking questions

Model how experts work

Image credit: Susanna Oksanen

The learning space is in the main hallway of the department

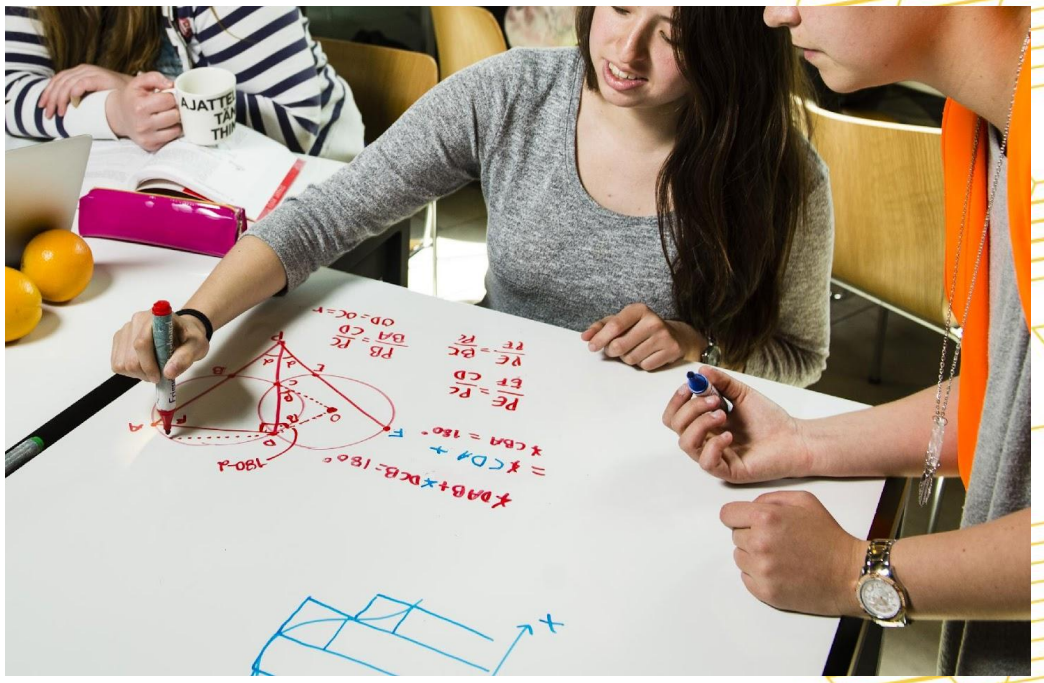
Tutor

Group of students

Professor

Mathematical community made visible and accessible to both students and professors

