AI-HED
Artificial Intelligence in Higher Education Teaching and Learning



FINAL EVENT

From Improvisation to Effective Integration: AI in Teaching and Learning in Higher Education

Amsterdam, 6th October 2026

Amsterdam University of Applied Sciences

ESCS SCHOOL OF COMMUNICATION AND MEDIA STUDIES

University of Applied Sciences for Business & Society BFI Vienna

foi UNIVERSITY OF ZAGREB FACULTY OF ORGANIZATION AND INFORMATICS VARAŽDIN

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From Improvisation to Effective AI Integration

What the AI-HED pilots teach us

Erik Kostelijk
October 6, 2026

Introduction to AI-HED

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- Erasmus+ Cooperation Partnership “Artificial Intelligence in Higher Education Teaching and Learning” (AI-HED)
  - Duration: 09/2024 - 08/2026
  - Funding: 250,000 EUR

- The project responds to a paradigm shift in higher education:

AI is redefining how students learn, teachers teach, and learning is assessed.
AI-HED explores what it takes to integrate AI effectively in higher education.

- Website: https://ai-hed.eu

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Objectives

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Broader aim: Adjust the teaching and learning environments at our HEIs to the shifts caused by Artificial Intelligence (AI).

General objectives:

1. Explore, test and conceptualise the **impact** of AI on the teaching and learning process
2. Enhance **teachers** skills, competences and attitudes to use AI as a facilitator in the teaching and learning process
3. Enhance **students** skills, competences and attitudes to use AI in learning
4. Develop **recommendations for HEIs** on the integration of AI in the teaching and learning process

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AI-HED Team

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Main Activities of the Project

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Year 1

Year 2

Improving Digital Literacy on AI among higher education teachers (WP2, UNIZG)

- **STARTER KIT** on AI in teaching and learning
- **TRAINING** for teachers on AI literacy > Feb/March 2025
- **MOOC** on AI in teaching and learning

Selection and Design of Pilot Courses (WP3, UAS BFI Vienna)

- Selection and preparation of **PILOT COURSES** (including syllabi)
- **GUIDELINES** to prepare the Pilot Courses
- **WORKSHOP** for course preparation

Implementation of the Pilot Courses (WP4, AUAS)

- Implementing **PILOT COURSES**
- **EVALUATION** and impact measurement
- **COMPILATION** of best practices, **WHITEPAPER** with recommendations

From Pilots to Evidence

The Pilot Semester:

24 AI-enhanced courses across four higher education institutes

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Amsterdam University of Applied Sciences (AUAS)

- Consumer Branding
- Innovate for Impact
- Marketing Consultancy Project
- Personal Finance
- French 1 & 2 / Spanish 1 & 2

University of Applied Sciences BFI Vienna (FH BFI)

- Interactive Media & Games Project 1
- Process Management
- Introduction to Political Science
- Spanish 1
- Public Affairs in the EU: Fields of action and instruments
- Business English 1
- Scientific Working

Polytechnic University of Lisbon (ESCS / IPL)

- Multiplatform Journalism Workshop
- Integrated Communication Laboratory
- Public Relations Theories and Techniques
- Employee communication
- Screenwriting for Journalism
- Journalism Project Seminar
- Gamification in Public Relations Strategies
- Project Seminar on Audiovisual and Multimedia

University of Zagreb – Faculty of Organization and Informatics (FOI)

- Digital transformation
- Digital marketing
- Business Process Modeling
- Business Communication

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Student Participation

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University	# enrollments[1)]	# attendees first class [2)]	# attendees last class [3)]	# valid survey completions - PRE COURSE SURVEY [4)]	# valid survey completions - POST COURSE SURVEY [4)]
Amsterdam University of Applied Sciences (AUAS)	282	220	200	187	138
University of Applied Sciences BFI Vienna (FH BFI)	225	175	180	161	151
Polytecnic University of Lisbon (ESCS / IPL)	279	220	189	219	126
University of Zagreb – Faculty of Organization and Informatics (FOI)	379	338	287	337	248
Totals	**1165**	**953**	**856**	**904**	**663**

[1)] # enrollments: based on enrollments at the start of the semester
[2)] # attendees first class is a proxy for students actively participating in the pilot course semester
[3)] # attendees last class is a proxy for students completing the pilot course semester
[4)] Only unique student IDs were counted. In some cases, students participated in more than 1 course. These students were counted only once

- Large-scale pilot implementation
  - The pilot semester involved 1,165 enrolled students across four partner universities
- High course participation
  - 953 students attended the first class and 856 the final class: an overall completion rate of 89.8%
- Substantial survey participation
  - 904 pre-course and 663 post-course survey responses collected. This implies a response rate of 94.9% (pre-course) and 77.5% (post-course)

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Evaluation of the Pilot Courses

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SEMESTER I – ACADEMIC YEAR 2025-2026

Pre-Course (Before the semester)	During the semester: Teachers complete weekly Logbook	Post-Course (After the semester)
Student Survey Teacher Survey		Student Survey Teacher Survey
		Focus Group with Teachers and Students

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What did we learn?

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Student Competence Development

How Does AI impact what students need to know and do?

