

IDEAL

Integrating Data Analysis and AI in Learning Experiences

D5.1

Experiences Reports

Work Package 5: Implementation Strategy

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Executive Summary

IDEAL (Integrating Data Analysis and AI in Learning experiences) is a 24 month Erasmus+ Cooperation Partnership in Higher Education (KA220-HED) that spans from October 2024 to September 2026. The consortium consists of seven partners from four countries: National Research Council of Italy (CNR, Italy), University of Milan-Bicocca (Italy), University of Applied Sciences Ruhr West (Germany), Pompeu Fabra University (Spain), Aristotle University of Thessaloniki (Greece), Q21 - Agency for Qualification and Transfer Management Ltd (Germany) and Smart Revolution Srl (Italy).

The project aimed at strengthening the capacity of European higher education institutions to integrate Data Analysis and the responsible use of Artificial Intelligence (AI) into teaching and learning. The project sought to broaden access to knowledge and skills related to Data Analysis and AI use among educators across a wide range of academic disciplines, thereby creating opportunities for applying them effectively in their own teaching and learning situations rather than restricting them to technology-focused fields. To this end, the project developed (a) a comprehensive curriculum and educational resources focusing on Data Analysis and AI; (b) a competency framework for Data Analysis and AI; (c) a blended learning environment, all designed as openly licensed resources that institutions can reuse and adapt beyond the project's lifetime; (d) conducted pilot programs in different European higher education institutions.

This deliverable brings together the experience reports from the pilots conducted by the consortium partners, illustrating how the IDEAL approach was translated from design into practice. Carried out in diverse institutional and disciplinary contexts, the pilots tested the approach and its validation framework under real teaching conditions, showing how it can be adapted to different learning scenarios.

For each pilot, the deliverable provides a detailed account of the context in which it took place, the participants involved, and the activities implemented, including how the IDEAL materials and methodologies were integrated into existing courses and learning offerings. It also reports the outcomes produced, highlighting what worked well, what challenges arose, and how the approach contributed to developing the integration of data analysis and AI in learning experiences

1. Introduction

1.1 Purpose and scope of the Deliverable

This deliverable brings together the experience reports from the pilots conducted by the consortium partners, illustrating how the IDEAL approach was translated from design into practice. It provides a detailed account of the activities implemented in each pilot and the outcomes they produced.

1.2 The IDEAL project in brief

IDEAL – Integrating Data Analysis and AI in Learning Experiences – is a two-year Cooperation Partnership in Higher Education (Erasmus+ KA220-HED), running from 1 October 2024 to 30 September 2026 and coordinated by the Consiglio Nazionale delle Ricerche (CNR). The project aims to foster the integration of data analysis and artificial intelligence within higher education, bridging existing gaps and empowering educators and students with advanced digital competences.

The partnership brings together CNR (Italy), Aristotle University of Thessaloniki (Greece), Università degli Studi di Milano-Bicocca (Italy), Smart Revolution (Italy), Q21 – Agentur für Qualifizierungs und Transfer management (Germany), Pompeu Fabra University (Spain) and Hochschule Ruhr West (Germany). Activities are organised in five Work Packages: WP1 Project Management; WP2 Use case Inventory for AI and Data Analysis in Higher Education and Competence Framework; WP3 Blended Learning Offer; WP4 IDEAL Learning Suite; WP5 Implementation Strategy.

1.3 Structure of the document

The document provides detailed descriptions of the 10 pilots carried out by the consortium partners, including the pilots' descriptions, outcomes, conclusions, and recommendations.

2. GERMANY: University of Applied Sciences Ruhr West

2.1 Introduction

Partner institution:

Hochschule Ruhr West University of Applied Sciences (HRW)

Country: Germany

Responsible person(s): Prof. Dr. Sabrina Eimler, Prof. Dr. Uwe Handmann, Lukas Erle

2.1.1 Pilot description

We conducted two rounds of pilots with students from different computer science degrees: Round 1 featured a total of N_1 = 5 (3 male, 2 female) different students from two computer science-related

Master study programs (Human-Computer Interaction (M.Sc.) and Computer Science (M.Sc.)). Round 2 featured $N_2 = 15$ (9 male, 6 female) students from different computer science-related Bachelor study programs (Human-Computer Interaction (B.Sc.), Applied Computer Science (B.Sc.), E-Commerce (B.Sc.)).

Both pilots were facilitated as part of Bachelor's and Master's modules and students received course credit for participating in the pilot. In each round, students received access to the IDEAL learning platform and were asked to visit different topics and carefully work through the content present on the platform. For Round 1, students then took part in a semi-structured interview, in which they were questioned regarding their experiences with the course structure and content (see interview guide provided below). Interviews were recorded and transcribed for later analysis. Round 2 had students complete the SPIDER questionnaire before interacting with any of the topics, then interact with the course at their pace, and finally completing the SPIDER questionnaire a second time to observe how interacting with the topics affected their individual competences.

Interview Guide (Round 1)

- Age
- Gender
- Degree program / field of study
- Participant code
- Which topic(s) did you work on?
- What were your expectations regarding the topic?
- Please name some of the materials in the course that stuck with you.
- Do the materials match the stated learning objectives?
- Were the materials easy to understand? If not, why?
- Were you able to work through all the material without help / additional sources (e.g., Googling, ChatGPT)?
- Is there any material you found unnecessary?
- Is there any material you consider inappropriate?
- Do you generally miss any material on this topic?
- Do the materials cover content and examples from different countries?
- Put yourself in the role of a university lecturer: How well could you integrate AI into your teaching with the help of this course?
- Do you have any final comments about this course?
- Do you have recommendations for materials or other courses you know?

2.1.2 Purpose and Objective(s) of the pilot

We conducted two pilots with the goal of gaining qualitative input on the course structure and materials (Round 1), as well as understand how interacting with the course in a shorter time frame might affect participants' competences, as indicated by the SPIDER questionnaire (Round 2). From the

IDEAL competence framework, we attempted to target a wide range of competences, as represented by the topics in the learning environment.

2.1.3 Materials and tools used

For the pilots, we drew inspiration mostly from existing learning management systems that were identified during the desk research. Specifically, the following resources, our experiences with sharing them with students, and the types of feedback we received informed our pilots:

- KI-Campus (engl.: AI Campus): https://fernuni-ki-campus.fernuni-hagen.de/hub/
- Collection of lectures and open resources on AI in higher education: https://www.mmkh.de/schulungen/kuenstliche-intelligenz.html

Beyond these cases, especially for Round 1 of our pilot, we drew inspiration from the focus groups conducted as part of WP2 of the IDEAL project, in which expert interviews – just in this case not as focus groups – proved very valuable for gaining a deeper understanding of participants' sentiments towards AI in higher education. This also builds upon our previous research, in which we conducted individual expert interviews with students and educators (Link: https://link.springer.com/chapter/10.1007/978-3-031-98465-5_40).

2.2 Pilot Outcomes

The results from the SPIDER questionnaires (Round 2) are sorted into pre-course (before interacting with the course content) and post-course (after interacting with the course content). Comparing these Pre and Post SPIDER results, it becomes apparent that – while there are no huge changes in the SPIDER profiles (for which the IDEAL course likely would have needed to be embedded even deeper as its own module, instead of as part of a module) – participants saw an increase in their awareness of rules and regulations, as well as ethical considerations regarding the use of AI in higher education. For example, several participants moved from needing more "practical/structured implementation" support to being described as already integrating AI responsibly and being ready to deepen practice with patterns/case studies and more systematic approaches. Additionally, for a few cases, the "Bias and Fairness" dimension moved from an "introductory / build basic awareness" framing to a "you already recognize this, now deepen pedagogical integration" feedback. In summary, there seems to be a clear upwards trend for most participants, even after a comparably short time frame of interacting with the IDEAL course. This indicates that future, deeper work on the course is likely to yield significant positive effects on participants' AI competences.

Regarding qualitative results from the individual interviews, the most discussed topics were:

- Topic 1: Ethical Use of AI / Generative AI in Education
- Topic 2: Algorithmic Bias
- Topic 4: Generative AI in Higher Education / AI Governance
- Topic 5: Practical Use of AI in Education

Across all interviews, participants generally viewed the courses positively and found the topics highly relevant and interesting. However, recurring criticism focused on the extensive use of long academic papers and the lack of practical examples.

Key Findings by Theme – a more detailed excerpt / translation can be provided upon request.

Expectations and Learning Goals

Most participants stated that their expectations were largely fulfilled. They expected: an introduction to ethical AI use, better understanding of algorithmic bias, guidance on integrating AI into education, and practical strategies for responsible AI use. Participants appreciated that the learning objectives were clearly presented at the beginning of the courses. Many said the goals aligned well with the actual content.

Several interviewees emphasized that they wanted: more concrete teaching examples, practical applications, real-world case studies, and step-by-step guidance for educators.

Perception of Course Materials

Participants referred to the following materials as being particularly striking:

- UNESCO guidelines
- Scientific papers
- TED Talks and videos
- Research articles about AI fairness and discrimination
- Educational guidebooks for teachers
- Studies about AI in hiring processes and social robots
- Positive Feedback

Students appreciated the diverse perspectives, visual elements (videos, diagrams), structured introductions, inclusion of fairness and ethics discussions, videos and visual explanations. The materials were repeatedly described as easy to understand, engaging, and helpful for illustrating abstract concepts.

Major Criticism of Materials

The strongest recurring criticism concerned the large number of long academic papers. Participants frequently stated that:

- The papers were too extensive
- Reading in English required significant effort
- The content was often too theoretical
- Some materials repeated similar ideas
- Important points could have been summarized more efficiently

As a remedy, interviewees suggested short summaries below each paper, slides instead of long texts, more videos, more concise materials, quizzes after each section rather than only at the end. To help

with understanding of the material, some participants used AI tools such as ChatGPT, Copilot, or DeepL.

Algorithmic Bias and Fairness

Participants in Topic 2 demonstrated strong awareness of:

- Bias in datasets
- Discrimination in AI systems
- Political and cultural biases in AI models
- Ethical concerns regarding fairness
- Frequently discussed examples included:
- Bias in hiring systems
- Gender and ethnic discrimination
- Differences between Global North and Global South
- Government-influenced AI systems
- Facial recognition fairness
- Students appreciated that the courses emphasized:
- Critical thinking
- Human oversight
- Transparency
- Responsible AI use

However, many still wanted more practical demonstrations, concrete classroom examples, as well as real educational implementation scenarios.

AI in Higher Education

Most participants believed the courses improved their understanding of how AI could be integrated into teaching. Common suggested use cases included:

- Creating teaching materials
- Structuring lesson plans
- Supporting assessment design
- Using chatbots during lectures
- Supporting students with explanations
- Teaching prompting skills
- AI-assisted coding and evaluation tasks

Participants repeatedly stressed that AI should be treated as a tool, not a replacement for humans. This means that human review remains essential, and students should learn AI literacy. Additionally, institutions need clear guidelines – importantly, several interviewees rejected strict AI bans and instead advocated for transparent AI policies, critical reflection, process-oriented assessment, oral exams and expect educators to teach students how to use AI responsibly.

Missing Elements and Recommendations

The most common recommendations were:

- More Practical Content
- Concrete examples from universities
- Real implementation case studies
- Demonstrations of AI-supported teaching
- “Success stories” from educators
- Better Presentation Formats
- Shorter papers
- Slides and visual summaries
- More videos
- Interactive quizzes
- Section summaries
- AI Literacy Training
- Dedicated AI literacy courses
- Prompt engineering instruction
- Guidance for students and educators
- Clear institutional policies
- Technical Guidance
- Tutorials for integrating AI tools
- Explanations of model training and bias mitigation
- Guidelines for selecting fair datasets

International Perspective

Participants generally believed the materials addressed international perspectives, especially through UNESCO documents. However, several interviewees noted that the USA and China were frequently referenced and that Europe was sometimes underrepresented. Additionally, the Global South issues were discussed more broadly than specific countries, while many participants did not perceive major geographic bias overall.

Overall Evaluation

The overall perception of the courses was positive. Participants described the courses as: interesting, relevant, thought-provoking, educational, helpful for developing awareness about AI risks and opportunities. The strongest strengths identified were: ethical reflection, awareness of bias and fairness, encouragement of critical AI use, and relevance to future teaching practice.

The strongest weaknesses identified were: excessive reliance on lengthy academic papers, too little practical application, lack of concise summaries, and insufficient concrete teaching examples. Overall, students supported integrating AI education into higher education and emphasized the importance of developing AI literacy for both students and educators.

2.3 Conclusions and Recommendations

2.3.1 Main Conclusions

Overall, the IDEAL platform and its materials and topics were perceived as highly relevant and well-aligned with stated learning objectives, especially around ethics, bias/fairness, and governance. Even with short exposure to the course – in our case as part of a different module – participants showed an upward trend in the competences that were questioned by the SPIDER questionnaire (notably rules/regulations and ethical awareness), suggesting good "quick impact" potential.

The IDEAL approach works well for building awareness and critical reflection; but might still somewhat lack stronger scaffolding for hands-on, classroom-ready application. The biggest lever for future improvement seems to be a shift from "reading-heavy knowledge" to even more "actionable teaching practice" (case-based, step-by-step, examples from international educators, templates, etc.).

2.3.2 Reflections on implementation and on the use of AI tools

What worked well: embedding the course as a pilot in existing modules (via course credit) ensured participation; the combination of qualitative interviews (Round 1) + pre/post competence self-assessment (Round 2) provided complementary insights. Regarding deviations and challenges: the short integration into a broader module limited measurable competence change; long academic readings reduced efficiency and increased workload; English-language papers were a barrier for some. Participants self-supported using tools (e.g., translation/summarization) and external sources, with their extensive feedback clearly identifying where restructuring might be needed (summaries, more visuals, more practice). AI tools were mainly used informally by students to summarize, translate, and clarify content. Here, it appeared helpful for accessibility and speed but might come at a risk concerning superficial learning and uneven support across students. To ensure that IDEAL course participants yield the full benefits of the course, several long-term improvements could include: built-in short summaries, different (self-)guided learning paths depending on specific target group, more practical tasks to integrate learnings into concrete measures during study programs, and explicit guidance on when/how to use AI tools responsibly (including expectations – and legislation! – for attribution and verification).

2.3.3 Overall feedback regarding the pilots

Overall sentiment was positive: topics were interesting, timely, and useful for developing responsible AI awareness in higher education. Most valued elements included the addition of clear learning objectives, strong ethics/fairness framing, and engaging formats like videos/visual explanations. A few sample quotes from Round 1 of the pilot:

"It's good that [the course] doesn't just report in five papers how everything works technically… instead it covers the technical aspect, but also the political one."

"Up to now it had been very theoretical… this was a long road until the circle finally closed – but it did close, and I'm glad about that."

"I found it nice that the learning objectives are clearly formulated at the top of the course, so you get a rough overview of what the course is about and what you'll learn."

"With good planning… I could integrate AI into teaching quite well, because it sensitizes you to specific problems."

"I found the course very good; I learned a lot."

On the flip side, most common criticism was: too many long, theoretical papers; not enough concrete teaching examples, implementation guidance, and "how-to" demonstrations. The typical participant takeaway was that AI should be treated as a tool with human oversight; universities should prefer clear policies and AI literacy over blanket bans. A few quotes from Round 1 of the pilot:

"For evaluating/assessment, it didn't describe well what exactly you would adjust… concrete examples of how you would restructure an exam."

"It's more motivating to look at five PDFs that are a bit more extensive than lots of small studies here and there – then you get confused."

"The information from the paper could be presented in another medium… papers take longer to work through, especially in English."

"The course could have been made a bit more pragmatic—more practical examples from multiple perspectives."

"It would help if, for the papers, there was a concise summary under each paper: aim, outcome, key findings."

2.3.4 Recommendations

For other partners: combine short competence measures (pre/post) with qualitative instruments to be able to derive learnings from both quantitative and qualitative data. While shorter pilots benefit from being credit-bearing and time-boxed with clear task instructions, allowing participants to spend even more time to focus on the course over several weeks is likely going to yield even more detailed feedback – and likely more measurable impact.

Regarding the design of content, overall reliance on long papers should be reduced (e.g., by adding structured summaries, key takeaways), and even more emphasis should be placed on slides, videos, and frequent low-stakes quizzes. Additionally – and especially relevant to educators – practical teaching scenarios and ready-to-use templates should be developed (e.g., through crowd-sourcing from other IDEAL participants) to increase applicability of knowledge obtained through the learning environment. For different target groups, various "implementation tracks" (e.g., educator track vs.

student track), step-by-step classroom integration examples, and case studies across disciplines and regions might further strengthen the bridge from competence awareness to competence performance by embedding applied tasks (lesson-plan creation, assessment redesign, policy drafting, bias-check exercises, etc.) and offering clearer guidance on responsible AI tool use during learning and teaching.

3. GERMANY: Q21 Agency for Qualification and Transfer Management Ltd

3.1 Introduction

3.1.1 Pilot description

The pilot was implemented in cooperation with BUPNET as part of an existing Continuous Professional Development (CPD) course on Project Management. The course is designed for university graduates seeking an additional professional qualification in project management and includes a practical internship component to support employability and career transitions.

The pilot involved approximately 12–14 participants from various academic disciplines. Participants were predominantly graduates holding Master's degrees or higher qualifications, including some postdoctoral researchers. Their age ranged between approximately 27 and 45 years. Based on observation during the training, the group consisted of approximately 60% men and 40% women. Participants represented a diverse range of academic and professional backgrounds, including individuals seeking entry into the labour market, professionals looking to strengthen their qualifications, and participants aiming to transition into new professional fields.

In addition to the learners, four trainers were involved in the pilot (one internal and three external trainers).