You can draw on all surfaces



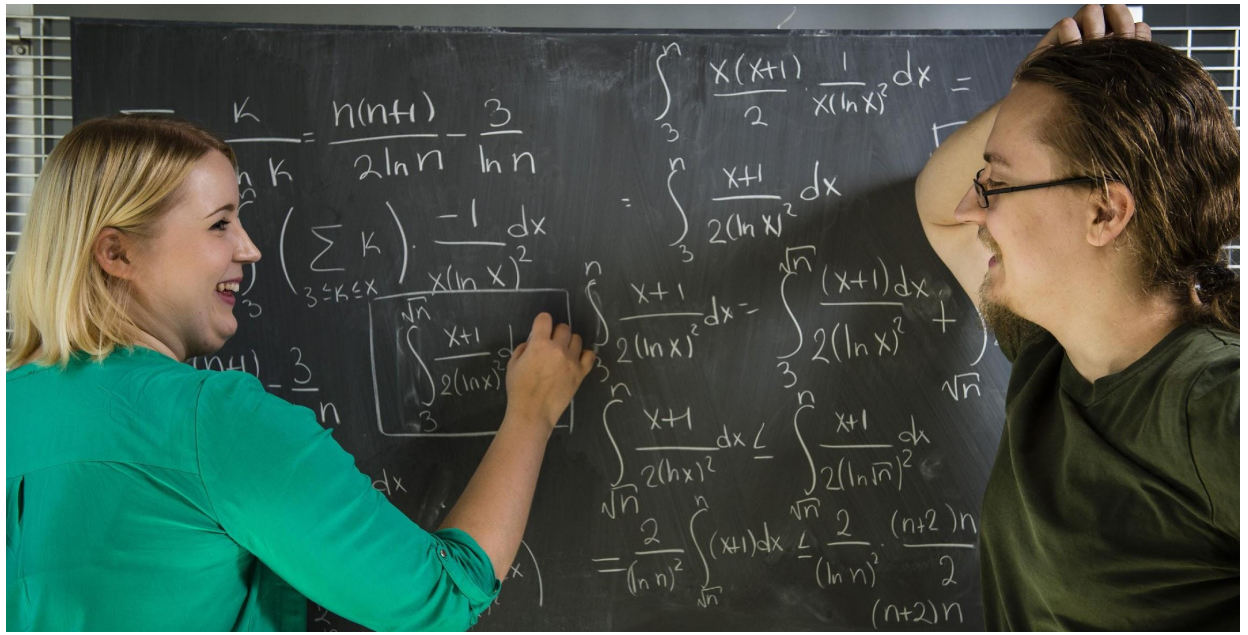


Image credit: Veikko Somerpuro

Results

Compared to traditional lecture-based teaching, the XA method supports **a better quality of learning**

- Students feel more competent
- More deep learning
- Less memorisation and fragmented learning

Lahdenperä, J., Postareff, L., & Rämö, J. (2019). Supporting Quality of Learning in University Mathematics: a Comparison of Two Instructional Designs

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Summary

- We tried to make teaching as student-centred as possible
- Low hierarchies
- Authentic practices
- Students learn skills that are relevant to real-life

Image credit: Susanna Oksanen

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Summary

- We tried to make teaching as student-centred as possible
- Low hierarchies
- Authentic practices
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But…

Image credit: Susanna Oksanen

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Assessment

One thing remained – the examination

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Discuss with your pair

- Think about a situation in which your skills have been assessed recently
- How were your skills assessed? What was the assessment method?

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Argh, why is changing assessment so difficult!

- I had 400 students in my course
- I felt that the exam was a guarantee that my students knew enough

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At the same time: “Assessment drives learning”

(George Miller)

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Assessment

- Traditional assessment has many drawbacks
  - Exam stress
  - Bulimic learning
  - “Exam strategies”
  - Challenges in producing fair exams
- Assessment has a **huge** impact on how students study

Au (2022). Unequal by design: High-stakes testing and the standardization of inequality

Räisänen et al. (2016). Students' and Teacher's Experiences of the Validity and Reliability of Assessment in a Bioscience Course

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“If tobacco smoking was invented today, it would not be permitted.”

Norman H Tiffin, 2015

Canadian Journal of Respiratory Therapy

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If our current assessment regime was invented today, would it be permitted?

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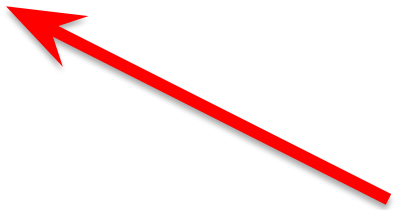

Assessment **of** learning

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Assessment **for** learning

Assessment is conducted with the intention of improving learning (Wiliam, 2001)

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Assessment **as** learning

- Assessment is both a learning opportunity and an instance of evaluation
- Students' have an active and reflective role in the assessment process

Z. Yan, & L. Yang (Eds.), 2021. Assessment as Learning : Maximising Opportunities for Student Learning and Achievement

Our solution: self-assessment

For life-long learning, students should learn to assess their current skills with respect to their goals
(Boud et al., 2010)

Image credit: Veikko Somerpuro

Context: the Finnish university education

- Teachers have full **autonomy** regarding the teaching and the assessment method
- Assessment is usually **low-stakes**
  - students can retake exams multiple times
  - grades do not play a big role in future studies or in getting a job

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DISA, Digital Self-Assessment

Häsä, J. I. A., Rämö, J., & Nieminen, J. H. (2021). Supporting quality of learning by letting students give their own grades: An innovative self-assessment model in university mathematics.

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Self-assessment is done with the support of a rubric

	Prerequisities	1-2	3-4	5
Quotient structures	I can determine the cosets (sivuluokat) of a subgroup. I can view a quotient group (tekijäryhmä) as a group and handle its elements like in any other group (e.g. determine inverse elements and powers). I know how normal subgroups and quotient groups are	I can calculate with cosets. I can, for example, determine the elements of the quotient group $S4/\langle(1234)\rangle$. I can also determine the elements of the subgroup generated by $(12)\langle(1234)\rangle$. I can view cosets as equivalence classes, and know which equivalence relation defines them. I can determine elements of a quotient ring.	I calculate with cosets fluently. I can check whether an equivalence relation is compatible with a binary operation. I know why the equivalence relation needs to be compatible with a binary operation when defining a binary operation for	I can deduce the definitions of normal subgroup and ideal from the concept of binary operation compatible with an equivalence relation.