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Digital Competences

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To evaluate the impact of AI integration in our pilot courses, we measured changes in students' competences in using AI with the European DigComp framework (DigComp 2.2)

The 5 competences of the DigComp framework

- Digital Competence 1: Information and Data Literacy
- Digital Competence 2: Communication and Collaboration
- Digital Competence 3: Digital Content Creation
- Digital Competence 4: Safety
- Digital Competence 5: Problem Solving

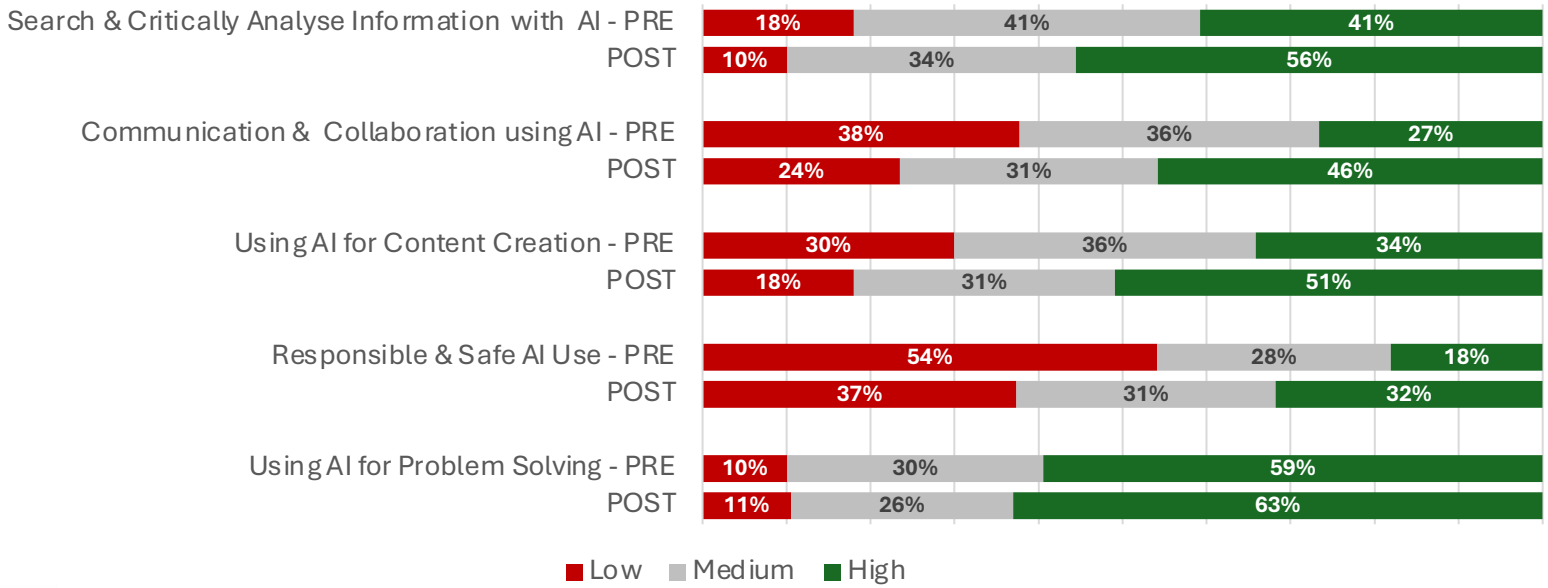
Each competence was operationalized towards AI, by using eight items: six cognitive items (based on Bloom's taxonomy), one item measuring attitude, and one item measuring self-efficacy (= confidence with using AI).

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AI Competences - Students

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- **AI already widely used for problem solving**
  - Most students already reported using AI for problem solving before the pilot semester. So, the increase in this area is relatively small
- **Strong growth in productive AI use**
  - The largest increases occur in content creation and collaboration, indicating that students increasingly use AI as a productive tool in their study activities.
- **Responsible AI use improves but remains a development area**
  - Although responsible and safe AI use increased, it remains the area with the lowest share of high-level use.



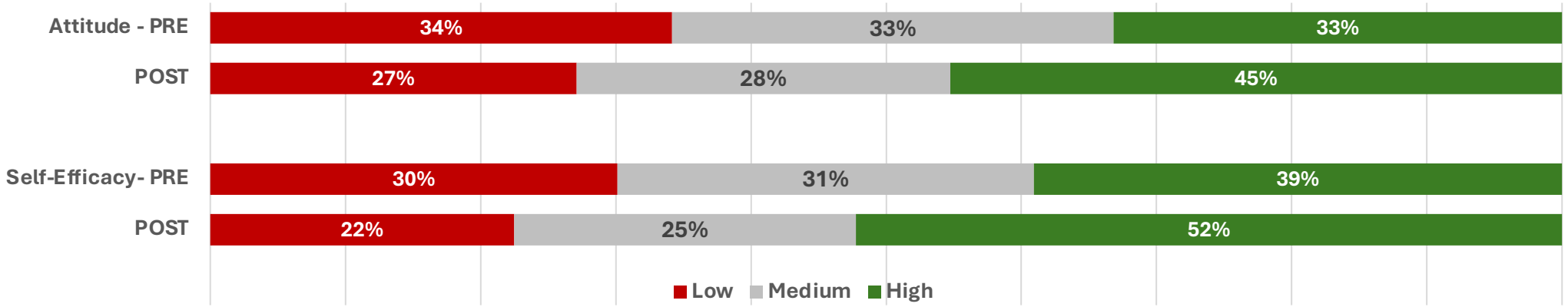
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All reported increases are statistically significant (p<0,05; 95% confidence level). The increase for using AI for problem solving is small, the other effects are substantial, based on Cohen's d using Kraft's (2020) benchmarks for educational interventions.