The pilot consisted of two phases:

- March 2026 – Trainer Preparation Session (2–3 hours)
  - Introduction to AI tools and current developments
  - Discussion of opportunities and limitations for integration into the Project Management course
  - Exploration of prompting concepts and AI-supported teaching approaches
- Spring 2026 – Participant Training Session (4–6 hours)
  - Hands-on workshop with Project Management course participants
  - Practical exploration of AI tools and workflows
  - Reflection on responsible and effective AI use within professional contexts

3.1.2 Purpose and objective of the pilot

The main purpose of the pilot was to raise awareness of Artificial Intelligence tools and demonstrate practical ways of integrating AI into professional learning and project management activities.

The pilot was not intended to replace existing course content but to explore how AI could support learning, communication, documentation, planning, and reflection activities within an established Project Management curriculum.

More specifically, the pilot aimed to:

- increase awareness of current AI tools and their capabilities;
- develop participants' understanding of effective prompting strategies;
- encourage critical evaluation of AI-generated outputs;
- demonstrate how multiple AI tools can be combined in practical workflows;
- explore opportunities and limitations of AI within project management practice;
- foster reflective and responsible use of AI technologies.

The pilot also served to test how the IDEAL approach—combining competence development, reflective self-assessment (SPIDER), practical experimentation, and structured learning resources—can support the integration of AI into professional education.

The pilot primarily addressed the following competence areas from the IDEAL framework:

- Responsible Artificial Intelligence Integration in Higher Education;
- Critical Evaluation of AI Outputs;
- AI Literacy, Critical AI Use, and Prompting Strategies;
- Critical Data Analysis and Validation;
- Reflective and Responsible Use of AI-supported Systems.

Particular emphasis was placed on understanding how context, objectives, available data, and intended outcomes influence AI-generated results.

3.1.3 Materials and tools used

The pilot followed a highly practical and exploratory approach. Participants were encouraged to actively engage with AI systems and test them against authentic project management tasks and real-world scenarios.

The training focused on two central questions:

1. Which AI tools are currently available and what are their strengths?
2. How can users interact effectively with AI systems through structured prompting?

The workshop introduced a range of AI tools, including:

Large Language Models (LLMs)

- ChatGPT
- Claude
- Gemini
- Le Chat (Mistral AI)

AI Productivity and Learning Tools

- NotebookLM
- Napkin.ai
- Gamma.app
- Canva AI
- Google AI Studio
- Lovable

Practical Applications Explored

Participants used AI tools for a variety of project management-related activities, including:

- Developing communication scenarios based on stakeholder communication matrices;
- Rewriting emails while maintaining the original message but adapting tone and style;
- Reviewing project reports for logical inconsistencies, missing elements, and narrative coherence;
- Creating FAQs from project documentation and learning resources;
- Generating quizzes, summaries, podcasts, and learning materials from existing course content;
- Developing presentations through the combination of ChatGPT and Gamma.app.

NotebookLM generated particularly strong interest due to its ability to work with participant-provided source materials, reducing concerns regarding hallucinated information while enabling the generation of multiple output formats.

IDEAL Resources

Participants and trainers were introduced to the IDEAL platform and its six thematic learning areas. Trainers received direct access to the platform to explore the academic background materials in greater depth.

While no specific use case from the IDEAL Best Practice Research Sheet was formally adopted, the pilot was inspired by the overall IDEAL approach of combining AI literacy, critical reflection, practical experimentation, and responsible use of AI tools.

3.2 Pilot outcomes

The pilot successfully achieved its primary objective of increasing awareness and understanding of AI-supported workflows within a professional learning environment.

Participants demonstrated strong interest in both AI tools and the broader methodological concepts behind AI use.

The strongest outcomes were observed in:

- improved understanding of prompting principles;
- increased awareness of AI strengths and limitations;
- greater confidence in experimenting with AI-supported workflows;
- stronger appreciation for critical evaluation and verification of AI-generated outputs;
- increased interest in responsible and context-sensitive AI use.

A key insight was that participants quickly moved beyond viewing AI as a simple productivity tool and began considering how AI can support reflection, communication, learning, and quality assurance.

The pilot showed a clear progression from curiosity about AI tools towards a more structured understanding of how AI can support professional work. Participants increasingly recognised that the quality of AI outputs depends on clearly defining context, objectives, and expected outcomes rather than on the tool itself.

Spider Questionnaire

Participants were introduced to the SPIDER questionnaire and encouraged to use it as an entry point to the IDEAL platform. Informal discussions indicated that many participants used the reflection tool to explore their own competence profile.

Participants actively used the SPIDER assessment to explore their current level of competence in different AI-related areas as well as their individual interests regarding the use of AI. Rather than serving primarily as an evaluation instrument, the tool was used as a means of identifying personal learning needs, challenges, and areas for further development. This self-reflection process helped participants gain a clearer understanding of their own starting point before engaging more deeply with the training activities.

The results of the SPIDER assessment also supported the final group discussion. Participants were able to reflect on their initial perceptions, compare experiences with peers, and better understand their individual learning priorities. As a result, the reflection process contributed to a more personalised and meaningful learning experience throughout the training session and helped participants identify areas for future learning and professional development.

A follow-up session is planned to gather additional participant feedback and further promote the use of the SPIDER questionnaire.

LEVEL5 Assessments

At the time of reporting, no formal LEVEL5 assessments had been completed by participants.

However, participants and trainers were informed about the newly developed LEVEL5 assessments focusing on:

- Responsible Artificial Intelligence Integration in Higher Education;
- Critical Data Analysis and Validation in Higher Education.

Future implementation of the LEVEL5 assessments is planned during the continued piloting activities and follow-up sessions.

Additional Evaluation Methods

The pilot primarily relied on:

- direct observation;
- participant discussions;
- trainer feedback;
- informal qualitative feedback collected during and after the workshop.

Participants actively engaged in discussions about AI opportunities, limitations, employability, ethical considerations, data protection requirements, and future workplace implications.

3.3 Conclusions and recommendations

3.3.1 Main conclusions

The pilot revealed a high level of interest in AI among both trainers and participants.

One of the most significant findings was that, while participants were familiar with AI tools such as ChatGPT, they lacked structured approaches for effectively integrating AI into their professional activities.

The strongest learning outcomes were not linked to individual tools, but rather to developing a more strategic understanding of:

- prompting;
- workflow design;
- tool selection;
- critical evaluation;
- responsible use.

Another important finding was the tension between enthusiasm for AI and institutional constraints. While trainers recognised the potential of AI, the certified Project Management curriculum only permits limited modification of official learning content.

The pilot therefore highlighted the opportunities and challenges of integrating AI into established educational programmes.

3.3.2 Reflections on implementation and on the use of AI tools

The practical and hands-on nature of the workshop worked particularly well. Participants appreciated the opportunity to explore real tools using authentic project management tasks.

NotebookLM generated the strongest engagement due to its ability to work with participant-provided materials and generate multiple forms of outputs such as summaries, FAQs, podcasts, and mind maps.

One challenge was the limited time available. Participants repeatedly expressed interest in exploring tools and workflows in greater depth.

Additional challenges included:

- uncertainty regarding data protection and GDPR compliance;
- differences between institutional and personal AI usage possibilities;
- rapidly changing AI tool ecosystems;
- limited opportunities for integrating AI into formally regulated curricula.

Despite these challenges, participants remained highly motivated and optimistic regarding future AI adoption.

3.3.3 Overall feedback regarding the pilots

Overall feedback from both participants and trainers was highly positive.

Participants particularly appreciated:

- practical demonstrations;
- direct experimentation with AI tools;
- exposure to tools beyond ChatGPT;
- discussions about responsible AI use;
- opportunities to apply AI to their own professional contexts.

A recurring message from participants was that AI should not be seen as a shortcut but as a tool that supports deeper exploration, reflection, communication, and documentation.

Many participants also expressed the need for further training opportunities focused on practical implementation and advanced prompting techniques.

Several participants stated that the workshop fundamentally changed the way they think about AI—from a tool for generating text towards a collaborative assistant for analysing, improving and structuring their own work.

3.3.4 Recommendations

Based on the pilot experience, the following recommendations are proposed:

- Increase the amount of hands-on practice during future pilots.
- Integrate AI activities directly into authentic learning tasks whenever possible.

- Allocate additional time for prompting exercises and workflow development.
- Include follow-up sessions to support long-term adoption.
- Encourage participants to complete SPIDER and LEVEL5 assessments before and after training activities.
- Continue combining theoretical understanding with practical experimentation.

Recommendations for the IDEAL Approach

The IDEAL approach provides a valuable combination of reflection, learning resources, and competence development tools.

Future improvements could include:

- additional practical examples and use cases linked to specific professions;
- more workflow-oriented learning scenarios;
- expanded guidance on prompting and AI tool selection;
- greater emphasis on organisational and data protection considerations;
- stronger connections between SPIDER results and recommended learning pathways.

The pilot demonstrated that participants are highly motivated to explore AI. The pilot demonstrated that awareness of AI is already widespread among highly educated professionals. The challenge now is supporting learners in moving from occasional experimentation towards purposeful, critical, and sustainable integration into their professional practice.

Future pilots could benefit from a stronger integration of the IDEAL platform throughout the learning process rather than introducing it only as a supporting resource. Embedding SPIDER reflections, learning modules, and follow-up activities into a coherent learning pathway may increase long-term engagement.

4. GREECE: Aristotle University of Thessaloniki

4.1 Introduction

Partner institution: Aristotle University of Thessaloniki

Country: GreecE

Responsible person(s): George K. Zarifis

4.1.1 Pilot description

The Greek pilot was implemented by Aristotle University of Thessaloniki (AUTH) within the undergraduate course P1808 – Design and Evaluation of Vocational Training Programmes, during the Spring Semester 2025–2026 (9 February – 22 May 2026). The pilot was designed as one local AUTH WP5 pilot embedded in a real higher education course context and structured around a collaborative, scenario-based approach.

It involved 54 undergraduate students, organised into 10 groups of approximately 5–6 students, and 6 teaching staff members who supported facilitation, observation, guidance, formative checkpoint review, and evaluative reflection. Rather than functioning as ten separate pilots, the Greek case is best understood as one umbrella pilot operationalised through ten scenario-based micro-implementations, each resulting in a completed thematic-unit design on the responsible use of artificial intelligence in higher education.

The beneficiaries of the pilot were primarily undergraduate students in the field of vocational education and training, while the teaching staff functioned as pedagogical facilitators and reflective practitioners. Depending on the scenario selected, the designed thematic units addressed different target audiences in higher education, including students, teaching staff, and administrative staff.

Gender and exact age-disaggregated data were not systematically recorded during the pilot documentation process. For this reason, the report does not quantify them retrospectively. What can be stated with confidence is that the student cohort consisted of undergraduate students enrolled in the course P1808 (Design and Evaluation of Vocational Training Programmes), while the six staff members represented the teaching team supporting the pilot.

Participant profile element	Greek pilot description
Pilot format	One AUTH local WP5 umbrella pilot implemented through 10 scenario-based micro-implementations
Main student participants	54 undergraduate students in B1808
Teaching staff involved	6
Group structure	10 groups of approximately 5–6 students
Main output structure	10 completed thematic-unit designs with associated protocol deliverables
Gender/age data	Not systematically recorded in pilot documentation

Implementation timeline

Phase	Description
Phase 1	Orientation to the IDEAL project logic, introduction to the course task, and familiarisation with the Moodle-based IDEAL Learning Suite.
Phase 2	Group formation and scenario allocation/selection from the ten-scenario bank embedded in the protocol.
Phase 3	Guided exploration of platform materials and early conceptualisation of the thematic units.
Phase 4	Protocol-guided drafting of thematic units, AI-use transparency appendices, alignment tables, and reference lists, with staff checkpoints.
Phase 5	Completion and submission of the group outputs, followed by reflective feedback and evaluative consolidation.
Overall duration	Implemented over the Spring Semester 2025–2026 within the normal rhythm of the course.

4.1.2 Purpose and objective of the pilot

The main purpose of the Greek pilot was to test how the IDEAL approach could be implemented in a real higher education course environment in Greece by combining structured online learning materials with a protocol-guided design task. More specifically, the pilot examined whether students could engage critically and constructively with AI-related educational content and transform it into coherent, ethically grounded, and pedagogically viable thematic units for higher education.

The pilot was not designed merely to expose students to discussions about AI. Its deeper objective was to examine whether the IDEAL approach could support pedagogical translation: that is, whether curated online materials on ethics, fairness, competencies, institutional perspectives, responsible use, and critical literacy could be turned into concrete teaching-and-learning designs suited to differentiated higher education contexts.

A second objective was to generate practical implementation evidence for WP5. The Greek pilot therefore aimed to produce not only learning experiences, but also tangible pedagogical artifacts, reflective implementation knowledge, and structured feedback capable of informing the wider IDEAL implementation strategy.

Targeted competence areas from the IDEAL framing

Competence area	Relevance to the Greek pilot
3.1 Critical AI Literacy in Higher Education Teaching	To support critical reading of AI outputs, recognition of hallucinations, questioning of authority effects, and reflective use of AI in educational settings.
3.2 Data Ethics and Privacy in Teaching with AI	To foreground protection of personal data, privacy-sensitive design, and responsible handling of information within educational tasks.
3.3 Promoting AI Fairness and Social Justice in Teaching Practice	To address bias, fairness, inclusion, and differentiated effects of AI on different users and groups.
2.1 AI-Informed Course Design for Diverse Learners	To support the design of structured thematic units tailored to specific target groups and learning settings.
2.4 AI-Aided Learning Resource Curation	To enable selection, adaptation, and contextual use of AI-related educational resources.
2.5 AI-Based Curriculum Evaluation and Improvement	To connect outputs, assessment logic, and reflective improvement indicators.
1.1 AI-Supported Inclusive Instructional Design	To encourage accessible and inclusive design choices where relevant to the selected scenario.
1.3 AI-Augmented Teaching Adaptability	To promote flexible but responsible pedagogical adaptation of AI within higher education contexts.
4.1 AI-Supported Reflective Professional Development	To support reflective development among teaching staff and future educators.

4.3 AI for Inclusive Institutional Development and Innovation	To link scenario work with broader institutional questions, especially where scenarios touched policy, administration, or support structures.

4.1.3 Materials and tools used

The Greek pilot combined two main pillars: (a) the IDEAL Learning Suite as the online content environment, and (b) the Protocol for Designing a Thematic Unit on the Responsible Use of AI in Higher Education as the pedagogical implementation framework.

The IDEAL Learning Suite was hosted on a Moodle-based environment and functioned as the main digital resource base for the pilot. The online content environment included six main thematic areas: Ethical Use of GenAI in Higher Education; Bias and Fairness of GenAI; Frameworks and Competencies; Broader Impact and Institutional Perspectives; (Responsible) Use of AI; and Stakeholder Perceptions and Critical Literacy. Across these areas, students engaged with readings, short presentations, research papers, policy texts, video lectures, framework resources, practical guidance, reflective activities, and recap quizzes.

The second core element was the course protocol, which functioned as the structured design and assessment mechanism for the pilot. Students selected one scenario from a bank of ten scenarios and developed a complete thematic unit with a clearly defined target group, purpose, learning outcomes, 2–4 learning activities, formative and final assessment, a risk map with mitigation measures, supporting sources, and a short improvement/evaluation plan. The protocol also required an appendix on transparency of AI use, an alignment table, and a short list of reliable references and policy sources.

The pilot also drew on the blank protocol template and two completed example scenario documents that modelled the expected level of coherence and detail. These examples were used as reference points rather than as scripts to be copied. Their main role was to make visible the structure and level of analytical integration expected from the students.

In relation to AI tools, the pilot did not prescribe one single mandatory product for all groups. Instead, groups were permitted to use generative AI tools selectively and transparently in support of brainstorming, restructuring, language refinement, comparative prompting, and the checking of alternative formulations. Because tool choice was not standardised across all groups, the report foregrounds the functions of AI use rather than a single mandated tool. The decisive requirement was that any use of AI had to be documented, critically reviewed, and subordinated to human judgment, as reflected in the transparency appendix.

Main digital and pedagogical resources used

Resource / tool	Role in the pilot
IDEAL Learning Suite (Moodle)	Main online content environment containing thematic modules, readings, videos, quizzes, and reflective tasks.
B1808 Protocol	Pedagogical design-and-assessment framework governing all group outputs.
Blank completion template	Operational form used by students to structure the thematic-unit design.
Completed example scenario documents	Reference models showing how a thematic unit could be completed coherently for different scenarios and target groups.

Scenario bank (S1–S10)	Set of ten scenario prompts used to differentiate group work and contextual application.
Course guidance and staff checkpoints	Human support layer ensuring coherence, focus, and staged quality control.

Use case inspiration. The Greek pilot did not rely on the direct replication of one single named use case from the IDEAL Desk Best Practice Research Sheet. Instead, it was principally informed by the IDEAL Learning Suite as an internal project resource environment, by the IDEAL competence-framework orientation embedded in Topic 3 of the online course, and by the B1808 protocol and its example scenario logic. In that sense, the pilot drew inspiration from the wider IDEAL resource ecology rather than from one isolated benchmark case.

4.2 Pilot outcomes

The Greek pilot aimed to generate both pedagogical products and implementation insights. The targeted outcomes included student engagement with IDEAL learning materials, collaborative design of structured thematic units on responsible AI use in higher education, and reflective evidence on the feasibility and pedagogical value of the IDEAL approach in a Greek higher education course context.

These outcomes were achieved through the completion of 10 scenario-based thematic-unit designs, each produced by one student group and developed according to the common protocol. Across these outputs, students demonstrated engagement with key elements such as pedagogical purpose, learning outcomes, AI-supported learning activities, ethical and risk-aware design, transparency of AI use, and assessment alignment.