Self-assessment is done with the support of a rubric

Content knowledge

	Prerequisities	1-2	3-4	5
Quotient structures	I can determine the cosets (sivuluokat) of a subgroup.	I can calculate with cosets. I can, for example, determine elements of the quotient group $S4/\langle(1234)\rangle$. I can also determine the elements of the subgroup generated by $(12)\langle(1234)\rangle$.	I calculate with cosets fluently.	I can deduce the definitions of normal subgroup and ideal from the concept of binary operation compatible with an equivalence relation.
	I can view a quotient group (tekijäryhmä) as a group and handle its elements like in any other group (e.g. determine inverse elements and powers).	I can view cosets as equivalence classes, and know which equivalence relation defines them.	I can check whether an equivalence relation is compatible with a binary operation.	
	I know how normal subgroups and quotient groups are related.	I can determine elements of a quotient ring.	I know why the equivalence relation needs to be compatible with a binary operation when defining a binary operation for equivalence classess.	
		I know how ideals and quotient rings		

Mathematical discussion and collaboration

I can formulate precise questions when I do not understand something.	I present my solutions to other people.	When talking to others about my mathematical thinking, I try to concentrate on the main ideas instead of technicalities.	I can summarise my solutions clearly, briefly and precisely.
I can talk about mathematics to other people.	I take part in mathematical discussions with my peers.	I give feedback to others when their solutions are discussed.	I give constructive feedback to others so that they can improve their work. I can find something positive and meaningful to say in other people's work.
	If I do not understand what other people say, I ask them to explain it again.	When collaborating with others, I listen to other people's ideas, try to undestand them and use them in our collaboration.	When discussing with other people I can take their position and feelings into consideration. I try to make the conversations meaningful to all parties.
	I collaborate with other people, listen to them and share my ideas with them.		

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Generic skills

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Part of a rubric in a mathematics course

Communication and collaboration		
Basic skills	Intermediate skills	Advanced skills
If I do not understand what another person says, I ask them to explain again I collaborate with other people, listen to them and share my ideas with them	When talking to others, I try to concentrate on the main idea instead of technicalities When collaborating, I try to understand other people's ideas and use them in our collaboration	When presenting my ideas, I can summarise them clearly and concisely When discussing with other people, I can take their positions and feelings into account

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Try self-assessment with your pair:
What is your level? How do you know?

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Basic skills	Intermediate skills	Advanced skills
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How we have used the DISA self-assessment model

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Example 1

- Students practice self-assessment during a course
- At the end of a course, they look back to the self-assessment exercises they have done and reflect their development
- Teacher grades their reflections based on the deepness of the reflection

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Example 1

Noticing own skills

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Noticing development

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Noticing own skills

Noticing development

Verbalising own skills

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Instructions for writing a self-assessment reflection

For each of the topics in the rubric, use the following as your guiding questions:

- What kind of development has taken place?
- What do you know / do not know?
- How do you know you master / do not master a skill?
- What has helped you learn the skills?