Attitude & Confidence - Students

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- **Increased confidence in using AI.**
  - The share of students with high self-efficacy increased from 39% to 52%, indicating greater confidence in using AI in their work. This suggests that fewer students feel uncertain or uncomfortable using AI.
- **More positive attitudes towards AI**
  - Positive attitudes increased from around one-third to 45%; low attitude scores fell from 34% to 27%



All reported increases are statistically significant ($p<0.01$; 95% confidence level). The effect sizes are substantial, based on Cohen's d using Kraft's (2020) benchmarks for educational interventions.

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The impact of AI on learning

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- **From answers to dialogue**
  - Across the pilots, students moved beyond asking AI for answers and began using it to explore disciplinary problems in dialogue.
  - Students increasingly questioned and refined AI output within disciplinary tasks.
- **Subject knowledge remained essential**
  - Subject knowledge helped students recognise weak answers, verify information and retain control of their work

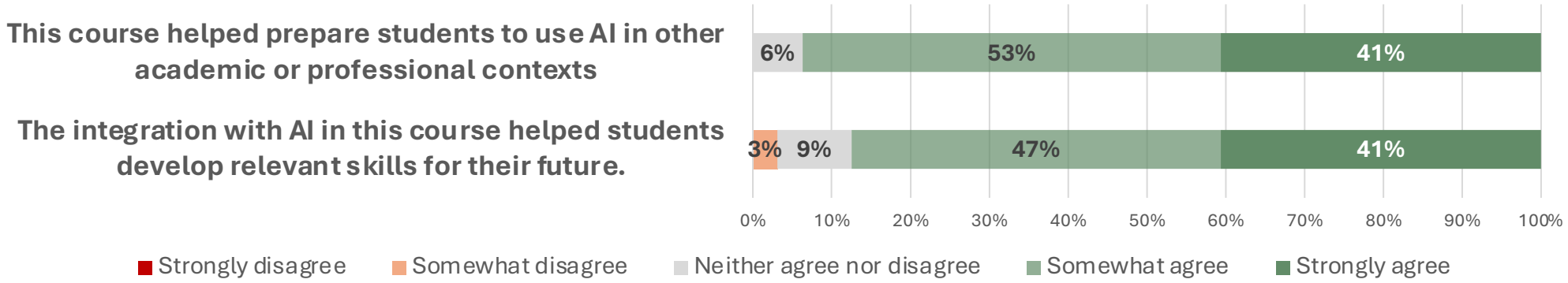
"I can initiate a great discussion with AI about advising a company with a low current ratio, but that only works if I myself understand what a current ratio is." — Student

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Students' Future Readiness

Teacher Perceptions

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- **Teachers report improved student readiness to use AI beyond the course**
  - A large majority of teachers agree that the course helped prepare students to use AI in other academic or professional contexts.
- **AI integration supports future-relevant skill development**
  - Most teachers believe that working with AI in the course helped students develop skills relevant for their future studies or careers..

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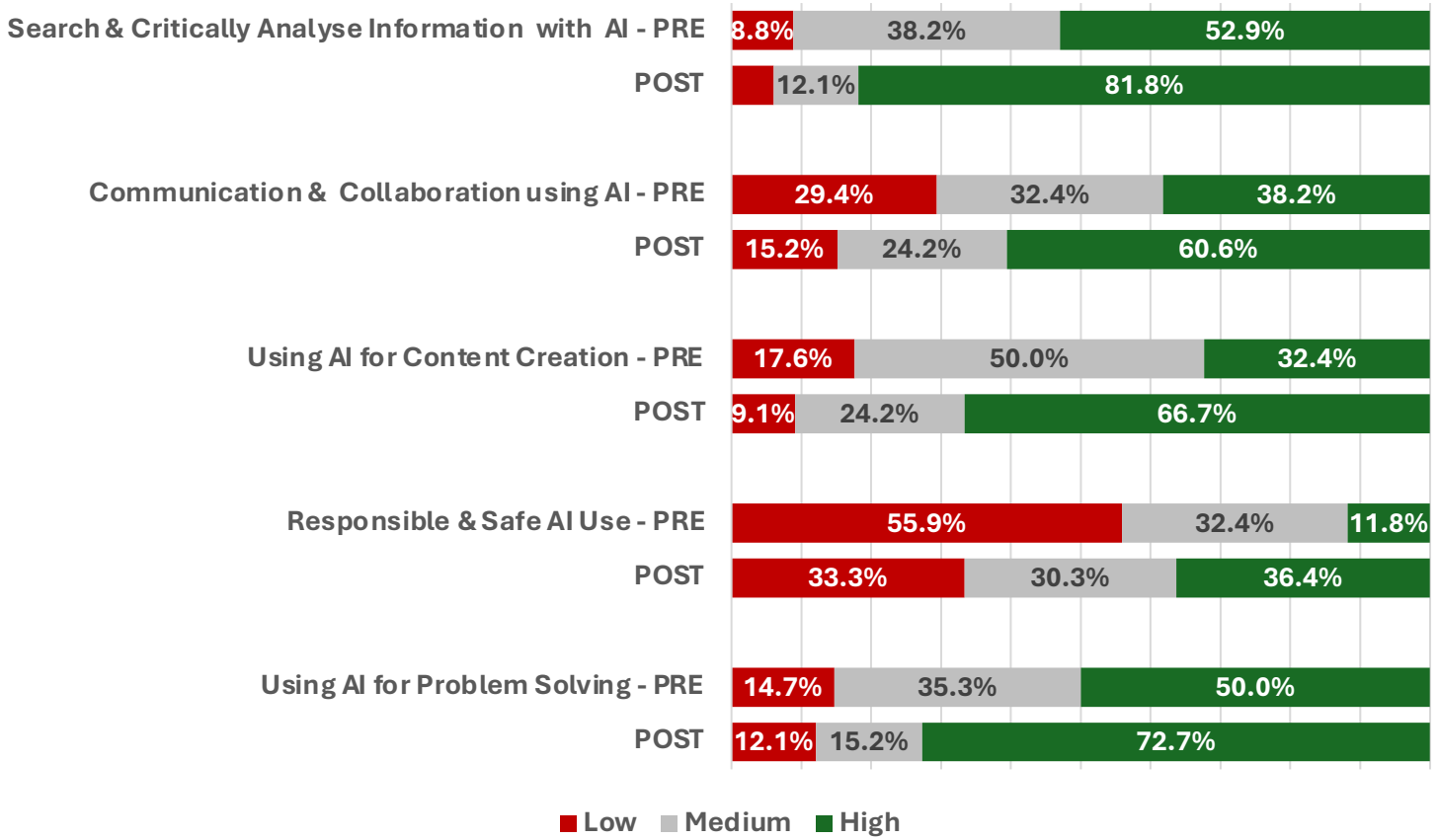
Teacher Competence Development