Outcome areas: targeted and achieved

Outcome area	Targeted outcome	Achieved outcome	Main evidence
Engagement with IDEAL materials	Students engage critically with structured project content	Achieved across all groups through selective use of the Learning Suite	Group outputs; student feedback; staff observations
Scenario-based design work	Students translate AI-related content into contextualised higher-education units	Achieved through ten completed scenario-based thematic units	10 completed thematic-unit designs
Ethical and critical awareness	Students integrate fairness, privacy, transparency, and risk awareness	Achieved unevenly but substantially across outputs; strongest in risk mapping and transparency sections	Risk maps; transparency appendices; feedback

Assessment and alignment thinking	Students connect outcomes, activities, assessment, and mitigation measures	Achieved through mandatory protocol alignment logic	Alignment tables and final designs
Implementation evidence	Pilot yields transferable insights for WP5	Achieved through staff reflections, student feedback, and artifact analysis	Observation notes; reflections; synthesis
Transferable pedagogical examples	Produce reusable examples for future IDEAL implementation	Achieved through ten differentiated scenario-based outputs	Scenario table; artifacts

Spider questionnaire

The Spider questionnaire was not used in this pilot. Instead, the Greek case relied on a more context-sensitive evaluation model built around analysis of the group outputs, structured participant feedback, teaching staff reflections, and implementation-process observations. This choice should not be read as a methodological gap but as a locally coherent decision within a course-embedded pilot that already generated substantial artifact-based and reflective evidence.

LEVEL5

The LEVEL5 assessment was offered as an option to participants, but it was not used in the Greek pilot. The central reason was contextual rather than negative: the pilot tasks were already embedded in an assessed course project, evaluated through portfolio-based course assessment and linked to formal ECTS recognition. In this setting, students and teaching staff did not perceive LEVEL5 as necessary or as offering sufficient added value beyond the already existing course-based assessment framework. No LEVEL5-based assessment data are therefore reported for the Greek case.

Additional instruments used

Instrument	Participants / volume	Data type	Purpose
Analysis of completed thematic-unit outputs	10 group outputs + associated deliverables	Qualitative + product-based	To assess coherence, pedagogical quality, ethics/risk integration, transparency, and alignment
Student feedback corpus	54 short feedback statements	Qualitative	To capture participant experience of the platform, protocol, group work, and learning value
Teaching staff reflections	6 short reflections	Qualitative	To capture feasibility, workload, pedagogical value, and transfer potential
Observation/ process notes	Teaching team notes across implementation	Qualitative	To document checkpoints, recurring difficulties, support needs, and implementation dynamics
Participation counts	54 students; 6 staff; 10 groups	Quantitative	To document scale, scope, and local pilot reach

Overview of the ten group/scenario outputs

Group	Scenario	Scenario title	Main target group	Status
Group 1	S1	Academic Writing and Integrity	Students	Completed
Group 2	S2	Assessment and Feedback with AI Support	Teaching staff	Completed
Group 3	S3	Research Methodology in the Social Sciences/Humanities	Students	Completed
Group 4	S4	Ecological/Climate Literacy and Misinformation	Students	Completed
Group 5	S5	Health/Biosciences: Safety and Responsibility in AI Use	Students	Completed
Group 6	S6	Law and Public Policy: Evaluation of Claims	Students	Completed
Group 7	S7	Accessibility and Inclusion with AI	Students and staff	Completed
Group 8	S8	Media and Content Creation: Copyright and Deepfakes	Students	Completed
Group 9	S9	HE Administrative Services: Conversational Support and Data	Administrative staff	Completed
Group 10	S10	Professional Development of Teaching Staff: AI Literacy	Teaching staff	Completed

4.3 Conclusions and recommendations

4.3.1 Main conclusions

The Greek pilot suggests that the IDEAL approach can be implemented productively in a course-based higher education setting when online project materials are combined with a clearly structured pedagogical protocol. The combination of the IDEAL Learning Suite and the P1808 protocol made it possible to move beyond general awareness-raising and into the structured design of concrete, ethically informed thematic units on AI in higher education.

A key strength of the Greek pilot was that it generated concrete pedagogical artifacts rather than only discussion or perception data. The ten completed outputs provided tangible examples of how the IDEAL approach can be translated into differentiated higher education scenarios. This artifact-producing dimension is analytically significant because it demonstrates that the pilot yielded not only attitudinal evidence but also reusable pedagogical material.

A second major conclusion is that the scenario-based design model was effective in linking AI-related content to specific educational situations. The scenario structure helped students move from generic statements about AI to context-sensitive reflection on target groups, pedagogy, fairness, assessment, and risk.

A third conclusion concerns the local transferability of the IDEAL approach. The Greek pilot indicates that the model is viable beyond technically oriented courses, provided that the online materials are

paired with a disciplined implementation framework, staged support, and explicit expectations concerning transparency and critical judgment.

4.3.2 Reflections on implementation and on the use of AI tools

Overall, the pilot worked well as a blended structure combining online course content with collaborative design work. The online materials provided breadth, conceptual grounding, and access to a wide range of perspectives, while the protocol created coherence, structure, and a clear expectation of pedagogical and ethical rigour.

One implementation challenge was the need to translate a broad online resource environment into focused group outputs without overwhelming students. This was partly addressed through staff guidance, staged checkpoints, and the discipline imposed by the protocol. Even so, the volume of available material created selection pressures, and students sometimes needed support in narrowing their thematic focus and retaining only the essential content for a viable thematic unit.

A second challenge concerned the balance between the use of AI tools as support and the need to preserve human judgment, verification, and pedagogical responsibility. The pilot handled this challenge by embedding transparency requirements, critical evaluation of AI output, and explicit risk-mitigation thinking into the design task. This helped position AI as a support mechanism rather than a substitute for educational reasoning.

From the point of view of staff implementation, the pilot was feasible and pedagogically meaningful, but it did require coordination, close monitoring, and recurrent clarifications. Quality did not arise automatically from access to the platform; it depended on facilitation, intermediate feedback, and a shared standard of what counted as an acceptable and coherent output.

The non-use of LEVEL5 is best interpreted as a context-sensitive implementation outcome. In a course where the pilot tasks already formed part of an assessed portfolio and were recognised through formal ECTS, participants did not perceive a separate validation route as sufficiently necessary or relevant. This does not indicate resistance to competence validation as such; rather, it indicates that local assessment ecologies matter when deciding whether optional tools are taken up.

Analytical synthesis of implementation factors

Factor	What worked well	Challenge / implication
Platform content	Provided rich conceptual and practical resources across major AI-related themes	Required guidance to avoid overload and improve relevance selection
Protocol structure	Created coherence, discipline, and analytical depth	Demanding for students; needed staged explanation and checkpoints
Scenario-based design	Made the task realistic and context-sensitive	Some groups needed support in narrowing the scenario scope
AI use in task completion	Supported brainstorming, restructuring, and drafting support	Needed explicit boundaries to prevent substitution for judgment
Teaching-team facilitation	Improved coherence and quality control	Created workload and coordination demands

4.3.3 Overall feedback regarding the pilot

Participant feedback from the Greek pilot was broadly positive, while also highlighting the complexity of the task. Students valued the structured combination of online IDEAL materials and protocol-guided group design, particularly the way the pilot connected AI use with pedagogy, ethics, transparency, and risk awareness. Many participants experienced the scenario-based format as realistic and intellectually useful because it moved the discussion beyond general impressions of AI and into concrete higher education applications.

At the same time, student feedback showed that the richness of the online materials and the demands of the protocol required substantial guidance. Recurrent difficulties included selecting the most relevant resources from the platform, narrowing the scope of the thematic unit, maintaining coherence across group-produced sections, and distinguishing between legitimate AI-supported assistance and excessive reliance on AI-generated outputs.

Teaching staff feedback converged on a similar conclusion: the pilot was pedagogically meaningful and transferable, but only because the platform materials and the protocol were treated as complementary elements rather than as separate layers. Staff also emphasised that the strongest outcome of the pilot was not simply discussion about AI, but the production of structured pedagogical artifacts that can inform future implementation work.

Thematic synthesis of participant feedback

Feedback theme	Main pattern observed	Analytical implication
IDEAL online materials	Viewed as rich, relevant, and internationally grounded, but sometimes difficult to navigate selectively	Strong resource base; needs sharper orientation support
Protocol structure	Experienced as demanding but clarifying and quality-enhancing	Design discipline is valuable and should be retained
Scenario-based task	Perceived as realistic, contextual, and more meaningful than generic discussion	Scenario logic is a strong transfer mechanism
Group collaboration	Improved discussion and quality, but required coordination	Collaborative design is useful but needs scaffolding
Ethics and criticality	Helped participants move beyond instrumental views of AI	Pilot strengthened reflective and critical AI literacy
Improvement suggestions	Need for shorter orientation guides, clearer mapping, and more checkpoints	Future iterations should reduce uncertainty at the outset

Illustrative synthesised participant voices

- Students repeatedly indicated that the project helped them understand that AI in higher education is not only about tools, but also about responsibility, verification, and pedagogical consequences.
- A recurrent message in the student feedback corpus was that the protocol was demanding, yet precisely this demand created clarity, coherence, and a stronger final product.

- Teaching staff reflections stressed that students engaged more seriously with ethical issues once they had to translate abstract concerns into an actual learning design.
- Another consistent message was that the pilot worked best when the online materials and the protocol were experienced as mutually reinforcing rather than as unrelated components.

4.3.4 Recommendations

Based on the Greek pilot, several recommendations emerge for future implementation.

1. First, the combination of a structured online learning environment and a clearly defined pedagogical protocol appears to be particularly effective. Future pilots may benefit from maintaining this dual structure: a resource-rich platform on the one hand, and a disciplined design-and-documentation mechanism on the other.
2. Second, scenario-based group work is a strong implementation model, but it requires careful scaffolding. Clear instructions, staged checkpoints, and reference examples should remain central. Where possible, future iterations should also include a short mapping guide that links specific platform topics more directly to the ten scenarios.
3. Third, future pilots would benefit from stronger early orientation in relation to selecting relevant materials from the platform, narrowing scope, and distinguishing between productive AI assistance and unacceptable substitution of human work.
4. Fourth, when optional common assessment or validation tools are offered across partners, their uptake should be considered in relation to local assessment ecologies. In the Greek pilot, LEVEL5 was offered but not used because participants did not perceive it as adding sufficient value beyond portfolio-based assessment and formal ECTS recognition. Future cross-partner planning should therefore take account of when such tools are likely to be experienced as complementary rather than duplicative.
5. Fifth, the IDEAL approach could be strengthened by making even more explicit links between online modules, competence-framework areas, and scenario-based applications. This would enhance navigability, support transferability, and make local adaptation easier for institutions working in diverse higher education fields.

Recommendation matrix

Recommendation area	Proposed adjustment	Why it matters
Platform navigation	Add short orientation guide and scenario-to-topic mapping	Improves resource selection and reduces overload
Implementation scaffolding	Retain checkpoints and examples; consider one extra early checkpoint	Supports coherence and reduces drift across groups
AI-use guidance	Clarify acceptable versus excessive AI assistance even more explicitly	Protects academic integrity and pedagogical responsibility
Cross-partner comparability	Use common instruments only where they add value to local assessment ecology	Avoids duplication and supports meaningful uptake
Transfer support	Strengthen links between modules, competences, and scenario applications	Improves usability for future partners and contexts

ANNEX

Pilot snapshots (Photos during the last phase of the pilot)






5. ITALY: National Research Council of Italy

5.1 Introduction

Partner institution: National Research Council of Italy — Institute for Educational Technologies (CNR-ITD)

Country: Italy

Responsible person(s): Andrea Nelson Mauro, researcher, National Research Council of Italy — Institute for Educational Technologies

5.1.1 Pilot description

The pilot was conducted within the **Data Visualization** course (DATAVIZ) offered to postgraduate students enrolled in the **Data Science** and **Theory and Techniques of Complex Systems (TTC)** Master's programmes at the **Università degli Studi di Milano-Bicocca (UNIMIB)**, Italy.

Facilitator: Andrea Nelson Mauro (CNR-ITD), who served as instructor and researcher, and was responsible for course design, delivery, and subsequent data collection.

Target group and numbers involved: A total of **N = 159 students** participated across three examination sessions:

- Session 1 — 23 January 2026: 143 students
- Session 2 — 5 February 2026: 14 students
- Session 3 — 10 June 2026: 2 students (preliminary drafts)

The student population was composed of **96 male, 55 female**, and 8 students with unrecorded gender. All participants were postgraduate students in quantitative, computational, or data-oriented disciplines. Age range was not systematically recorded, but the cohort was consistent with Master's-level students (estimated 22–30 years).

Short timeline of the pilot:

Period	Activity
November 12 – January 8, 2025–2026	Teaching phase (weekly laboratory sessions, Wed+Thu, LAB facilities UNIMIB)
January 23, 2026	First examination session (143 projects submitted)
February 5, 2026	Second examination session (14 projects submitted)
June 10, 2026	Third examination session (2 projects submitted)

Teaching sessions combined **lectures** (2-hour slots) and **laboratory turns** (2.5–3-hour practical sessions), held in computer-equipped lab facilities (LAB1401 and LAB4A1, building U14/U4) to support hands-on data analysis and visualization work.

How the pilot was conducted: Students were required to produce a **data visualization project** — an analytical report combining data acquisition, processing, visualization, and narrative — on a freely chosen topic. The assessment brief explicitly required students to include a **methodology section** documenting all tools used, including AI tools, as part of the reproducibility requirements. This made AI disclosure a formal component of the project structure rather than an optional transparency gesture. Projects were submitted as PDF documents and subsequently analysed using automated keyword-based extraction (see §1.3).

5.1.2 Purpose and Objectives of the pilot

Purpose: The primary purpose of the pilot was to test whether embedding an **explicit AI disclosure requirement** within the assessment structure of a postgraduate data science course would produce measurable, systematic documentation of student AI use. The secondary purpose was to characterise the pattern of AI tool adoption — which tools, for what purposes, with what degree of multi-tool complexity — in a technically advanced student cohort.

The pilot was motivated by the observation that prior studies on Italian higher education data journalism courses (academic year 2023–2024) had found a transparency rate of only 13.0%, raising the question of whether low disclosure reflected low usage or low institutional expectation. By making disclosure a formal requirement, the UNIMIB pilot tested the hypothesis that **pedagogical design is the primary driver of transparency behaviour**.

Targeted competences from the IDEAL Competence Framework:

The pilot primarily targeted the following competences:

- **Type 3 — Ethical, Inclusive, and Data-Literate AI Use Competences**
  - **3.4 Transparency and Accountability in AI Use**: The mandatory documentation of AI tools in the methodology section directly operationalises this competence. Students were expected to name the tools used, describe the purpose of each tool, and integrate this declaration into the reproducibility section of their project.
  - **3.1 Critical AI Literacy in Higher Education Teaching**: Students were implicitly expected to understand AI as an assistive tool rather than a replacement for their own analytical work, and to evaluate the outputs of AI systems critically.
- **Type 1 — Pedagogical-AI Integration Competences**
  - **1.5 AI in Reflective and Metacognitive Skill Development**: The structured disclosure requirement created conditions for students to reflect on how, when, and why they used AI tools — fostering metacognitive awareness of their own AI-mediated workflow.
- **Type 2 — AI-Enhanced Curriculum Design and Assessment Competences**
  - **2.2 AI-Assisted Inclusive Assessment Design**: From the instructor's perspective, the redesign of the assessment rubric to explicitly include AI disclosure is an instance of assessment design that incorporates AI as a methodological dimension rather than a threat to academic integrity.

5.1.3 Materials and tools used

How the pilot was conducted: The course followed a project-based learning model. During the teaching phase (November–January), students received instruction in data analysis and visualization techniques using Python (Pandas, Matplotlib, Seaborn) and R (tidyr, dplyr, ggplot2). Students were free to use any AI tools they chose; the requirement was that any AI tool used be declared and described in the methodology section of the final project.

AI tools declared by students (as extracted from submitted PDF projects):

Tool	Role in student work (as declared)
ChatGPT	Code generation, debugging, text refinement, concept explanation
Gemini	Visualization troubleshooting, API error resolution, narrative drafting

Claude	Code structure and best-practice verification, documentation support
Copilot	Inline code suggestions (VS Code IDE integration)
Google Colab	Computational notebook environment (not generative AI, but declared as tool)
Grok	Data processing support

Other digital resources used: Python data science stack (Pandas, Seaborn, Matplotlib), R statistical environment, GitHub and Google Colab for reproducible workflows, public open data portals (Eurostat, ISTAT, national statistical agencies).

Assessment instrument used by the researcher: A keyword-based automated extraction methodology was applied post-hoc to all 159 submitted PDF projects. Text was extracted using **PyMuPDF (fitz)**, and 24 AI-related keywords were searched across each document. Each match was classified by use type (methodological declaration vs. AI as research subject vs. indeterminate) and by functional category (code generation, data processing, visualisation support, information retrieval, content generation). The extracted data formed structured JSON datasets used for quantitative analysis. This instrument was developed within the CNR-ITD research programme and served as the primary additional assessment instrument for the pilot.

IDEAL resources: The pilot was informed by the IDEAL Competence Framework (WP2), specifically the competence cluster around transparency and accountability in AI use (Type 3). The design of the mandatory disclosure requirement draws conceptually from the IDEAL emphasis on AI use as a professional and ethical responsibility, not merely a technical choice.

5.2 Pilot outcomes

Outcomes targeted and achieved:

The pilot targeted two main outcomes: (1) a measurable, documented rate of AI tool disclosure exceeding rates observed in prior studies; (2) a characterisation of the functional patterns of AI use in a postgraduate data science context.

Both outcomes were achieved:

Quantitative results (from automated PDF analysis):

Metric	**Value**
Total projects analysed	159
Projects with AI tool declaration	107 (67.3%)
Projects without AI declaration	52 (32.7%)

Total AI mentions extracted	379
Students using 2+ distinct AI tools	73% of those with AI declaration

The 67.3% transparency rate substantially exceeds the 13.0% baseline observed in the prior study (AY 2023–2024) on comparable Italian higher education data journalism contexts.