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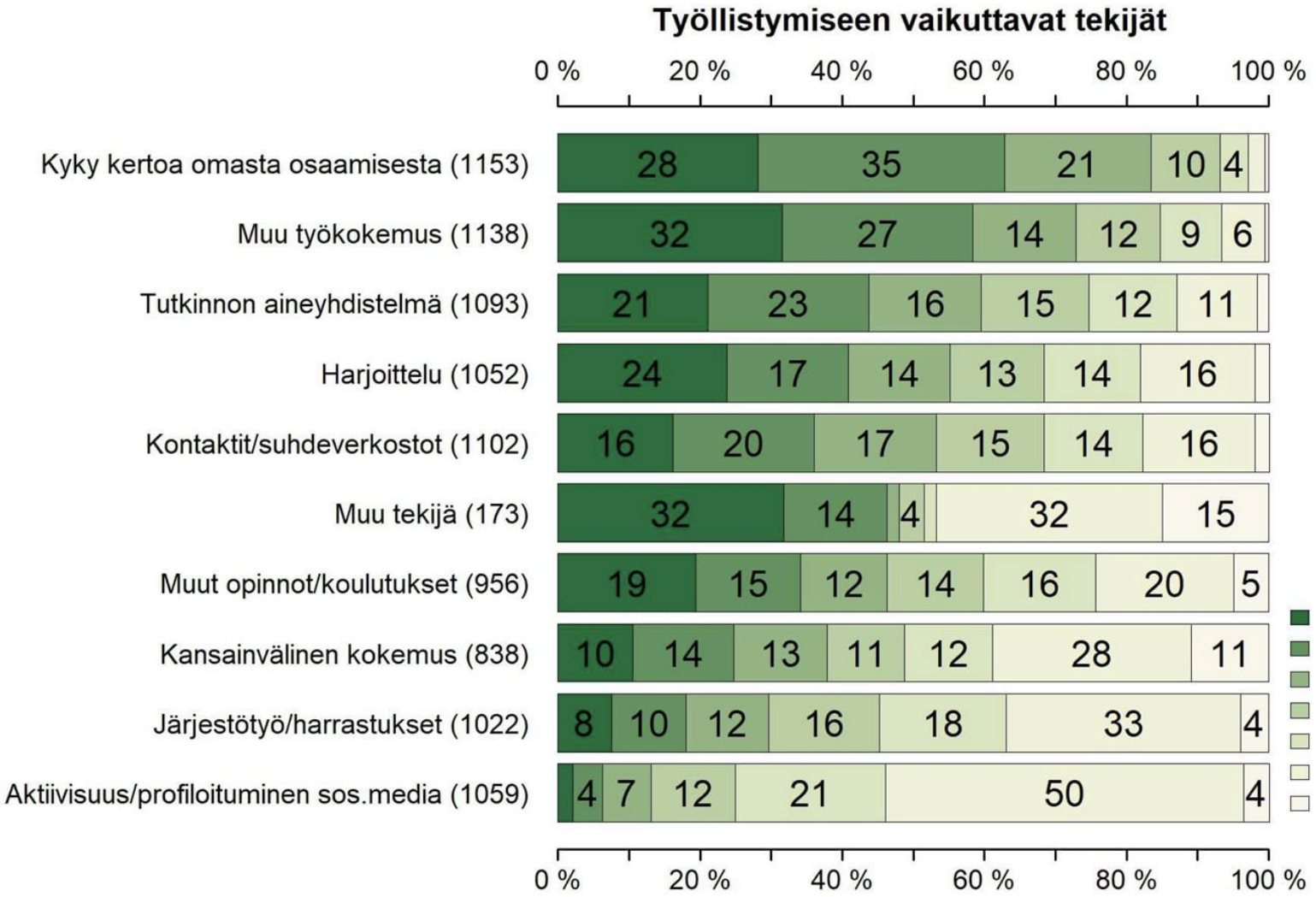
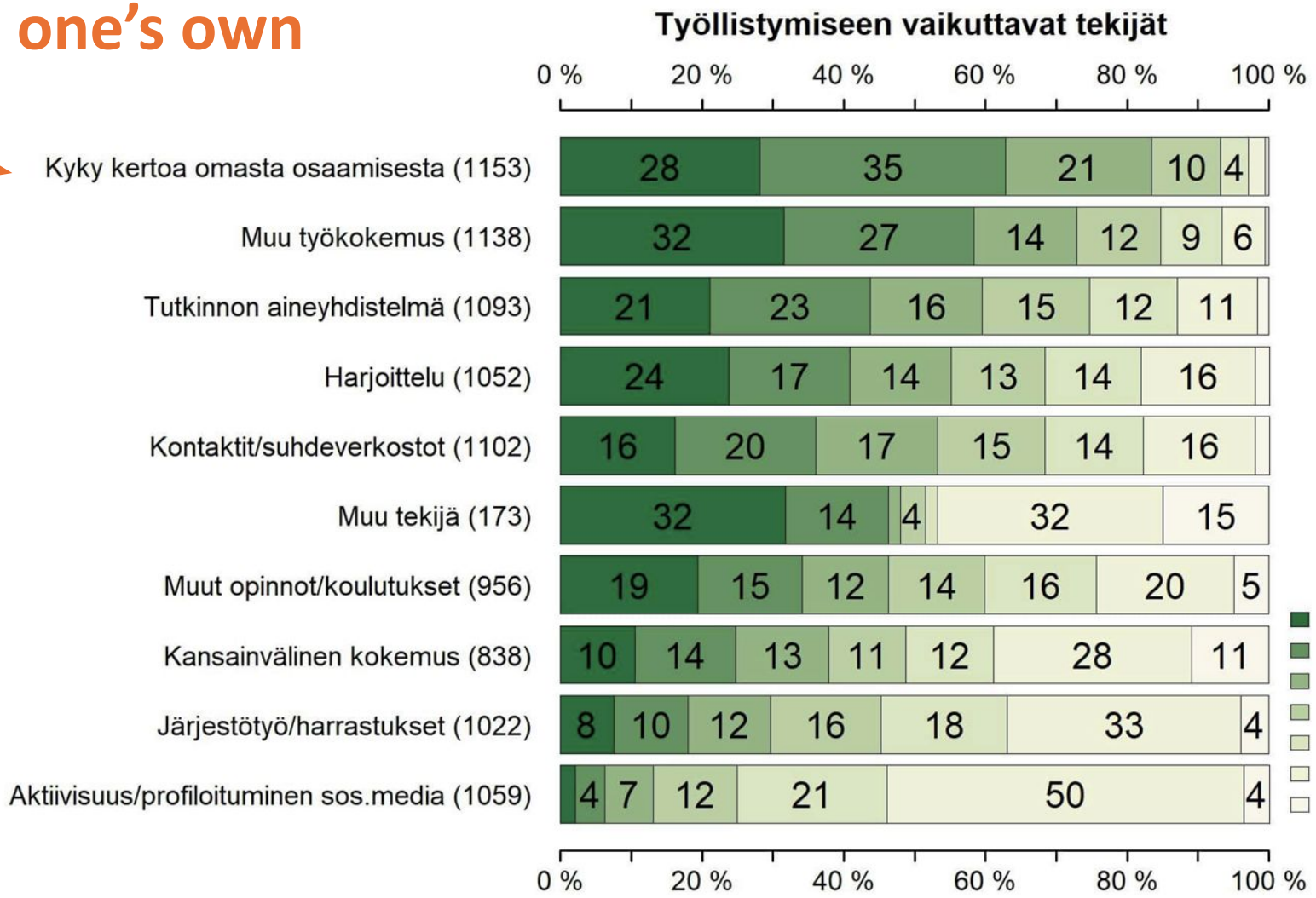
The most important factors in getting employed