How Does AI impact what teachers need to know and do?

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AI Competences - Teachers

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Teachers reported substantial growth in AI competence during the pilot semester.

- High competence levels especially for using AI for searching & critically analysing information, for problem solving and for digital content creation
- Responsible AI use improves but remains a development area: As with the students, despite the substantial increase, this remains the area with the lowest share of high-level use.

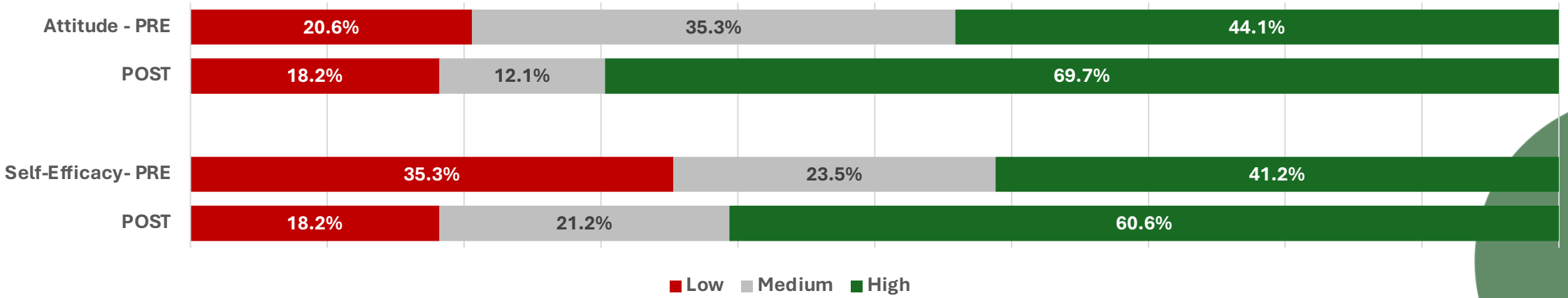
The reported increase for DigComp 5 (Problem solving) is indicative (p=0.063). All other reported increases are statistically significant (p<0.05; 95% confidence level). The increase for using AI for problem solving is small, the other effects are substantial, based on Cohen's d using Kraft's (2020) benchmarks for educational interventions.

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Attitude & Confidence - Teachers

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- **Substantial increase of self-efficacy (confidence) in using AI.**
  - The share of teachers reporting high confidence in using AI increased from 41% to 61% during the pilot semester. The proportion of teachers reporting low self-efficacy dropped considerably, indicating growing familiarity with AI tools.
- **More positive attitudes towards AI use**
  - The share of teachers with a highly positive attitude towards AI increased from 44% to nearly 70%.