Functional breakdown of declared AI use:

- **Code generation and debugging**: the predominant use category, with students describing AI as supporting Python and R code writing, syntax error resolution, and algorithmic logic verification.
- **Visualisation support**: troubleshooting chart libraries, resolving API errors, optimising visual output.
- **Data processing**: assistance with data cleaning, reshaping, and transformation logic.
- **Text refinement**: a smaller subset described using AI to refine English-language explanatory text or summarise analytical findings.
- **Information retrieval**: background context for the project topic, subsequently verified against primary sources.

Content generation (AI producing primary analytical content or argumentation) was **absent or marginal** in the declared record.

Multi-tool usage: 73% of students who declared AI use reported using two or more distinct tools within the same project — a pattern not observed in the 2023–2024 baseline. Typical combinations included ChatGPT for code debugging + Gemini for visualisation troubleshooting, or Claude for code review + Copilot for inline suggestions.

Spider questionnaire: The Spider questionnaire has not yet been administered in this pilot. Administration is planned for a future iteration of the course. Results will be reported when available.

LEVEL5 assessments: LEVEL5 assessments were not conducted in this pilot.

Additional instruments: The primary additional instrument was the keyword-based automated PDF extraction described in §1.3. This instrument provided quantitative data at scale (N=159) and verbatim citation evidence for qualitative characterisation. Selected verbatim citations from student projects (anonymised, reproduced exactly as extracted):

> *"Use of AI Tools: Claude AI and Cursor AI was used for code structure and best-practice verification, including suggesting optimal pandas operations for data cleaning, recommending appropriate statistical techniques, and debugging syntax errors."*
>
> *"ChatGPT was used to assist with code structuring, debugging, and explanation of concepts."*

"I used ChatGPT to obtain contextual background information on the material underlying my project, particularly to deepen the thematic context and support the data analysis and interpretation phase. I then double-checked the given context with other sources of information."

"Gemini was used specifically for troubleshooting API authentication errors and generating the syntax for complex Seaborn visualizations."

"Copilot integrated into the Visual Studio Code IDE was used for inline suggestions, ChatGPT to summarize long sentences and simplify writing in English."

These citations document that students treated AI as a **technical support tool** within a larger, human-driven analytical workflow — consistent with the IDEAL framework's framing of AI as assistive rather than autonomous.

5.3 Conclusions and Recommendations

5.3.1 Main conclusions

The principal finding of this pilot is that **making AI disclosure a formal requirement of the assessment structure reliably produces systematic documentation**. The 67.3% transparency rate — compared to 13.0% in prior studies where disclosure was not explicitly required — indicates that pedagogical design is the dominant driver of disclosure behaviour, more significant than AI availability, disciplinary context, or individual student motivation.

With regard to the IDEAL approach, the pilot supports the following observations:

- **Transparency and Accountability in AI Use (3.4)** is achievable at scale in postgraduate technical education when embedded as an explicit assessment criterion. Institutional ambiguity ("AI is allowed but undocumented") is the main barrier; removing that ambiguity produces rapid behavioural change.
- **Critical AI Literacy (3.1)** was evidenced by a subset of students who documented not just tool use but their critical evaluation of AI outputs — notably, one student explicitly stated they "double-checked the given context with other sources of information," and several students framed AI as supporting specific technical sub-tasks rather than driving the overall analysis.
- **Multi-tool workflows** represent a new complexity that existing AI literacy frameworks — including IDEAL — may not yet fully address. Students navigating ecosystems of competing AI tools require guidance on tool selection, workflow documentation, and responsibility attribution across tool boundaries.

5.3.2 Reflections on implementation and on the use of AI tools

What worked well: Embedding AI disclosure in the methodology/reproducibility section — already a standard component of data science projects — made the disclosure requirement feel natural rather than punitive. Students accustomed to documenting data sources, code repositories, and analytical

pipelines applied the same logic to AI tools. The 67.3% compliance rate (in the absence of enforcement mechanisms) suggests the norm was largely internalized.

Challenges:

- **32.7% non-disclosure**: Despite the formal requirement, approximately one-third of students did not declare AI use. Whether this reflects actual non-use, incomplete understanding of the requirement, or deliberate omission cannot be determined from declaration data alone.
- **Tool classification ambiguity**: Google Colab (a computational notebook environment) appeared in declarations, raising the question of where the boundary between AI tools and standard digital infrastructure lies. Future guidelines should clarify this.
- **Extraction quality**: Some UNIMIB PDF submissions were image-based or scanned; text extraction for these files was partial, and AI mentions in these documents may be undercounted.

How AI tools supported teaching and learning: Based on the declared use patterns, AI tools in this context primarily functioned as **technical scaffolding** — reducing friction in code writing and debugging without displacing the student's analytical judgment. The high frequency of code-related declarations (Python, R, Pandas, Seaborn) and the low frequency of content generation declarations suggest students used AI to accelerate technical execution while retaining ownership of analytical framing and interpretation.

5.3.3 Overall feedback regarding the pilots

Direct qualitative feedback from students (e.g., survey responses, interviews) was not collected in this pilot iteration. The verbatim citations extracted from project submissions provide indirect evidence of student attitudes toward AI tools. The tone of declarations is consistently instrumental and technically grounded — students describe AI as a means to a specific technical end (debugging, visualisation, error resolution) rather than as a general-purpose substitute. The absence of apologetic or defensive framing in declarations suggests that students perceived AI use as professionally legitimate within the course context.

Note: The Spider questionnaire is planned for the next iteration of the course to collect direct competence self-assessment data from participants.

5.3.4 Recommendations

For other IDEAL partners:

1. **Embed disclosure as a formal assessment requirement, not a recommendation.** The most actionable lever for transparency is assessment design. Even a single sentence in the assessment rubric — "Document all AI tools used, specifying tool name and purpose" — appears sufficient to substantially change disclosure behaviour in technically-oriented student cohorts.
2. **Leverage existing documentation culture in technical disciplines.** Data science and computational programmes already expect students to document code repositories, data

sources, and analytical pipelines. Positioning AI disclosure as part of this reproducibility norm — not as a separate ethics compliance exercise — reduces resistance and increases uptake.

3. **Prepare for multi-tool workflow complexity.** Students now use multiple AI tools in a single project, selecting tools for specific sub-tasks. Assessment rubrics and AI literacy guidelines should address workflow documentation (which tool for which task), not just single-tool disclosure.
4. **Combine quantitative extraction with Spider questionnaire data.** The automated PDF extraction methodology used in this pilot provides population-level, unobtrusive data on declared use. Combined with pre/post Spider questionnaire data, it would enable triangulation between self-reported competence development and actual declared behaviour. The two instruments are complementary rather than redundant.

Adjustments planned for the next phase: Administer the Spider questionnaire to students at both the beginning and end of the course to measure competence development related to AI transparency, critical AI literacy, and reflective AI use. Develop explicit guidelines clarifying which tool categories should be declared (generative AI vs. computational environments vs. AI-assisted IDEs). Consider whether a qualitative interview component could capture the reasoning behind non-disclosure in the 32.7% of projects where no AI use was documented.

For the IDEAL approach: The IDEAL framework's emphasis on transparency and accountability (Type 3) maps clearly onto assessment-level interventions in technical higher education. However, the framework may benefit from more explicit guidance on **multi-tool AI workflows** — a phenomenon now widespread in postgraduate STEM education that requires competence descriptors addressing tool selection judgment, cross-tool consistency, and documentation across heterogeneous AI ecosystems.

ANNEX

Pilot snapshots planned for next iteration. The following data artefacts from the current pilot are available for verification:

- *Anonymised structured JSON dataset (159 students, keyword extraction results)*
- *Verbatim citation corpus (379 AI instances extracted from PDF submissions)*
- *Keyword frequency distribution across 24 AI-related terms*
- *Session-level breakdown of transparency rates (January, February, June 2026)*

Original PDF submissions are held under data governance arrangements agreed with UNIMIB. Personal identifiers (names, student IDs) are not included in shared research outputs.

6. ITALY: University of Milano-Bicocca – Pilot 1

6.1 Introduction

Partner institution: University of Milano-Bicocca

Country: Italy

Responsible person(s): Prof. Dimitri Ognibene

6.1.1 Pilot description

The first pilot was conducted on 6 March 2026 as a two-hour laboratory activity within the course AI and Organizational Development, offered in English in the Human-Centered Artificial Intelligence joint master's degree programme at the University of Milan. The master's programme is an inter-university programme involving the University of Milan, University of Milano-Bicocca and University of Pavia, delivered in English and oriented toward responsible integration of artificial intelligence into human contexts.

The session was facilitated in English by Cansu Koyuturk and four attending students (3 male and 1 female) participated as the direct beneficiaries/target group. Their common educational background was master's-level study in a human-centered AI programme, with interests connected to AI, organizational contexts, and human-AI cooperation.

Short timeline:

Before the pilot: the facilitator selected IDEAL "Responsible use of AI" materials from Topic 5 and prepared a presentation introducing AI, LLMs, limitations, sycophancy, overreliance and critical and domain-general prompting guidelines.

6 March 2026;

- introduction: the facilitator presented the core concepts from the IDEAL materials, excluding the video lecture as a direct teaching resource but explaining its key themes through the presentation.
- hands-on activity: students worked first individually using the Wisely chatbot to develop, test and refine prompts for an organizational analysis task related to designing a mentoring programme for Niguarda Hospital and then they completed the in-class task as a group of 4.
- wrap-up: the session concluded with discussion on the reliability, usefulness and limitations of AI-supported information sources and the responsible use of AI when preparing for organizational consulting or intervention design.

6.1.2 Purpose and Objective of the pilot

The purpose of the pilot was to test how IDEAL materials on the responsible use of AI could be embedded in a higher education laboratory setting and combined with a practical AI-assisted learning activity. The pilot aimed to help students move beyond simple use of a chatbot and instead practice more deliberate, critical and responsible prompting habits.

The specific objectives were to:

- introduce students to opportunities and challenges of AI and LLMs in learning, including hallucinations, reliability limits, sycophancy and overreliance;

- support students in using AI as a tool for inquiry and preparation rather than as an unquestioned source of answers;
- develop students' ability to formulate prompts, interpret AI feedback, and iteratively improve the quality of their questions;
- connect responsible AI use with an authentic organizational development problem: identifying relevant contextual information before proposing a mentoring programme for Niguarda Hospital;
- observe the feasibility of using Wisely, a task-agnostic AI prompt coach, during an in-class university activity.

Targeted IDEAL competences: the activity primarily targeted AI literacy, responsible and critical use of AI, awareness of AI limitations, metacognitive reflection on prompting and learning processes, evaluation of information quality, and ethical awareness regarding the use of AI-supported tools in higher education and organizational contexts. These competences were addressed through the presentation and through the prompt-refinement activity, in which students had to consider the reliability, accessibility and usefulness of different sources of organizational information.

6.1.3 Materials and tools used

The pilot was conducted as a blended presentation and laboratory activity. The facilitator first introduced the key topics from the IDEAL "Responsible use of AI" materials, then students applied the concepts in a practical activity using Wisely.

IDEAL materials used:

- IDEAL project materials, Topic 5: Responsible use of AI.
- Introduction: AI for Improving Learning Outcomes and Challenges, covering personalized learning, tutoring systems and dependence on technology.
- Introduction: the Risk of Sycophancy, based on Punya Mishra's discussion of sycophantic behaviour in AI systems and the related research by Sharma et al. (2023) on factual sycophancy and Cheng et al. (2025) on social sycophancy.
- Introduction: the Risk of Overreliance, based on Zhai et al. (2024), focusing on uncritical acceptance of AI-generated recommendations and possible effects on critical thinking, analytical thinking and independent judgement.

Digital tool used:

- Wisely chatbot: a chatbot with a task-agnostic AI prompt coach. The tool provides real-time, structured feedback on users' prompts grounded in a responsible AI prompting framework. In this pilot, it was used to foster AI literacy, metacognitive awareness, and responsible habits for AI-assisted independent learning.

In-class activity:

Understanding the organizational context: Students worked as if they had been contacted by Niguarda Hospital, which was interested in developing a formal mentoring programme for its employees. Before

meeting the client and proposing an intervention, students had to identify key information they would seek about the organization, considering different areas of organizational life such as managerial, cultural and technological dimensions. For each type of information, they discussed where and how they would collect it, including public sources, internal documents, interviews, data systems and AI-supported tools. They were asked to think critically about the reliability, accessibility and usefulness of different sources. Finally, focusing on Niguarda Hospital, they searched for valuable information available without direct contact, listed it, and hypothesized a meaningful target group or purpose for the mentoring programme.

6.2 Pilot outcomes

Targeted outcomes included increased awareness of AI limitations, improved prompt formulation, more critical evaluation of AI-generated or AI-supported information, and application of responsible AI principles to a realistic organizational development scenario. Based on the pilot design and the completion of the laboratory activity, the main achieved outcome was that students had the opportunity to practice AI-supported inquiry in a structured way and to connect prompt quality with the quality, reliability and usefulness of the information generated or retrieved.

The activity also supported metacognitive awareness: students were not only asked to obtain information, but also to reflect on what information would be needed before a client meeting, why it would be relevant, and which sources would be more or less reliable. This aligned the use of AI with critical thinking and responsible decision-making rather than with passive answer generation.

Spider questionnaire: no Spider questionnaire data were provided for this first pilot. If the questionnaire was not administered.

LEVEL5 assessments: no LEVEL5 teacher assessment data were provided for this first pilot.

Verbal discussion during and after the activity allowed students to give feedback on the responsible use of the GenAI for academic purposes and the chatbot tool ‘’Wisely’’.

6.3 Conclusions and Recommendations

Lessons learned and recommendations:

- Provide access instructions for Wisely before the session, including the need to use university Wi-Fi and the expected browser certificate warning.
- Where possible, resolve the certificate issue before scaling the pilot to larger groups, because warning screens can create confusion and reduce trust in the tool.
- Keep the applied scenario: the Niguarda Hospital mentoring programme task successfully links responsible AI use with a realistic organizational development problem.
- Collect examples of initial and revised prompts, with students’ consent, to document how Wisely supports prompt improvement and metacognitive awareness.

Sources and links referenced in this report

- Human-Centered Artificial Intelligence master's programme: https://www.unimi.it/it/corsi/laurea-magistrale/human-centered-artificial-intelligence
- AI and Organizational Development course page: https://www.unimi.it/it/corsi/insegnamenti-dei-corsi-di-laurea/2027/ai-and-organizational-development

7. ITALY: University of Milano-Bicocca – Pilot 2

7.1 Introduction

Partner institution: University of Milano-Bicocca

Country: Italy

Responsible person(s): Prof. Dimitri Ognibene

7.1.1 Pilot description

This report describes the first pilot conducted at the University of Milano-Bicocca within the IDEAL project activities. The pilot took place as part of a workshop embedded in the course Elements of Human-Technology Interaction.

The activity was facilitated in English by Cansu Koyuturk and Prof. Dimitri Ognibene. The beneficiary group consisted of 8 students enrolled in the Master's degree programme in Applied Experimental Psychological Sciences at the University of Milano-Bicocca.

Timeline (March 12th, 2026) of the one-hour workshop and pilot activity:

- During the session: facilitator-led presentation and discussion of responsible AI use and bias/fairness concepts, followed by individual hands-on testing of the Wisely chatbot.
- Final 15 minutes of the session: students individually tested the chatbot using an arbitrary topic of their choosing.

7.1.2 Purpose and objective of the pilot

The purpose of the pilot was to introduce students to responsible and effective uses of generative AI in higher education and to test how a task-agnostic AI prompt coach can support students during prompt formulation. The pilot was designed to foster AI literacy, metacognitive awareness, and responsible use of generative AI tools in independent learning contexts.

The main objectives were to:

- raise awareness of opportunities and limitations of AI and large language models in learning contexts;

- support students in critically reflecting on the quality, reliability, and risks of AI-generated responses;
- introduce responsible prompting strategies, including attention to hallucinations, sycophancy, overreliance, bias, and fairness;
- provide students with hands-on experience using Wisely, a chatbot that gives structured feedback on prompts grounded in a responsible AI prompting framework;

The competences targeted from the IDEAL Competence Framework were primarily connected to responsible AI literacy, critical evaluation of AI outputs, awareness of risks and limitations of AI systems, reflection on bias and fairness, and metacognitive regulation of AI-assisted learning practices.

7.1.3 Materials and tools used

The pilot was carried out through a short facilitator-led presentation and discussion on the selected IDEAL topics using project materials and a presentation, followed by an individual hands-on activity with Wisely chatbot individually for approximately 15 minutes.

The activity drew mainly on IDEAL project materials for students from “Responsible Use of AI” (Topic 5), with a brief integration of “Bias & Fairness of GenAI” (Topic 2). The Topic 5 materials used as the basis for the explanation covered an overview of AI in learning, the educational opportunities and challenges of AI and LLMs, the risk of sycophancy, the risk of overreliance, and critical prompting guidelines. Topic 2 was used to introduce bias and fairness, including the idea that bias in AI emerges through the interaction of data, design decisions, societal structures, and contextual use.

The AI tool used during the pilot was Wisely. Using Wisely, a chatbot with a task-agnostic AI prompt coach, users receive real-time, structured feedback on their prompts grounded in a responsible AI prompting framework. The activity aimed to support students in developing effective habits for AI-assisted independent learning.

7.2 Pilot outcomes

The targeted outcomes were initial improvements in students’ awareness of responsible AI use, recognition of key risks associated with generative AI, and practical experience with prompt coaching through Wisely. The workshop format allowed students to connect conceptual issues, such as sycophancy, overreliance, hallucinations, bias, and fairness, with a concrete hands-on interaction using an AI tool.