The most important factors in getting employed

Ability to verbalise one's own skills



Example 2

- Students do self-assessment exercises during a course
- One-on-one assessment discussions with the teacher mid-course and at the end of the course
- No exam. Students **give their own grades** at the end of the course

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Students can improve their self-assessment skills

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Students are heard

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Students are heard

Ownership of learning

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Example 3

- Students do self-assessment exercises and get automated feedback from the digital DISA tool
- The students **give their own grades** at the end of the course
- The teacher can intervene if students self-assessment does not align at all with the work they had done

Example 3

In a large class, digital tools help

- Students do self-assessment exercises and get automated feedback from the digital DISA tool
- The students **give their own grades** at the end of the course
- The teacher can intervene if students self-assessment does not align at all with the work they had done

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Results on DISA self-assessment

- Increases deep learning
- Students feel that they study for themselves

Nieminen, J. H., Asikainen, H., & Rämö, J. (2021). Promoting deep approach to learning and self-efficacy by changing the purpose of self-assessment: a comparison of summative and formative models

Nieminen, J. H., & Tuohilampi, L. (2020). ‘Finally studying for myself’–examining student agency in summative and formative self-assessment models

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Students reflections on self-assessment

"Now I didn’t focus on memorising things. Instead, I focused on **understanding** the topics, so that in the future, if necessary, I can use them / re-learn them quickly.”

"[...] I think that there wasn’t any **bulimic learning**. I remember the content better. “

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“[…] the exam measures just content knowledge. In self-assessment, **also other kinds of skills are considered**.”

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“Wild hippie vibes”

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“When I was doing those self-assessment tasks, I felt like now I’m **finally studying for myself**.

“If I’m studying for an exam, I often feel like now I’m studying for that exam. And for the fact that I would get a good grade. Now I felt more like I would have been learning to be able to **use these skills in the future**.”

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Should we ban exams altogether?

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Self-evident…

If I am taken ill I want to see a doctor who has taken exams and passed them

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… but also:

I want doctors to be able to assess very well what they know and don’t know

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Concluding remarks

- Self-assessment skills are important in life. Students need to have an opportunity to **practice** them
- Also the students should have **ownership** over their assessment, not only the teacher
- If we only use teacher-led evaluation, it can solidify students' belief that they are not capable of assessing their own learning

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Thank you!

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