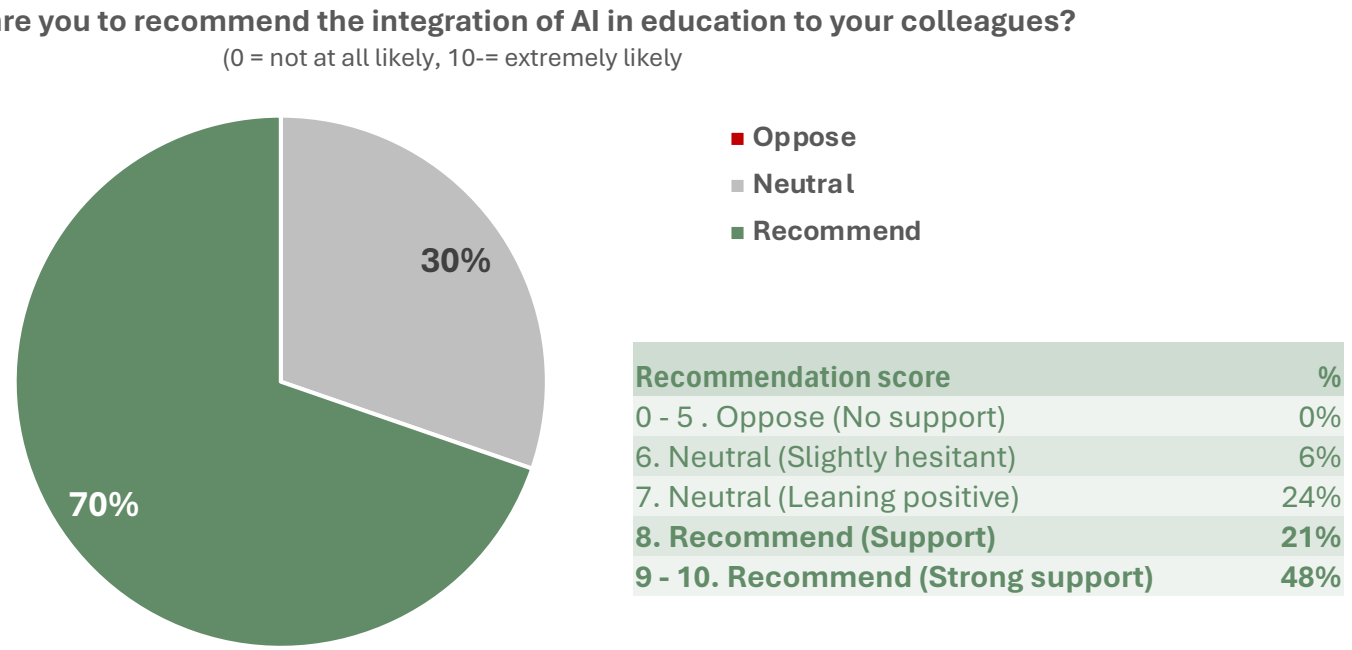


The increase in self-efficacy is statistically significant ($p < 0,05$), the increase in attitude is indicative ($p=0,068$) (95% confidence level). The effect sizes are substantial, based on Cohen's d using Kraft's (2020) benchmarks for educational interventions.

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Pilot Teachers Strongly Recommend AI Integration

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Recommendation score	%
0 - 5 . Oppose (No support)	0%
6. Neutral (Slightly hesitant)	6%
7. Neutral (Leaning positive)	24%
8. Recommend (Support)	**21%**
9 - 10. Recommend (Strong support)	**48%**

- **70% of pilot course teachers (strongly) recommend** integrating AI in education.
- 30% remain neutral, suggesting openness but some caution.
- **No teachers oppose AI integration** after the pilot semester

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AI strengthens the teacher's role as facilitator

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- AI can handle initial questions, giving teachers more room for discussion and deeper feedback.
- Teachers' judgement becomes more important: they have more opportunity to guide students, helping them to evaluate and apply the sometimes enormous amount of words delivered by AI.

"For the projects, AI often helps improve the consultation sessions. Simpler questions can be partly answered upfront, which allows our discussions to go deeper." — Teacher

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Curriculum Design

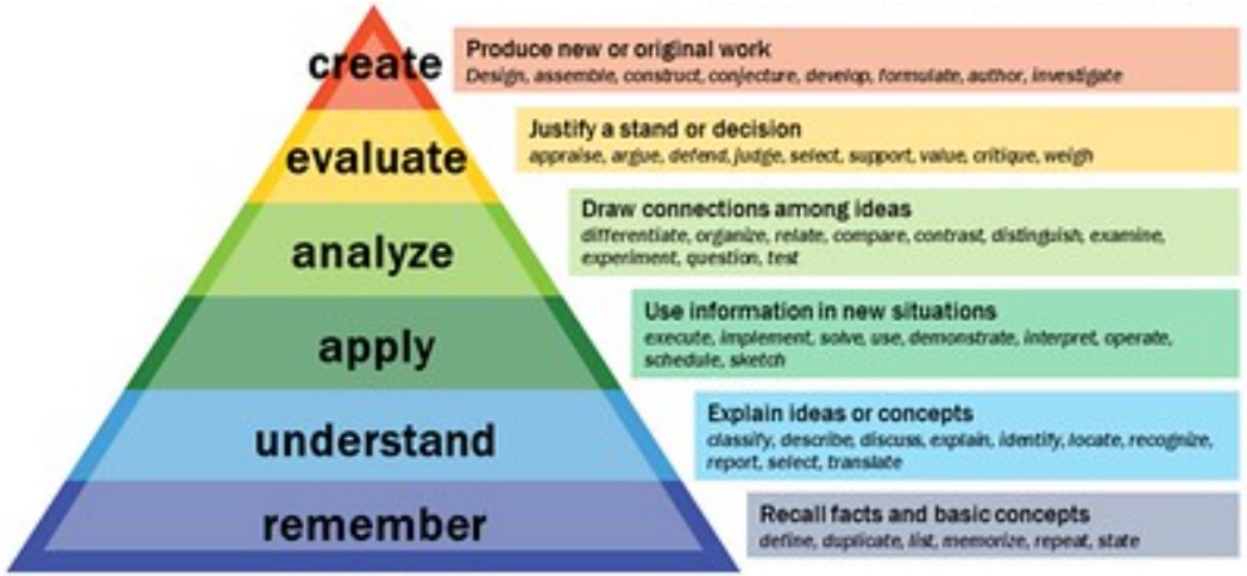
How does AI impact learning outcomes and teaching methods?