The main outcomes achieved were:

- 8 Master’s students participated in the pilot activity.
- Students were introduced to responsible AI concepts and to selected risks and limitations of LLMs relevant to higher education.
- Students tested Wisely individually and explored the tool using self-selected topics, enabling a low-stakes introduction to responsible prompt formulation.
- The pilot provided initial feasibility check for using Wisely within a short workshop integrated into an existing university course.

7.3 Conclusions and recommendations

7.3.1 Main conclusions

The pilot demonstrated that the IDEAL approach can be integrated into a short higher education workshop and connected to a practical activity with an AI prompt coaching tool. The combination of conceptual input and hands-on exploration helped position responsible AI use not only as an abstract topic, but as a practical competence relevant to students' independent learning activities.

A key highlight was the alignment between the IDEAL responsible AI materials and the Wisely chatbot activity. Together, these materials supported a balanced introduction to both the potential and the risks of generative AI in higher education.

5.3.2 Reflections on implementation and on the use of AI tools

The main strength of the implementation was the combination of a concise facilitator-led explanation with an individual trial of the tool. This structure was suitable for a one-hour workshop and allowed students to move quickly from concepts to practice.

Challenge: The access to Wisely was still affected by a technical issue related to the certification of the webpage. Students saw a certificate warning screen when trying to access Wisely and needed to be connected to the university Wi-Fi in order to access the tool. Despite this issue, the hands-on component could still be included. However, this should be resolved before future pilots or clearly anticipated in pre-session instructions.

Wisely supported the teaching and learning experience by giving students structured, real-time feedback on their prompts. Its task-agnostic design made it possible for students to test the tool on arbitrary topics of their choosing, which supported ownership and relevance.

7.3.3 Overall feedback regarding the pilots

The session included an informal discussion with the students after the activity. During the discussion, students asked several questions about how they can use GenAI tools during their studies and more generally in academia. At the same time, they also raised questions about what is allowed, what is considered fair use, and how to avoid depending too much on AI-generated answers.

A point that came out clearly from the discussion was the need for clear guidance on the use of AI in academic work. Students seemed interested in using these tools, but they also wanted to understand the limits and expectations better. They discussed that having shared rules and examples could help students use AI in a more responsible and fair way, without creating confusion or unequal practices between students. Overall, the feedback was informal but useful. It showed that students are interested in the topic and that there is a need to continue discussing responsible AI use, not only from a technical perspective but also in relation to academic integrity, fairness, and learning.

7.3.4 Recommendations

The main recommendation for future iterations is to resolve the technical access issue before the next pilot session. Students should be able to access Wisely without certificate warnings and without uncertainty about the correct network conditions.

Further recommendations are:

- Collect brief participant feedback after the hands-on activity with a written format, for example through a questionnaire focused on perceived usefulness, clarity, and responsible AI and prompting awareness and efficacy.
- Include a few guided example prompts before asking students to explore arbitrary topics, so that students can more easily connect the IDEAL concepts to concrete prompting practices.

8. ITALY: University of Milano-Bicocca – Pilot 3

8.1 Introduction

Partner institution: University of Milano-Bicocca

Country: Italy

Responsible person(s): Prof. Dimitri Ognibene

8.1.1 Pilot description

The first pilot was conducted at the University of Milano-Bicocca with 33 master's students who participated as part of a workshop and in-class activity within the course Human resources management and development.The target group was therefore non-technical higher education students with a background in psychology and human resources-related topics.

The activity was mainly facilitated by Andrea Marthinenghi, with limited support from Cansu Koyuturk. The session was delivered in Italian and lasted two hours. It took place on 21 April 2026.

The pilot combined a short facilitator-led presentation with an applied group activity. Students first received an introduction to the responsible use of AI, large language models, and critical prompting. They then used the chatbot Wisely during an in-class exercise connected to a human-resources scenario. Students were free to interact with the chatbot individually or in groups during the exploration phase, but the final product was completed collaboratively in groups of either three or four.

The in-class task asked students to take the role of an HR manager in a consulting services company operating in the banking sector. They had to prepare for an evaluation interview with Luca Bianchi, a 51-year-old experienced employee who had recently shown difficulties, including conflicts with colleagues and a customer complaint describing rude behaviour at a branch office.

Short timeline:

- Before the activity: students completed a pre-questionnaire on prompting self-efficacy and perceived usefulness of generative AI chatbots.

21 April 2026:

- facilitator-led presentation in Italian on responsible use of AI, LLM limitations, risks of sycophancy and overreliance, and critical prompting guidelines.
- students completed the HR case-based in-class activity using Wisely as a prompt coach and AI-supported reasoning tool.
- students completed a post-questionnaire on prompting self-efficacy, perceived usefulness and two open-ended questions on the prompt coach (chatbot) and the activity.

8.1.2 Purpose and objectives of the pilot

The purpose of the pilot was to test how a responsible AI prompting activity, supported by an AI prompt coach, could help non-technical higher education students use generative AI more critically, deliberately, and collaboratively in a discipline-relevant learning task.

The main objectives were to:

- introduce students to key opportunities and risks of AI and large language models in learning contexts;
- support students in formulating clearer, more contextualised, and more purposeful prompts;
- encourage students to critically evaluate chatbot outputs rather than accepting them uncritically;
- promote metacognitive awareness of the information needed to make AI-supported work useful and responsible;
- observe how students collaborate around AI-supported feedback while completing an authentic HR-related practice task.

8.1.3 Materials and tools used

The pilot drew on the IDEAL project materials for students on the responsible use of AI (Topic 5), “Overview of AI”. The facilitator explained the topics using the materials and a presentation.

The main materials and references informing the session were:

- “Overview of AI”, covering how AI and LLMs can enhance learning and the responsibilities and challenges associated with their use.
- introduction to possible educational benefits of AI such as personalised learning, tutoring systems, automated assessment, and support for diverse learners, alongside issues such as equity, privacy, and dependence on technology.

- The risk of sycophancy, used to introduce how AI systems may align with user opinions or errors and how this can mislead learners.
- Overreliance on AI dialogue systems in higher education, used to discuss risks for decision-making, critical thinking, and analytical thinking.

The main AI tool used during the pilot was Wisely, a chatbot with a task-agnostic AI prompt coach. Wisely provides real-time, structured feedback on users' prompts, grounded in a responsible AI prompting framework.

Students used the chatbot to receive feedback on prompts, revise or improve their work, identify missing elements, structure their answers, and compare their own reasoning with AI-generated suggestions. The activity was intentionally designed so that the final output remained group-based and discipline-relevant, rather than a purely technical demonstration of AI tools.

8.2 Pilots outcomes

The targeted outcomes were improved awareness of responsible AI use, increased confidence in prompt formulation, better understanding of how to interpret AI feedback, and collaborative use of AI to support reasoning in a discipline-specific task. The qualitative evidence suggests that these outcomes were broadly achieved, especially in relation to prompt refinement, structuring ideas, identifying missing elements, and using AI feedback as a basis for reflection rather than as a final answer.

Students completed a questionnaire before and after the activity on prompting self-efficacy and perceived usefulness of generative AI chatbots. Anonymized student answers were collected and the surveys were optional. They also answered two open-ended questions:

Main qualitative findings from students' open-ended responses included the following themes:

- Prompt refinement and clarity: several students reported that feedback helped them reformulate ideas, make requests clearer, improve structure, and pay more attention to the quality of the prompt.
- Support for revision and elaboration: many groups used Wisely to review a draft they had already produced, identify weaker parts, enrich the response, and reorganise content into a clearer structure.
- Critical checking and validation: students often used the chatbot as a control mechanism to verify whether their ideas were coherent, adequate, and aligned with the task. Some explicitly selected only the information they considered correct or consistent with their own reasoning.
- Generation of new perspectives: several responses indicated that Wisely helped students notice aspects, critical points, pros and cons, or intervention options that they had not considered independently.

- Collaboration and comparison: groups used the chatbot to compare ideas, read feedback together, divide exploratory work across devices, and decide collectively what to include or exclude from the final answer.

- Awareness of limitations: some students noted that feedback could be superficial, too broad, or insistent on details that were not relevant or not available, such as specific company policies or detailed job information. This suggests that students were beginning to critically evaluate the appropriateness of AI suggestions.

No technical problems were reported during the session. Because the students did not come from a technical background, some asked basic questions about which AI models were recommended by the facilitators. This was handled as part of the facilitation and did not prevent completion of the activity.

8.3 Conclusions and recommendations

8.3.1 Main conclusions

The pilot showed that a responsible AI prompting activity can be meaningfully integrated into a psychology and human resources course, even with students from a non-technical background. The combination of a short conceptual introduction and an authentic HR case supported students in moving from general curiosity about AI to more purposeful, reflective use of a chatbot.

A central finding is that Wisely was not used only to produce answers. Students frequently used it as a coach, reviewer, and discussion partner: to reformulate prompts, improve structure, check coherence, identify missing points, and compare AI suggestions with their own ideas.

This aligns well with the IDEAL emphasis on responsible, critical, and reflective use of AI.

The qualitative feedback also suggests that students did not always accept AI feedback automatically. Several groups described selecting, adapting, or rejecting suggestions depending on whether they were relevant to the task and consistent with the information available. This is an important outcome in relation to the risks of sycophancy and overreliance discussed in the presentation.

8.3.2 Reflections on implementation and on the use of AI tools

What worked well: The two-hour structure worked well for this context. Students first received conceptual input and then immediately applied it in a realistic, course-relevant scenario. Wisely's feedback helped students focus on the purpose of the task, output structure, clarity, and completeness. The group-based final product encouraged discussion rather than isolated chatbot use.

Challenges and deviations: No technical or pedagogical challenges were encountered.

Benefits of AI tools: Wisely supported the teaching and learning experience by making prompt quality visible and discussable. Students used the tool to improve the clarity of their requests, refine the structure of their answers, identify missing or weak parts of their reasoning, and develop more precise terminology. It also gave groups an external reference point for discussion and helped them compare their own answers with possible alternatives.

Limitations and unexpected issues: Some feedback was perceived as too broad, superficial, or focused on information that students did not have, such as detailed company policies or role-specific information. In one case, students reported that the initial chatbot output was too long and had to be shortened through follow-up prompting. These limitations are pedagogically useful because they highlight the need for students to understand the context, boundaries, and relevance of AI-generated suggestions.

8.3.3 Overall feedback regarding the pilots

Overall, students' feedback was largely positive. Many comments emphasised that responsible use of AI and the chatbot with feedback helped them improve their understanding of AI, and how to reformulate, structure, or enrich their work using a chatbot. Students also described using the chatbot for control, verification, and comparison, which suggests that the activity supported both AI literacy and reflective collaboration.

At the same time, a few students found the tool equally necessary for this task. A few responses were minimal or negative, such as "No" or "Controllo", and one group noted that although the prompt analysis was good, they did not need to modify the prompt for this specific task. This mixed feedback is useful because it suggests that the value of prompt coaching may depend on the complexity of the task, students' prior confidence and AI literacy, and the degree to which the activity explicitly requires iteration.

8.3.4 Recommendations

The pilot was conducted successfully so there are not so many recommendations for future implementation. However, one point could be

- Include a source-verification step when relevant. Some students added requests for verified sources, but not all had time to verify them. Future pilots could allocate a few minutes specifically to checking assumptions and sources.

For the IDEAL approach, this pilot suggests that responsible AI materials are effective when combined with an application of a relevant task and a structured reflection instrument.

9. ITALY: University of Milano-Bicocca – Pilot 4

9.1 Introduction

Partner institution: University of Milano-Bicocca

Country: Italy

Responsible person(s): Prof. Dimitri Ognibene

9.1.1 Pilot description

This report describes the fourth and final pilot conducted by the University of Milano-Bicocca within the IDEAL project. The pilot took place in the context of the School Management course and was integrated into a workshop and in-class activity for master's students.

Participants were 14 students enrolled in a master's degree programme. They took part in the pilot as part of a course-based learning activity. The facilitator was Andrea Martinenghi, who conducted the activity in Italian. The pilot was held on 15 May 2026 and lasted 2 hours. The session began with a facilitator-led presentation introducing the responsible use of AI topics from the IDEAL project materials. Students then completed a group-based in-class activity using the Wisely chatbot.

Short timeline:

- facilitator-led presentation in Italian on responsible AI use, including AI and LLM foundations, limitations, sycophancy, overreliance, and critical prompting.
- group activity phase 1, 20 minutes without AI, during which students developed an initial proposal independently.
- group activity phase 2, 45 minutes with Wisely, during which students revised and strengthened their work with chatbot-supported prompt feedback.

9.1.2 Purpose and objective of the pilot

The purpose of the pilot was to test how responsible AI learning materials and an AI prompt-coaching chatbot could support higher education students in using generative AI critically, reflectively, and effectively during an authentic course-based task.

The pilot was designed to move students away from using AI as a source of ready-made answers and toward using AI as a tool for reviewing, challenging, and improving their own reasoning. Students were first required to develop their own solution without AI and only afterwards use AI to refine their proposal.

The main objectives were to:

- foster AI literacy by introducing students to core concepts related to AI, generative AI, large language models, and their limitations;
- raise awareness of responsible AI risks, including hallucinations, sycophancy, overreliance, privacy, equity, and excessive dependence on technology;
- support metacognitive awareness by encouraging students to examine the quality of their own prompts and reasoning;
- promote critical and independent thinking before, during, and after interaction with AI;
- test the usefulness of Wisely as a real-time prompt coach for responsible AI-assisted learning in a higher education classroom.

The pilot targeted IDEAL competences related to AI literacy, critical evaluation of AI outputs, responsible and ethical use of AI, reflective prompting, and effective integration of AI tools into learning processes.

9.1.3 Materials and tools used

The pilot drew on the IDEAL project materials on responsible use of AI, specifically topic 5: Overview of AI. The videos and materials were not shown directly during the activity; instead, the facilitator used the materials as the basis for an Italian-language presentation and explanation of the key topics.

The following IDEAL-related learning resources informed the session:

- AI for Improving Learning Outcomes and Challenges introducing how AI can support personalized learning, tutoring systems, automated assessment, and diverse learners, while also addressing equity, privacy, and dependence on technology.
- Introduction: the Risk of Sycophancy, referring AI systems telling users what they want to hear and the educational risks of agreeable but misleading AI behavior.
- the Risk of Overreliance, addressing the risks of uncritical acceptance of AI-generated recommendations and the possible effects on critical thinking, analytical thinking, and decision-making.
- Foundations of AI, LLMs, their Limitations and Critical and Domain-general Prompting Guidelines

The main AI tool used during the in-class activity was Wisely. Wisely is a chatbot with a task-agnostic AI prompt coach. It provides users with real-time, structured feedback on their prompts, grounded in a responsible AI prompting framework. In the pilot, Wisely was used to support students in improving their prompts and using generative AI in a more reflective and responsible way.

Activity design: students worked in groups on a school management scenario involving a complex human resources and organisational development case in a lower secondary school. They were asked to imagine acting as expert consultants contacted by a school principal, Dr. Collani, who was concerned about high levels of stress, tension, conflict, and reduced well-being among teachers.

The activity was divided into two phases. First, students worked for 20 minutes without AI to develop an initial proposal based on course content and their own knowledge. Second, students worked for 45 minutes with Wisely to revise and improve their work. This sequencing was intended to ensure that AI was used to support critical reflection and improvement rather than replace students' own reasoning.

9.2 Pilot outcomes

The pilot targeted outcomes related to responsible AI use, AI literacy, critical reflection, prompt improvement, and the application of course knowledge to a realistic school management problem. These outcomes were addressed through the combination of a short facilitator-led introduction, independent group work, and AI-supported revision using Wisely.

The achieved outcomes included:

- students completed a structured consulting task connected to the School Management course;
- students first generated their own reasoning before using AI, supporting ownership of the learning process;

- students used Wisely to receive real-time feedback on their prompts and to improve the quality of their AI interactions;
- students engaged with responsible AI themes such as sycophancy, overreliance, AI limitations, and critical prompting;
- the session was completed without technical problems.

The main available evidence comes from the implemented classroom activity, facilitator observation, and the structure of the group exercise.

9.3 Conclusions and recommendations

9.3.1 Main conclusions

The pilot showed that IDEAL responsible AI materials can be meaningfully integrated into a master's level School Management course through a short workshop and in-class activity.

A key strength of the pilot was the two-phase design. By asking students to work without AI first and only then use Wisely, the activity supported independent reasoning before AI-assisted revision. This design aligned well with the IDEAL approach by positioning AI as a reflective support tool rather than a substitute for students' thinking.

The pilot also highlighted the value of addressing sycophancy and overreliance explicitly before students interact with generative AI. These concepts helped frame AI use as something that requires critical judgement, verification, and awareness of limitations.

9.3.2 Reflections on implementation and on the use of AI tools

The implementation worked well.

There were no reported deviations from the planned structure. The main pedagogical choice was to avoid showing the IDEAL video lectures directly and instead have the facilitator explain the relevant topics through a presentation in Italian. This adaptation was appropriate for the classroom context.

Wisely supported the teaching and learning experience by giving students real-time, structured feedback on the quality of their prompts. This helped students focus not only on the final answer but also on the process of asking better questions, clarifying goals, providing context, and using AI feedback responsibly.

The main benefit of AI use in this pilot was that it supported revision and improvement after students had already produced an initial solution. This reduced the risk of overreliance and encouraged AI-assisted critical reflection.

9.3.3 Overall feedback regarding the pilots

No direct formal feedback summaries were reported for this pilot. However, facilitator's impression indicates that the activity was completed successfully, involved all 14 students, and encountered no technical problems.

Participants' prompts, their interactions and AI coach feedback are collected (always anonymized), however detailed analyses, and therefore time, are needed to check the results. The overall classroom experience suggests that the combination of responsible AI content, independent group reasoning, and AI-supported prompt feedback is feasible within a 2-hour course-based workshop. The pilot also suggests that Wisely can be used in higher education settings to support responsible AI-assisted independent learning.