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Cognitive Depth of Using AI

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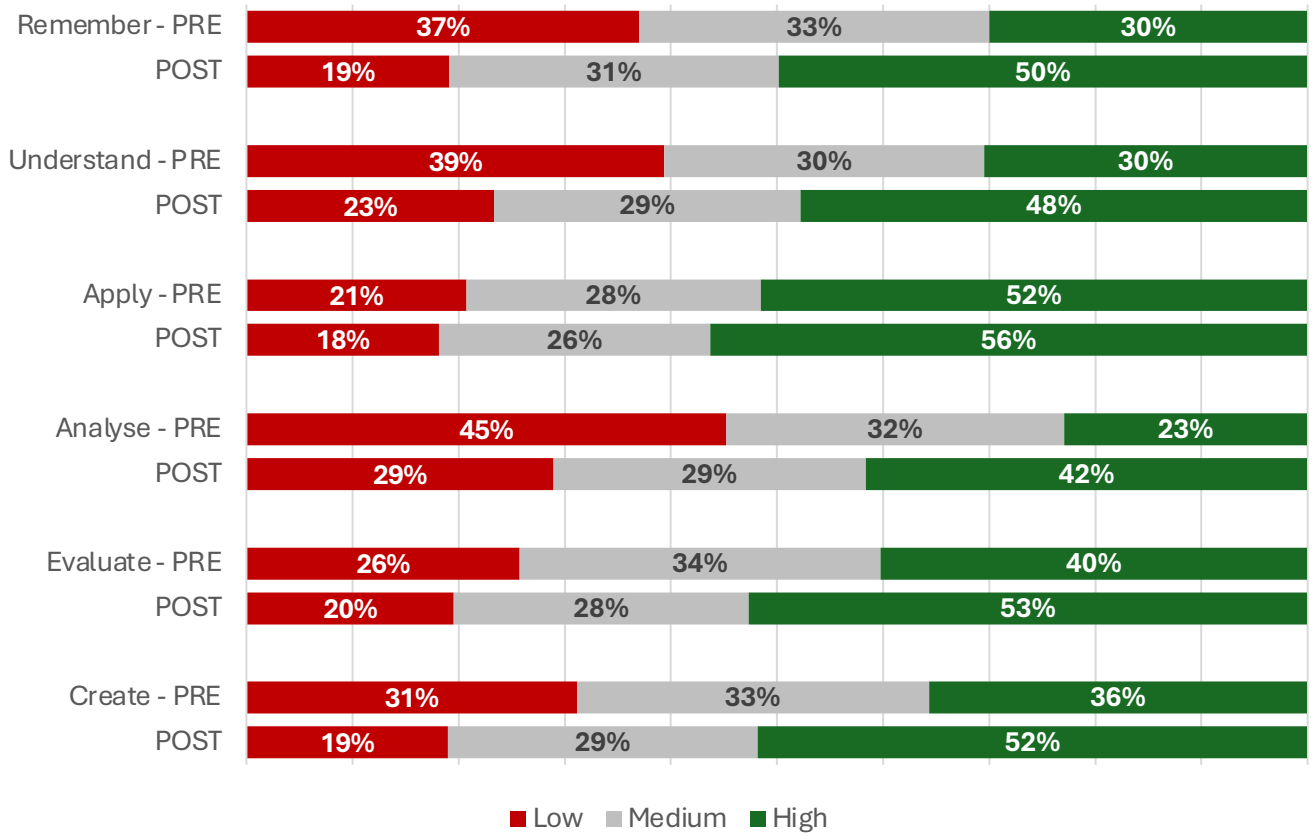
- To assess how deeply students engage with AI, use of AI was measured across Bloom's cognitive levels.



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Bloom's Taxonomy - Students

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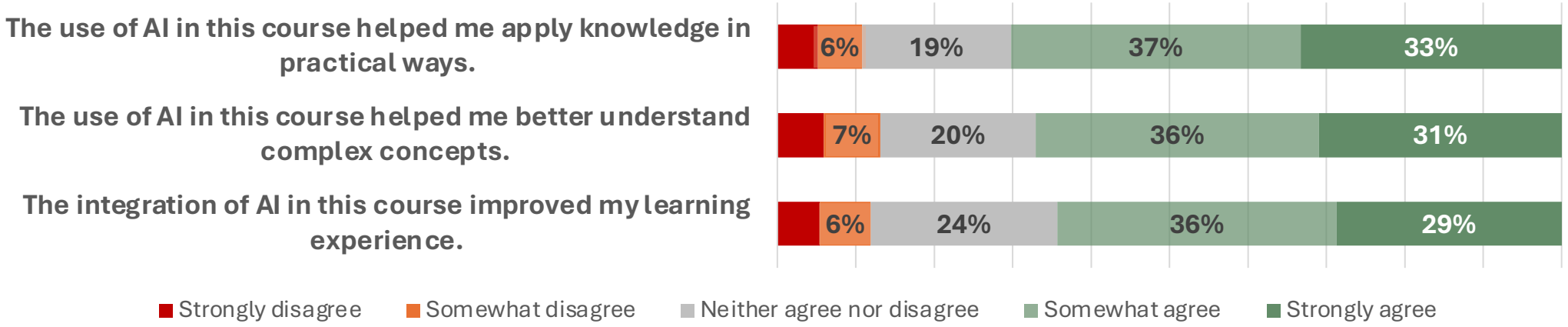
All reported increases are statistically significant ($p<0,01$; 95% confidence level). The effect sizes are moderate to substantial, based on Cohen's d using Kraft's (2020) benchmarks for educational interventions.

- **Increase across all Bloom levels.**
  - We see a substantial increase in student's abilities to integrate AI in their activities
- **From basic AI use to productive integration**
  - The share of high competence students increased substantially, especially in higher Bloom levels (Analyse, Evaluate, Create)

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Added Value for Learning- Students

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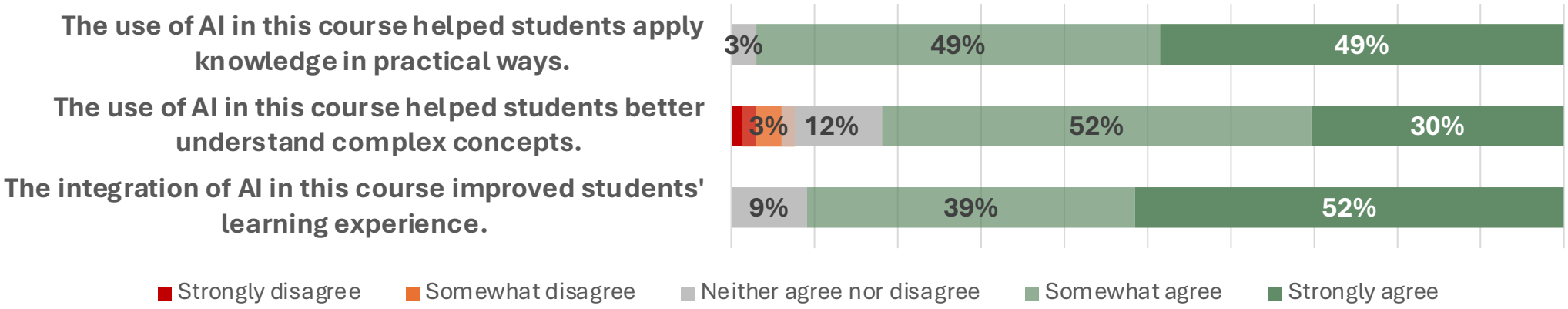
- **Students perceive clear benefits from AI use**
  - A clear majority of students report that the use of AI helped them understand concepts, apply knowledge, and improved their learning experience
- **Strong agreement across all items**
  - Around two-thirds agree or strongly agree, while only a small minority express disagreement.

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Added Value for Learning

Teacher Perceptions

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- **Teachers see clear added value of AI for student learning**
  - A large majority of teachers agree that AI supports student learning
  - Teachers report that AI helps students better understand complex concepts, and that AI helps students to apply knowledge.
  - More than 90% of teachers agree that AI integration improves the overall learning experience in the course.

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AI use should grow with the curriculum

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- Build the **foundations first**
  - ➢ students need disciplinary knowledge
- **Increase the challenge** over time
  - ➢ Establish a common AI foundation early, then integrate AI into increasingly com disciplinary tasks.
- **Incorporate AI** in longitudinal lines
  - ➢ make progression of both course content and AI integration visible across the programme, with clear expectations at each stage

"Maybe there should just be one online AI course that all first-year students have to complete." — Student
"They don't invest in building a proper foundation because they don't see the need to spend time doing so." — Teach

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Assessment

How does AI change what assessment can demonstrate?

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A polished output no longer proves competence

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- AI can contribute substantially to the final product.
- Assessment needs evidence of **the student's own contribution**.
- Students must be able to explain and defend their work.

- ➢ The shifting focus of assessment increases the importance of oral examinations in combination with process-oriented indicators such as evidence packs.
- ➢ At the same time, the impact of AI on the student journey might require more knowledge tests in the foundation years of a programme.

"*Words are becoming a commodity.*" — Teacher

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From detecting AI use to demonstrating ownership

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- Students need to learn that they are in control, and AI is the assistant
- This requires students' ability to evaluate the quality of their work with respect to what is demanded.
- Making ownership visible takes more assessment time.

"People don't want to say it, because even though it's not forbidden, it still kind of feels like cheating." — Student

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What could stand in the way?

When AI supports performance, does it still support learning?

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- **AI can improve task performance while taking over cognitive work students need to do themselves**
  - **Learning:** Students need to retain critical judgement and ownership of their work.
  - **Assessment:** A high-quality output is no longer sufficient evidence of what a student actually knows and can do.

How do we ensure that AI supports learning without substituting the learning itself?