9.3.4 Recommendations

Based on this pilot, the following recommendations can be made for future implementations:

- Keep the two-phase structure, requiring students to develop an initial answer without AI before using AI for review, challenge, and improvement.
- Use realistic, discipline-specific cases that require judgement, argumentation, and contextual analysis, as these are well suited to responsible AI reflection.
- Frame AI tools as supports for metacognition and improvement rather than as answer generators.
- Collect simple evidence of learning, such as initial proposals, revised proposals, prompt examples, short student reflections, and facilitator observations.

10. ITALY: Smart Revolution Srl.

10.1 Introduction

Partner institution: Smart Revolution Srl.

Country: Italy

Responsible person(s): Enrica Pautasso

10.1.1 Pilot description

The pilot was carried out within the University of Turin, Italy, and involved **58 participants** from the technical and administrative staff of the university. The department in charge of staff's continuous professional development, asked each department to register up to 5 participants based on staff's individual interest and connection with the work tasks. Therefore, the final group was heterogeneous in terms of departments, roles, and everyday tasks. 44 were female and 14 were male. The age ranged from 25 to 55 years old. They all have a university degree and, as daily

job, either support the teaching staff of the university (research and innovation) or work for the overall university's management.

The facilitators were:
Prof. Davide Taibi – project coordinator and computer science senior researcher
Mr. Sebastian Schwaebe – AI expert
Mrs. Enrica Pautasso – learning design/competence-oriented learning expert

The pilot had the following timeline:
- January-April 2026: contact and discussion with the University's office for staff's continuous professional development to agree on the format, target group, needs and duration
- April 2026: Selection of participants
- April-May 2026: data gathering and analysis of participants' specific needs and initial competence level
- May 20th 2026: in-presence workshop and spider validation
Also, the pilot was organised in connection to the IDEAL Datathon, that took place on the 21st of May. Pilot participants were invited to attend this public event as a complementary experiential learning opportunity, extending the training beyond the formal workshop session and providing hands-on engagement with data analysis in a collaborative, challenge-based setting.

10.1.2 Purpose and objective of the pilot

The pilot served a dual purpose: to address a concrete institutional gap in data literacy and AI awareness among technical and administrative staff at the University of Turin, and to test the IDEAL project's methodology with this target group.

Despite working in a knowledge-intensive environment, administrative and technical staff rarely have access to structured professional development in data analysis and AI. The pilot specifically set out to:

- introduce participants to foundational concepts of data analysis and AI, contextualised within the realities of university administrative work;
- foster a critical, ethical, and responsible approach to AI tool use, with attention to data quality, privacy, and reliability;
- develop participants' capacity to use data as a strategic resource in support of institutional decision-making;

More broadly, the pilot aimed to demonstrate that data literacy and conscious AI use are essential competences for all HE professionals — not only teaching staff — thereby extending the reach and impact of the IDEAL project across the full spectrum of the higher education workforce.

The pilot drew primarily on **Type 3** and **Type 4** competences, adapting them to an administrative professional context.

From **Type 3 (Ethical, Inclusive, and Data-Literate AI Use)**: the training targeted **critical AI literacy** (3.1 — understanding how AI systems work and interpreting outputs with informed scepticism), **data**

ethics and privacy (3.2 — responsible data use, consent, and quality awareness), and **AI fairness awareness** (3.3 — recognising bias and evaluating the reliability of AI-generated results).

From **Type 4 (AI-Driven Professional Development and Collaboration)**: the pilot engaged **reflective professional development** (4.1 — supported by the SPIDERS self-assessment) and **collegial collaboration** (4.2 — operationalised through cross-departmental teamwork in the Datathon).

Elements of **Type 1** were also engaged in adapted form, particularly competences related to working with data to inform decisions (1.3.1), reframed for an administrative rather than pedagogical setting.

10.1.3 Materials and tools used

Considering the large audience (58 participants) the pilot was organized as a 2,5 hours frontal presentation, from two different lecturers, interspersed with interactive activities using Mentimeter. As tools, we used:

- survey through Google Modules

- PPT slides for two different presentations developed by the lecturers

- Mentimeter for live pools and discussion

- live simulation with AI tools: ChatGPT, GeminiAI, Notebook LM, Napkin, Julius AI

- IDEAL Spider

10.2 Pilot outcomes

The pilot was designed to produce outcomes at two interconnected levels: individual competence development and institutional capacity building.

At the individual level, the training targeted the following learning outcomes among participants:

- acquisition of foundational knowledge of data analysis and artificial intelligence concepts, contextualised within the university administrative environment;
- development of a critical and responsible approach to AI tool use, including awareness of ethical implications, data privacy, and the risk of bias in AI-generated outputs;
- improved capacity to read, interpret, and communicate data as a resource for supporting institutional processes and decision-making;
- increased confidence in engaging with data-driven tools and methodologies in everyday professional practice.

At the institutional level, the pilot aimed to establish a validated, replicable model for delivering IDEAL-

aligned training to administrative HE staff.

The pilot outcomes can be considered achieved at both levels.

Given the condensed timeframe of the pilot, the SPIDERS questionnaire was selected as the most appropriate evaluation instrument. While the LEVEL5 grids offer a more comprehensive and granular assessment of competence development, their effective application requires a longer training cycle that incorporates extended practical periods. The SPIDERS tool, by contrast, provided a reliable and manageable means of capturing participants' self-assessed competence levels within the constraints of a single-day training event. 47 participants completed the **Spider questionnaire**, however only **25** of them gave consent to share it with the IDEAL project. These participants demonstrated a measurable increase in self-assessed competence across the core areas targeted by the training, particularly with regard to AI awareness, data literacy fundamentals, and critical evaluation of AI-generated outputs.

10.3 Conclusions and recommendations

10.3.1 Main conclusions

The pilot activities demonstrated the overall effectiveness of the IDEAL approach, as evidenced by several key outcomes. First, the high level of participant engagement throughout the training confirmed both the relevance of the topics addressed and the suitability of the methodology adopted. This was further reflected in the high quality of the group work developed during the Datathon exercise, where participants successfully applied the knowledge and skills acquired in a practical and collaborative setting.

A significant finding was also the measurable increase in competence levels, as captured through the SPIDER questionnaire after the training. This confirmed not only the learning impact of the pilot, but also the suitability of the SPIDER questionnaire itself as an effective tool for assessing practical, competence-oriented learning pathways.

In particular, the IDEAL approach proved valuable in addressing a gap identified by the participating university: while topics such as data analysis and AI are considered highly relevant, the training opportunities available so far have often been fragmented and tool-specific, rather than focused on building broader competencies and providing a comprehensive understanding of the overall technological and operational landscape. In this sense, the IDEAL methodology offered a more structured, integrated, and competence-driven learning experience.

10.3.2 Reflections on implementation and on the use of AI tools

In our opinion, the factors that led to a successful pilot are the following:

- The learning offer was **tailored to the needs and context** of the receiving institution. Indeed, over a period of four months, we had 3/4 online meetings with the organizing office of the university, in charge of the professional development of the staff, and a survey delivered to

the participants to better understand daily tasks, tools already known, university rules and practices, competence levels and scenarios of implementation. Then, all practical examples, scenarios, data sets, and exercises used during the learning offer were developed around the information received from the survey and the previous discussions with the organizers.

- Participants were selected based on **personal/professional interest** and role/daily tasks where AI tools and data analysis skills could bring benefits, so motivation was high and participants could apply new skills immediately.

- The training session was matched with a **practical, engaging activity** (the Datathon on the following day). Participants could immediately apply some of the tools, skills and knowledge acquired during the training in a real-world scenario connected to their professional environment. Also, the **design thinking approach** of the exercise, with a challenge-driven scenario, increased participants' curiosity, motivation and engagement.

- Spider questionnaires allowed a quick and immediate **self-assessment of the new competences acquired**, making participants more aware and conscious of their learning process.

In general, the learning offer were delivered as planned. There were minor technical issues, such as some AI tools taking too much time to produce results or not properly working, but they were easily tackled with a good structure previously planned and results already tested and ready.

AI tools certainly supported the teaching, they were used to create nice graphic presentations, create real-world scenarios and exercises.

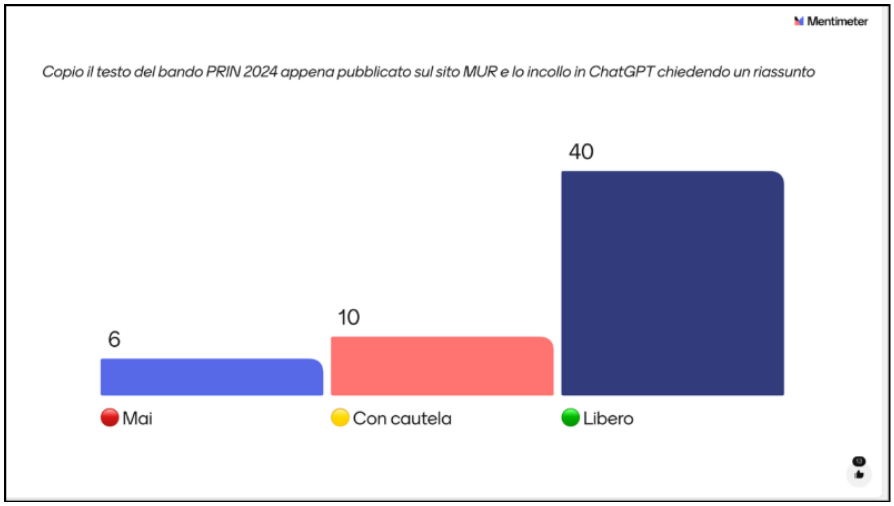
10.3.3 Overall feedback regarding the pilot

The overall feedback was very positive. We had immediate feedback from participants at the end of the training who expressed their gratitude and interest in the topic. The context-tailored examples and scenarios were particularly appreciated. Then, we had a more detailed feedback session with the organizers that confirmed the high appreciation of the approach.

10.3.4 Recommendations

The initial survey was key to tailor the learning offer to the actual context and daily activities of the participants. The design thinking approach, with a challenge-based exercise was successful in grasping the groups' interest and commitment. In a next round, we will make sure that there will be enough time for questions from the audience and for the groups to present their conclusions to the whole audience and receive feedback from the lecturers.

ANNEX







11. SPAIN: Pompeu Fabra University

11.1 Introduction

Partner institution: Pompeu Fabra University

Country: Spain

Responsible person(s): Marta Manzanares Altes, Ishari Amarasinghe, Francielle Marques, Davinia Hernández-Leo

11.1.1 Pilot description

The pilot was implemented within a first-year Physics course offered as part of the Bachelor's Degrees in Telecommunications Engineering and Computational Audiovisual Engineering at Pompeu Fabra University, Barcelona, Spain. The pilot was conducted throughout the third trimester of the academic year. The intervention reported here consisted of five practical sessions.

The pilot was facilitated by two course instructors (one female and one male), one of whom is also a researcher involved in the IDEAL project, as well as by a PhD student who prepared and maintained the platform used during the pilot. The target group consisted of students enrolled in the course. Participation in the pilot was voluntary.

During the Pilot, participating students had access to an Artificial Intelligence (AI) enabled platform (hereafter referred to as Lantern), which they could use during practical sessions or in their autonomous study time to ask questions related to the course.

The *Lantern* platform[1], supported by generative AI, allowed students to ask questions and express doubts through a chatbot (further details on *Lantern* are provided in Section 1.3). The AI-enabled system was designed not to provide direct answers but rather to guide students using a Socratic approach. Students could interact with the platform and also redirect their questions to the instructor. From the instructor's side, it was possible to monitor students' interactions with the tool and communicate with them through the platform. A total of 123 students were enrolled in the course, however, only 54 undergraduate students participated in the pilot, and approximately 50% of these students used the Lantern platform.

Table 1. Implementation timeline of the pilot

Phase	Period	Description
Phase 1	February-March 2026	Pilot preparation, including the development of user guides for both instructors and students (see Annex A), as well as prompt engineering and system testing activities (see Annex B).
Phase 2	March 2026	Recruitment of participating instructors and delivery of an introductory session on the pilot implementation.
Phase 3	April-May 2026	Pilot implementation within the course, involving student participation and use of the *Lantern* platform.
Phase 4	June 2026	Data analysis and preparation of the final pilot report.

11.1.2 Purpose and objectives of the pilot

The main purpose of the pilot was to explore the pedagogical use of AI to support help-seeking and problem-solving processes in higher education. Specifically, through the *Lantern* platform, students could interact with an AI-supported tutor when encountering difficulties with physics simulations and practical activities, while instructors could observe and reflect on the opportunities and challenges associated with integrating AI into teaching and learning practices.

The primary objective of the pilot was to improve the real-time management, or orchestration, of practical class sessions in which multiple students may simultaneously require assistance and be unable to progress until they receive support from the instructor. The use of *Lantern* aimed to alleviate this bottleneck by enabling students to resolve questions and doubts without waiting for the instructor's immediate availability, thereby making more efficient use of class time. In this context, instructors can devote greater attention to students who require in-depth guidance, while other students receive support through the AI tutor on the *Lantern* platform.

A secondary objective of the pilot was to enhance critical AI literacy among both instructors and students. This included supporting instructors in the effective integration of AI into classroom practice and helping students develop the skills needed to interact with AI systems effectively, responsibly, and critically. Such skills include formulating effective prompts, understanding the limitations of AI systems, and critically evaluating AI-generated outputs. In addition, the pilot sought to explore how AI-supported learning tools could contribute to greater student engagement and accessibility in higher education, while promoting the ethical and transparent use of AI. This involved examining how AI could support diverse learning needs, encourage active participation in learning activities, and foster awareness of ethical considerations related to data privacy, transparency, and accountability in AI-assisted educational environments. Table 2 presents the specific competencies from the IDEAL Competence Framework that were targeted by the pilot.

Table 2. IDEAL Competencies Targeted by the Spain Pilot

Competence area	Relevance to the Spain pilot
1.1 AI-supported Inclusive Instructional Design	Promoting accessibility with the use of GenAI for different learning needs.
1.2 AI- Facilitated Student Engagement Strategies	Encouraging students to participate actively in the classroom.
2.3 AI-Enabled Scaffolding and Learning Pathways	Providing students with adaptive guidance with scaffolds and individualized learning pathways.
3.1 Critical AI Literacy in Higher Education Teaching	Helping HE teaching staff understand the benefits and limitations of using AI in the classroom.
3.2 Data Ethics and Privacy in	Ensuring ethical aspects (informed consent, data

Teaching with AI	protection).
3.4 Transparency and Accountability in AI Use	Ensuring that students are well-informed about the use and implications of AI.
4.1 AI- Supported Reflective Professional Development	Promoting reflection on the use of AI among HE teaching staff.
4.5 Sustaining Wellbeing and Work-Life Balance through AI-Supported Practices.	Managing HE teaching workload.

11.1.3 Materials and tools used

As mentioned above, the pilot was conducted during the five practical sessions of a first-year undergraduate Physics course and the *Lantern* tool was integrated into the practical sessions. It incorporates a large language model (ChatGPT, openai/gpt-oss-120b)-based chatbot that was designed to function as a Socratic tutor. Rather than providing direct answers, the system was intended to guide students through their reasoning processes. It did so by suggesting relevant theoretical concepts to review and indicating possible next steps in their problem-solving approach. To support the effective use of the platform during the pilot, user guides were developed for both instructors and students.

Students could interact with *Lantern* whenever they encountered difficulties or had questions related to the practical activities. In addition to its use during the sessions, the platform remained accessible throughout the trimester, allowing students to use it for independent study and self-directed learning outside the classroom.

Participation in the practical sessions was optional, as students could complete the activities either in person or remotely. The average in-person attendance was 39 students per session, representing approximately 45% of the enrolled cohort.

Instructors could interact with the system in two ways. First, students could explicitly request assistance from the instructor through the platform. Second, instructors had real-time access to student–AI interactions and could intervene when necessary. From the students' perspective, instructors' responses were integrated into the conversation and were not distinguishable from those generated by the AI system. This functionality also enabled instructors to identify recurring misconceptions and frequently asked questions, providing valuable insights that could be used to adapt explanations and address common learning difficulties throughout the course.

IDEAL Use Case Inspiration. The pilot drew inspiration from the IDEAL Desk Best Practice Research, particularly studies on learning agreements that highlighted the importance of the ethical integration of AI tools in higher education contexts. In addition, *Topic 6, Stakeholder Perceptions and Critical Literacy*, from the IDEAL Learning Suite informed the design of the pilot by addressing issues related

to the broader adoption of AI in higher education and the development of AI literacy among key stakeholders.

11.2 Pilot outcomes

The pilot aimed to achieve a range of outcomes for both instructors and students related to the effective, responsible, and pedagogically meaningful integration of artificial intelligence (AI) in higher education. These outcomes were aligned with the pilot's primary objective of improving the orchestration of practical sessions through AI-supported assistance, thereby enabling students to receive timely support while allowing instructors to focus on learners requiring more in-depth guidance. The outcomes were also aligned with the secondary objective of enhancing critical AI literacy among both instructors and students, including the development of prompt-engineering skills, awareness of the limitations of AI systems, ethical use of AI and the ability to critically evaluate AI-generated outputs. Table 3 and 4 summarises the intended outcomes of the pilot and the extent to which they were achieved during implementation.

Table 3. Overview of Targeted Outcomes and Their Achievement During the Pilot - Instructors

Target Group	Targeted Outcome	Achievement
Instructors	Improve the orchestration of practical sessions	Achieved by providing students with an alternative source of support, reducing dependence on immediate instructor assistance and enabling instructors to focus on students requiring more in-depth guidance.
Instructors	Integrate AI into classroom practice	Achieved through the implementation of *Lantern* during practical physics sessions.
Instructors	Increase understanding of the benefits and limitations of AI in education	Achieved through direct experience with the platform and reflection on the pilot implementation and outcomes.
Instructors	Improve prompt-engineering skills	Achieved through the iterative development, testing, and refinement of the AI prompt across six versions (final prompt available in Annex B).
Instructors	Promote critical and ethical use of AI in teaching	Achieved through ongoing observation of student–AI interactions and reflection on the pedagogical implications of AI integration.

Table 4. Overview of Targeted Outcomes and Their Achievement During the Pilot - Students

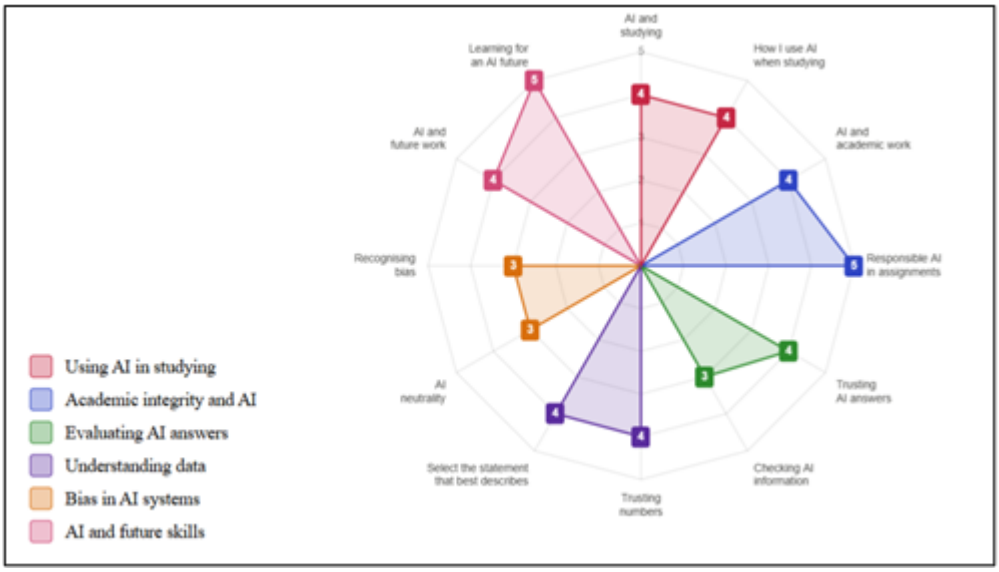
Target Group	Targeted Outcome	Achievement
Students	Improve critical AI literacy	Achieved through direct experience interacting with AI, learning how to formulate effective prompts, and critically evaluating AI-generated guidance.

Students	Promote responsible and accountable use of AI	Achieved through user guides, instructor guidance, and transparent communication regarding the role and limitations of AI within the course.
Students	Receive timely support during practical sessions	Achieved through access to *Lantern* when instructors were unavailable, enabling students to continue working without prolonged waiting times.
Students	Improve prompt-engineering skills	Achieved through repeated interactions with *Lantern* during multiple practical sessions and independent study activities.
Students	Increase accessibility and engagement with AI-supported learning	Achieved through the availability of *Lantern* both during and outside class sessions, supporting flexible access to learning assistance.
Students	Develop problem-solving skills through guided support	Achieved through *Lantern's* Socratic tutoring approach, which encouraged students to reason through problems rather than receive direct answers.

SPIDER Evaluation – Students .

The SPIDER questionnaire was administered to all students participating in the pilot. A total of 54 students completed the evaluation. Figure 1 provides an overview of the results.

Figure 1. Overview of the SPIDER Evaluation Results for Students



As shown in Figure 1, the questionnaire assessed students' self-assessment of AI literacy across twelve dimensions grouped into six thematic areas, using a scale ranging from 0 to 5. To represent the overall results of the pilot, the mode was calculated for each SPIDER dimension.

The results indicate high levels of confidence in the areas of *Academic Integrity and AI* and *AI and Future Skills*. The dimension *Responsible AI in Assignments* received the highest modal score (5), suggesting strong awareness of the responsible use of AI in academic work. Similarly, *Learning for an AI Future* received a modal score of 5, reflecting students' recognition of the importance of AI-related skills for their future education and careers. Dimensions related to the *use of AI for studying*, including *AI and Studying* and *How I Use AI When Studying*, both received modal scores of 4, indicating that students regularly engage with AI tools as part of their learning practices. Likewise, *AI and Academic Work* scored 4, suggesting that AI is already integrated into students' academic activities. The results for *Evaluating AI Answers* reveal a notable contrast. While *Trusting AI Answers* received a modal score of 4, *Checking AI Information* scored only 3. This suggests that students generally trust AI-generated outputs but are less likely to verify their accuracy. A similar pattern was observed in the area of *Bias in AI Systems*, where both *AI Neutrality* and *Recognising Bias* received modal scores of 3, indicating comparatively lower awareness of potential biases and limitations in AI systems. Overall, the findings suggest that students are confident and active users of AI and recognise its relevance for their academic and professional futures. However, the results also highlight the need to further develop those related to evaluating the accuracy, reliability, and potential biases of AI-generated information.

SPIDER Evaluation – Instructor 1 and 2

The SPIDER questionnaire was administered to the instructors participating in the pilot.

Figure 2 presents the results for Instructor 1 and Figure 3 presents the results for SPIDER Evaluation for Instructor 2 across six thematic areas. Overall, the SPIDER results for both instructors indicate an emerging to intermediate level of AI literacy and readiness for AI integration in higher education. Both instructors demonstrated strengths in ethical awareness, competence development, and critical reflection on AI use. Instructor 2 showed slightly higher and more consistent scores across several dimensions, particularly those related to responsible AI use, institutional perspectives, and stakeholder awareness. For both instructors, the results suggest a solid foundation for AI integration while highlighting opportunities for further professional development in the areas of bias and fairness, structured implementation, and critical AI literacy.

Figure 2. Overview of the SPIDER Evaluation Results for Instructor 1

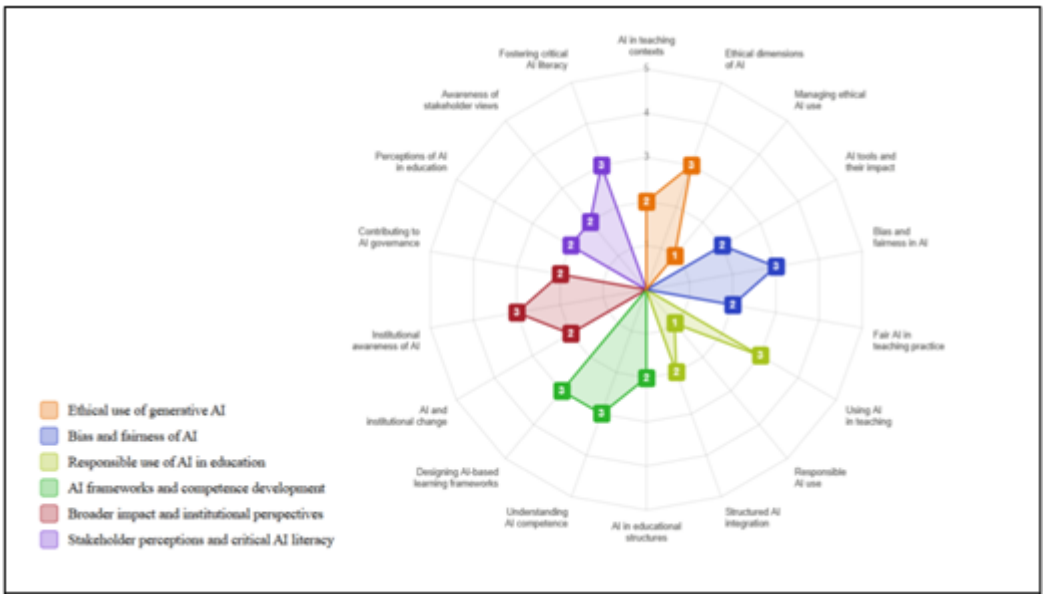
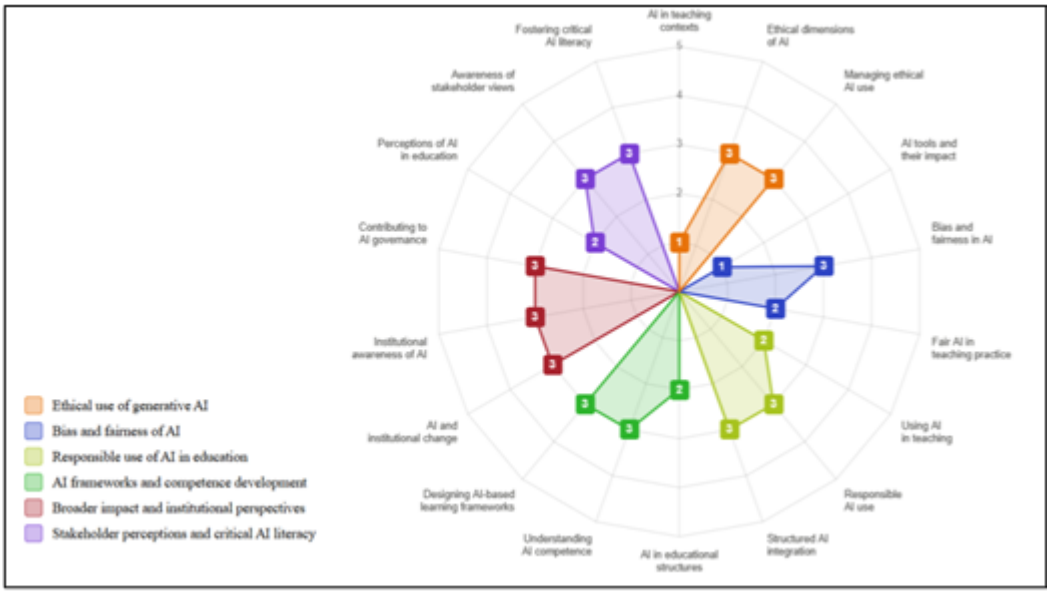


Figure 3. Overview of the SPIDER Evaluation Results for Instructor 2



LEVEL 5 Assessment Instructors - AI.

An instructor completed the LEVEL5 assessment of AI and results showed a clear progression across *knowledge, skills,* and *attitude* over the course of the pilot. In summary the assessment results are the following:

- At the beginning of the pilot, the instructor´s **knowledge** of GenAI-supported learning was at level 3, characterized by students completing assignments correctly without necessarily understanding underlying concepts. By the end of the pilot, this increased to level 4, reflecting a shift toward the use of guided, in-class activities where GenAI is intentionally integrated to support doubt resolution and to help students critically evaluate AI-generated answers.

- In terms of **skills**, the instructor initially reported limited and exploratory use of GenAI (level 1), with uncertainty about how to apply it pedagogically in a structured way. At the end of the pilot, this improved to level 3, indicating more consistent and purposeful integration of GenAI tools across different subjects and classroom activities.
- Regarding **attitude**, the instructor moved from level 2 primarily engaging in discussions about ethical use, plagiarism, and general pedagogical concerns to level 4. This reflects a transition toward active and confident use of AI, including for teaching preparation (e.g., brainstorming and refining materials) and in-class implementation focused on critical engagement and Socratic-style support. Overall, the instructor reports a substantial increase in both understanding and practical use of GenAI in education, shifting from exploratory and cautious engagement to more structured, reflective, and pedagogically grounded integration.

In conclusion, the instructor mentioned the following: "*My knowledge and use of GenAI have significantly increased. I now have a broader perspective on how it can be applied productively in learning environments, while remaining aware of the risks if it is not properly integrated into the learning process.*"

LEVEL 5 Assessment Instructors - Data Analysis.

The LEVEL5 assessment results for data analysis show a moderate but meaningful development, particularly in knowledge, while skills and attitudes remain more stable.

- At the beginning of the pilot, the instructor´s **knowledge** was assessed at level 3, reflecting an initial awareness that data provenance and processing can introduce bias. By the end of the pilot, this increased to level 4, with a more nuanced understanding of how survey design and implementation conditions affect data quality. In particular, the instructor highlights how unsupervised surveys may over-represent certain student profiles, whereas in-class administration improves participation and representativeness.
- For **skills**, the instructor moved from level 2 to level 3. Initially, they described analyzing student data on GenAI use and comparing cohorts in a general sense. At the end of the pilot, the reflection points to a limitation in the most recent implementation due to low student participation, which resulted in only preliminary findings. This suggests some methodological awareness but limited opportunity for deeper analytical expansion during the pilot period.
- In terms of **attitude**, the instructor remained at level 4 throughout. The instructor emphasized encouraging students to critically evaluate results and question the validity of problem-solving outcomes. This critical stance toward interpretation and reasoning in data use remained stable over time, with no reported change at the end of the pilot.

In conclusion, the instructor mentioned the following: "I have learned data processing and analysis methods, and how they can influence the conclusions that are drawn."

11.3 Conclusions and recommendations

11.3.1 Main conclusions

The pilot demonstrated that AI-supported tools can contribute to the orchestration of practical sessions by offering immediate assistance to students and enabling instructors to monitor student difficulties in real time. However, the impact on classroom orchestration could only be partially explored due to the relatively low attendance in the practical sessions. The pilot nevertheless promoted responsible and ethical use of AI in higher education settings and contributed to a deeper understanding among both students and instructors of the pedagogical opportunities and challenges associated with Generative AI.

The pilot also highlighted the importance of prompt-engineering skills for both students and instructors, showing that effective interaction with AI systems requires dedicated support and training. Furthermore, the pilot encouraged reflective professional development among teaching staff by evaluating AI-supported teaching practices and their impact on student learning. Another key finding was that *Lantern's* Socratic tutoring approach supported students' reasoning by encouraging reflection rather than providing direct answers.

With regard to the IDEAL approach, the pilot contributed to several competence areas of the IDEAL Competence Framework. It supported AI-facilitated student engagement and AI-enabled scaffolding by providing adaptive guidance during learning activities. It also promoted critical AI literacy, transparency, and accountability by ensuring participants understood the AI system's role, capabilities, and limitations.

11.3.2 Reflections on implementation and on the use of AI tools

As mentioned above, overall, the pilot demonstrated the potential of AI-supported tutoring to assist students during practical sessions and to provide immediate support when questions arose. The platform also enabled instructors to monitor student difficulties in real time, helping them identify recurring misconceptions and adapt their support accordingly. However, the impact on classroom orchestration was less evident than initially anticipated since attendance at the practical sessions was relatively low. As a result, situations in which large numbers of students simultaneously required assistance were less frequent, limiting the extent to which the platform's potential to reduce instructor workload and improve classroom management could be fully observed during the pilot.

Technical challenges

The development and deployment of the platform required continuous refinement throughout the pilot. Several functionalities had to be iteratively adjusted based on observations during practical sessions and user feedback. In addition, configuring the context and instructions provided to the AI system so that it generated appropriate educational responses proved to be a complex task.

While many technical issues were addressed through successive platform modifications, some limitations remained unresolved by the end of the pilot. For example, the system did not always

maintain the language selected by the student throughout the interaction, which occasionally affected the user experience.

Pedagogical challenges

One of the main pedagogical challenges was that many students lacked experience in formulating effective prompts. As a result, some interactions with the AI system did not fully exploit its potential as a learning support tool.

Another challenge was related to students' expectations regarding AI-generated assistance. The AI system was explicitly designed to act as a Socratic tutor and therefore avoided providing direct solutions. Instead, it guided students through the reasoning process by suggesting relevant concepts to review and possible next steps. While this approach was aligned with the educational objectives of the pilot, some students preferred obtaining immediate answers and consequently turned to commercial AI tools such as ChatGPT or Gemini.

In addition, only a small proportion of students evaluated the quality of the AI-generated responses. This limited the availability of structured feedback and made it more difficult to identify weaknesses and prioritise improvements for future iterations.

Benefits and limitations of AI

The main benefit of the *Lantern* was its ability to provide immediate assistance to students, reducing waiting times and allowing instructors to focus their attention on students requiring more personalised support. The platform also offered valuable insights into the types of difficulties encountered by students during practical activities.

At the same time, the pilot highlighted several limitations of current Generative AI tools in educational settings. Achieving consistent and pedagogically appropriate behaviour requires substantial effort in prompt engineering and system configuration. Furthermore, students need specific guidance and training to interact effectively with AI systems and to use them as learning tools rather than simply as answer-generating systems.

Future improvements and support needs

One of the main limitations encountered was the restricted access to professional AI licenses that can be trained with course-specific materials and provide more reliable educational support. Future implementations would benefit from institutional access to professional AI platforms through university-wide agreements or from the development of university-managed Generative AI solutions.

Such approaches could improve the quality and consistency of AI-generated responses while also addressing important concerns related to data privacy, security, and the protection of both student and instructor information. In addition, future iterations should include more explicit training on

effective prompt formulation and stronger mechanisms for collecting user feedback in order to support continuous improvement of the system.

11.3.3 Overall feedback regarding the pilots

Overall feedback from participants was mixed, but provided valuable insights into the opportunities and challenges of using AI-supported tutoring in practical classes. Students generally appreciated receiving immediate support when they encountered difficulties, and in many cases, the AI provided useful guidance and relevant explanations. However, because attendance at the practical sessions was relatively low, many students found it just as easy to ask the instructor questions directly, reducing the perceived added value of the AI system in some situations.

It was also observed that some students found the Socratic approach frustrating. While the chatbot was intentionally designed to guide students through a sequence of questions and encourage independent reasoning, many students preferred to receive direct answers immediately rather than engage in a guided problem-solving process. Some participants also felt that the AI occasionally asked too many questions before providing useful guidance. SPIDER questionnaire results suggested that students require further training in evaluating biases related to AI outputs.