- Making competence visible requires additional evidence. But richer assessment also increases **teacher workload** and becomes harder to scale.
- At the same time, students experience a growing uncertainty; How can they still have added value now that they witness AI becoming more powerful?

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Can institutions keep up?

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Local experimentation has generated valuable practices.
But effective integration cannot remain local.

- **Fragmentation**
  - Different practices and expectations across courses can turn local experimentation into structural fragmentation.
- **Access**
  - When relevant AI capabilities depend on what students can afford or access, differences in tool access become differences in learning opportunities.
- **Adaptability**
  - AI may develop faster than institutions can responsibly adapt. Investments in institutional AI solutions also create continuing demands for maintenance and updating simply to remain relevant.

The challenge is to build institutional coherence and capacity without replacing experimentation with uniformity

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From Improvisation to Effective Integration

AI changes how students learn. Education must respond



- AI is becoming an active part of how students work through disciplinary problems
- Our pilots showed potential for higher-order learning **when activities were deliberately designed for it**
- That calls for a fresh look at what students should learn, how they learn it, and how we recognise their competence.

We cannot simply add AI to an education model designed around students working without it.

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A course can innovate.
Only a programme can create progression

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Level	Decision
Institution	Set clear expectations for AI use and student responsibility.
Programme	Decide how disciplinary competence and AI use develop across study years.
Course	Design learning activities that fit the subject and the students' stage.

The challenge for a Programme Director:
Turn successful course experiments into a coherent student journey

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Make competence visible without making assessment unmanageable

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- **Decide what students must demonstrate independently.** Foundation years may need more direct checks of disciplinary knowledge.
- **Ask for evidence when AI can mask competence.** A brief oral explanation or selected process evidence may be more useful than extensive documentation.
- **Keep the evidence proportionate.** Redesign assessment criteria and allow teacher time for the methods chosen.

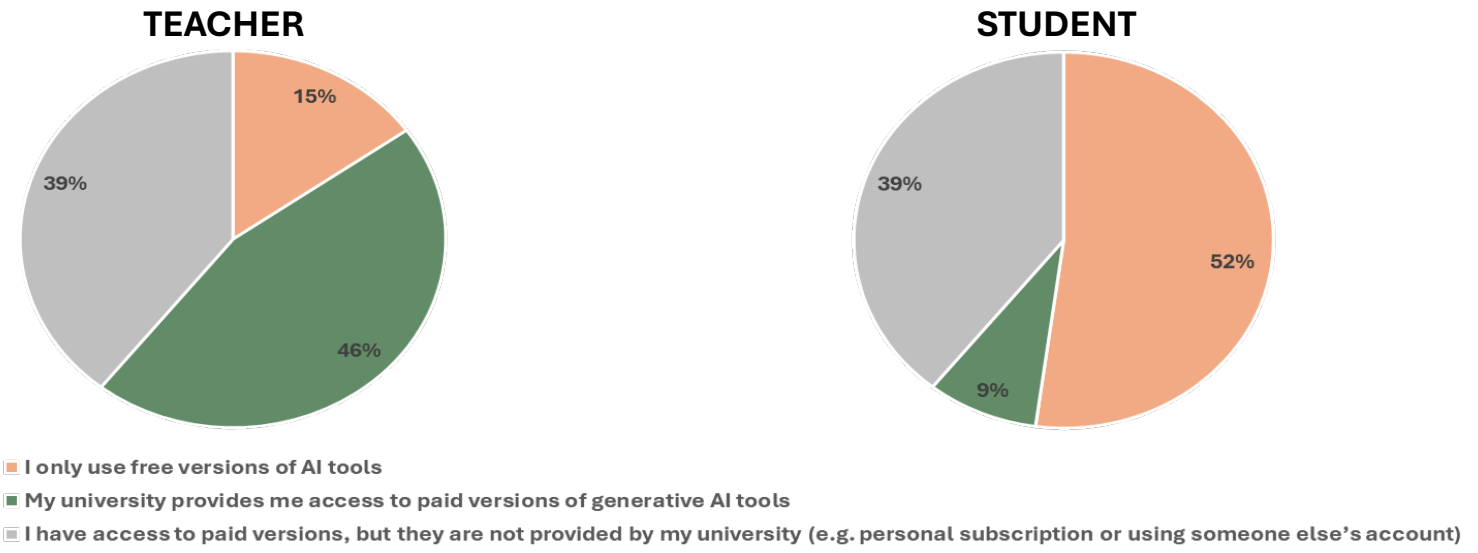
AI requires us to revisit both the purpose of assessment and how students demonstrate competence.

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If the curriculum requires AI, access cannot depend on who pays

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- **Paid AI access became common during the pilot semester.**
  - By the end of the pilot, 85% of teachers and 48% of students used paid versions, suggesting that free options did not offer the capabilities they wanted.
- **An institutional tool is only an equity solution if it offers the capabilities learning requires.**
  - If the private sector offers paid alternatives with better capabilities, providing a basic tool leaves the gap intact, or even widens it.



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AI will keep changing.
So must we.

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- **Give teachers time** to develop their practice as AI changes.
- Make lessons from courses **shared knowledge** that programmes can build on.
- **Revisit tools and guidance** as educational needs evolve.

From improvisation to effective integration.
This requires a university that keeps learning

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