Instructors noted that the platform was helpful for identifying student difficulties and providing additional support, but they also highlighted limitations compared with direct instructor assistance. For example, they could immediately direct students to specific course materials or resources, whereas the AI system, which relied on an external API, had more limited access to course-specific content. In addition, some instances of inappropriate use were observed, such as students directly copying course materials into the chat and requesting complete answers rather than seeking support for their learning process. These observations reinforced the importance of providing guidance on effective and responsible AI use and of designing AI-supported learning environments that align with students' expectations and educational objectives.

11.3.4 Recommendations

The pilot highlighted several lessons that may be useful for others implementing AI-supported learning activities.

- First, it is important to align students' expectations with the pedagogical objectives of the AI system. In this pilot, the AI system was designed to act as a Socratic tutor, supporting reasoning rather than providing direct answers. However, many students expected immediate solutions. Future implementations should clearly communicate the purpose of the AI tool and explain how guided questioning can support learning.
- Second, integrate AI tools more closely with course-specific resources and learning materials. Instructors were often able to direct students to relevant course content more efficiently than the AI system. Future pilots would benefit from AI solutions that can securely access and reference course materials, enabling more contextualised and relevant support rather than depending on external APIs. Stronger mechanisms for collecting user feedback should also be

implemented to facilitate continuous improvement of both the platform and the pedagogical approach.

- With regard to the IDEAL approach, future pilots could benefit from a stronger emphasis on preparing both students and instructors to use AI effectively in educational contexts. Our pilot showed that many students had difficulty understanding how to interact with an AI system designed to support reasoning rather than provide direct answers. Providing practical training on prompt formulation, the capabilities and limitations of AI, and strategies for using AI as a learning support tool rather than a direct answer machine could improve the quality of interactions and enhance learning outcomes. Similar support for instructors could facilitate the design and implementation of AI-supported learning activities and promote more informed and critical use of these technologies in higher education.

ANNEX

ANNEX A. User Guides of the *Lantern* Platform

Main Reference for *Lantern* Platform: Florido, H., & Hernández-Leo, D. (2025). Help-Seeking in Problem-Solving: Comparing Generative AI, Peers, and Teacher. In the International Conference on Artificial Intelligence in Education (pp. 11-18). Cham: Springer Nature Switzerland.

Instructor Guide

Podeu accedir a l'aplicació web tant amb el portàtil com amb el mòbil a través d'aquest **link** (que també trobareu a l' *Aula Global*). Un cop dins l'aplicació, veureu totes les aules a què teniu accés.

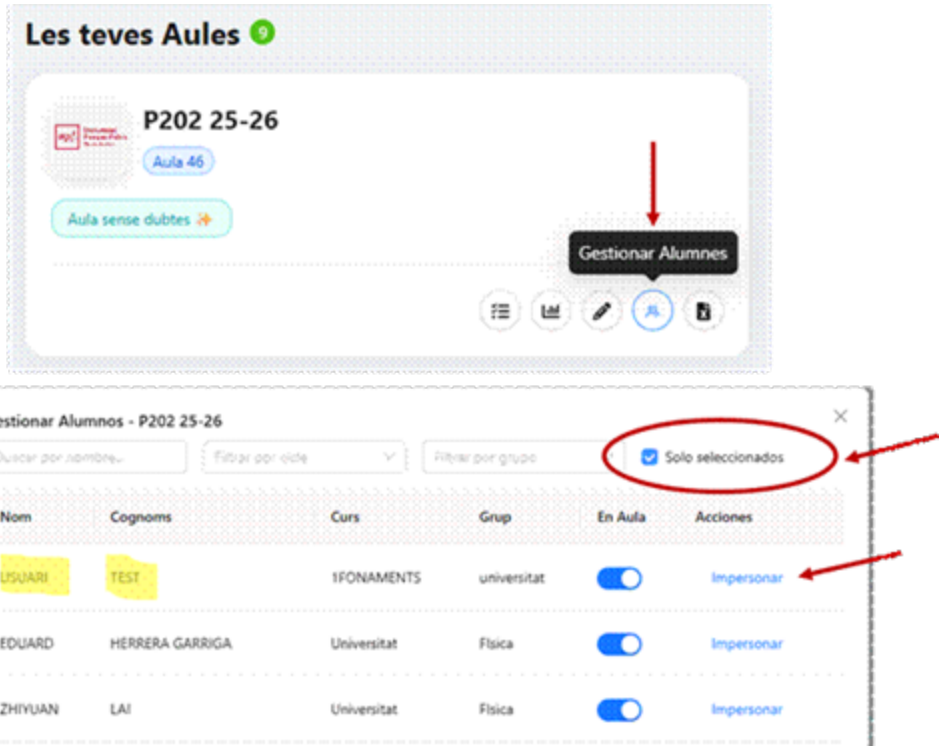
IMPORTANT :

- Si us plau, **no canvieu la configuració de les aules** i, en particular, el prompt.
- Anoteu l'assistència a classe de cara al processament de dades.

Impersonar un/a alumne/a

Aquesta opció us permet actuar com un alumne i fer proves. Tot i que podeu impersonar qualsevol dels vostres alumnes, és convenient que utilitzeu *"Usuari Test"* per poder distingir, en el processament de dades, si el registre correspon a un/a professor/a o a un/a alumne/a.

- En el requadre de l'aula que trieu, cliqueu el botó *"Gestionar Alumnes"*
- En la finestra emergent, activeu l'opció *"Sólo seleccionados"*
- Cliqueu en *"Impersonar"*



Modalitat Assistència IA-Gen

L'alumne obre una conversa i pregunta directament al xatbot (veure funcionament en la *Guia de l'estudiant*) .

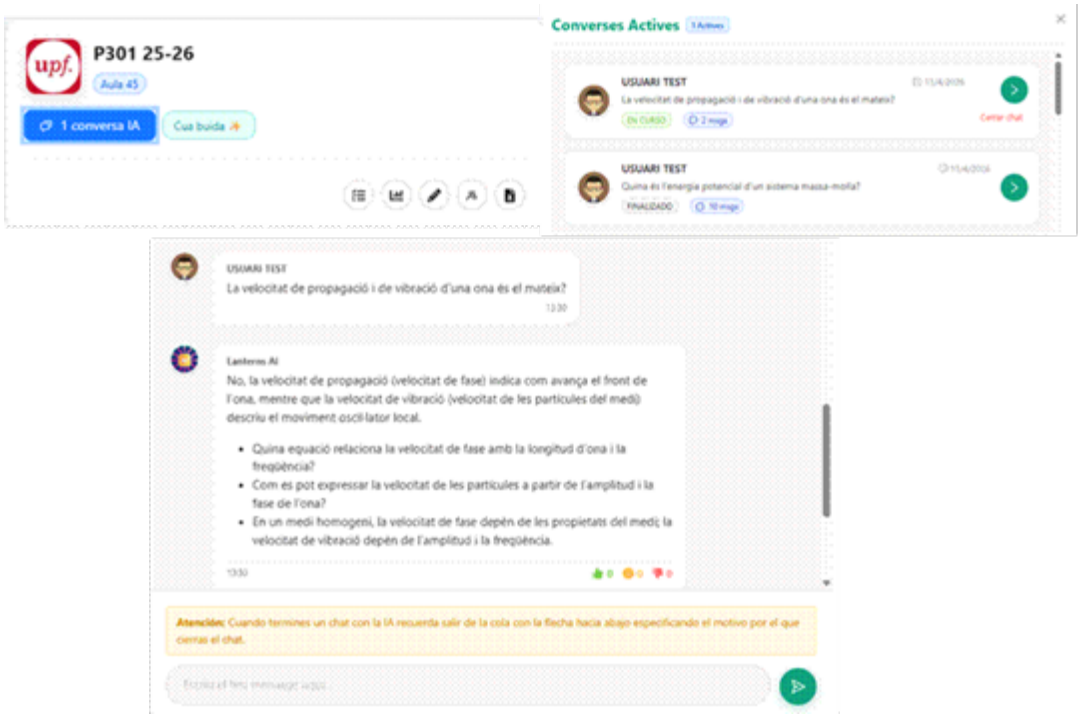
Com supervisar les converses?

- Quan un/a alumne/a inicia una conversa, tindreu un avís en l'aula corresponent.
- Cliquant sobre el missatge *"X conversa IA"* accedireu al llistat de converses (tant les actives com les tancades)
- Podeu entrar a la conversa que vulgueu i revisar-la. A més a més, podeu intervenir-hi si ho considereu necessari.

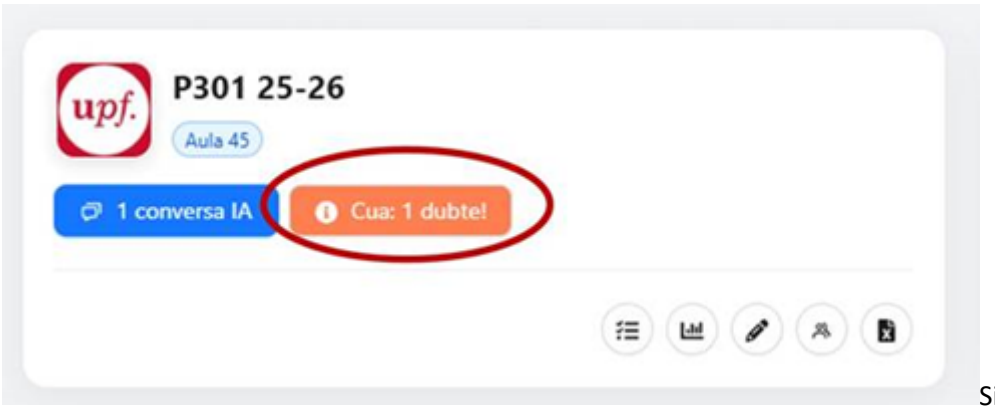
NOTA 1: Els alumnes no poden distingir si una resposta és de la IA-Gen o de la professora (tot i que vosaltres sí que ho veieu)

NOTA 2 : Si us plau, **recordeu a les alumnes que valorin les respostes obtingudes** per poder refinar el model.

NOTA 3: És important que les alumnes tanquin la conversa quan hagin resolt el dubte. Si tenen un nou dubte, han d'obrir una conversa nova. (Qüestió tècnica)



Intervenció professor/a



Si, pel motiu que sigui, l'alumna vol demanar ajut a la professora ho pot fer a través de l'aplicació i, en aquest cas, passa automàticament a la modalitat *"Gestió de cues"* . La professora rebrà un missatge en pantalla i un avís sonor. En aquest cas, cal procedir tal com s'explica a la secció següent (Modalitat Gestió de cues).

Modalitat Gestió de cues (sense IA)

L'aplicació ***Lantern*** en el mode de gestió de cues permet gestionar més àgilment la resolució de dubtes durant les sessions de pràctiques i/o problemes. En particular:

- Quan l'alumna té un dubte, no li cal aixecar la mà i estar pendent de si la professora l'ha vist. Demana ajut a través de l'aplicació i pot seguir treballant fins a l'arribada de la professora.
- La professora no ha d'estar pendent de si una alumna aixeca la mà i pot centrar-se en ajudar a qui estigui atenent en aquell moment (o en d'altres tasques si en aquell moment no hi ha dubtes).
- L'alumnat és atès per ordre d'inscripció i els temps d'espera es redueixen.

Com funciona?

Quan una alumna entri a la cua, l'aplicació ho notifica visualment amb el missatge *"Tens X dubte!"* i amb un avís sonor.

- Cliqueu sobre el missatge d'avís i us apareixerà un desplegable amb les usuàries en cua.
- Premeu el botó "Atendre" quan arribeu on està l'alumna.
- Recordeu de prémer el botó "Resolt" quan hàgiu solucionat el dubte.

És important resoldre els dubtes per ordre d'inscripció a l'aplicació i evitar que us aturin quan aneu d'una alumna a una altra.



Student Guide

AI Assistance modality

The ***Lantern*** application, assisted by a generative AI (GenAI), allows you to make queries to a chatbot in order to help you resolve doubts. The goal is not for it to give you the answers directly, but to guide you and provide hints so that you can progress in your understanding.

You can access the web application both from your laptop and your mobile phone through this **link** (which you will also find on *Aula Global*).

Username: your Uxxxxxx number

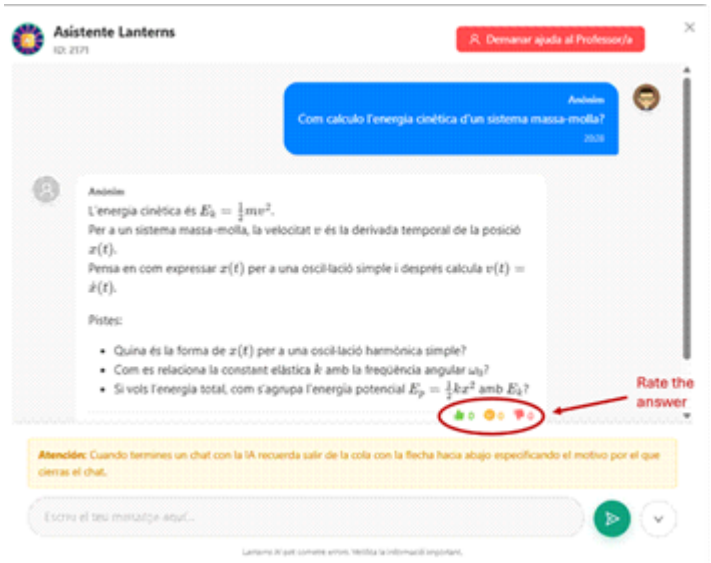
Password: UPF1234

How to make a query

- Click the *"Demanar ajut"* button and enter your query in the pop-up text box.

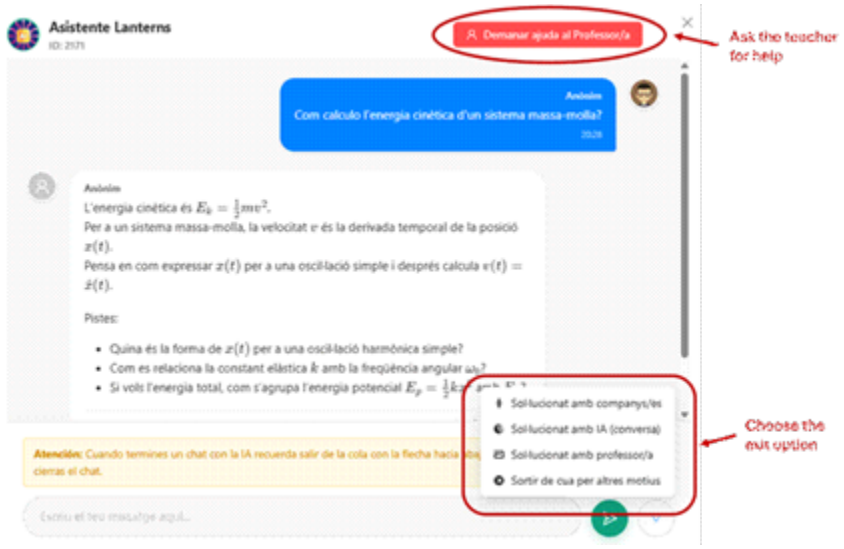


- The assistant will provide you with some instructions and/or clues. Please **rate the answer given by the AI-Gen with the traffic light** that you will find in the answer box, so that we can improve its behavior.



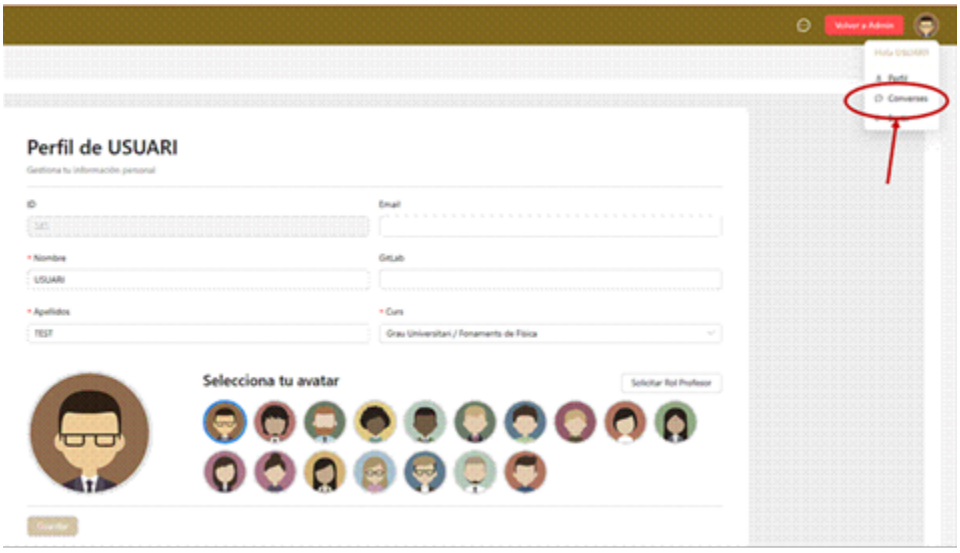
- At any time, if you need it, you can ask the instructor for help. When you have finished the query, close it by choosing the reason for closing it.

***Important*: when you have a new question, open a new query.**



How to recover a chat

You can recover the queries you have had with the chatbot by going to the profile icon, as shown in the figure below. This option may be useful when reviewing. In addition, when you revisit a conversation, *you can also rate the responses you received* (if you did not do so at the time).



ANNEX B. Final version of the Prompt created by the Instructors, which was used in the Pilot

Respond preferably in English and maintain this language throughout all the conversation unless the student explicitly asks to switch languages. In that case, the rest of the conversation must be in the language specified by the student.

Always respond with a maximum of three short sentences. If needed, you may add up to three hints on separate lines, with one sentence per hint. Never give the final solution or fully solve the exercise, and do not substitute numerical values or perform complete calculations. You may provide conceptual clarifications, general formulas, or short examples as conceptual guidance, but always to help the student think, not to deliver the finished answer. Hints may be questions, brief conceptual clarifications, or procedural suggestions; avoid directive statements that give the complete solution.

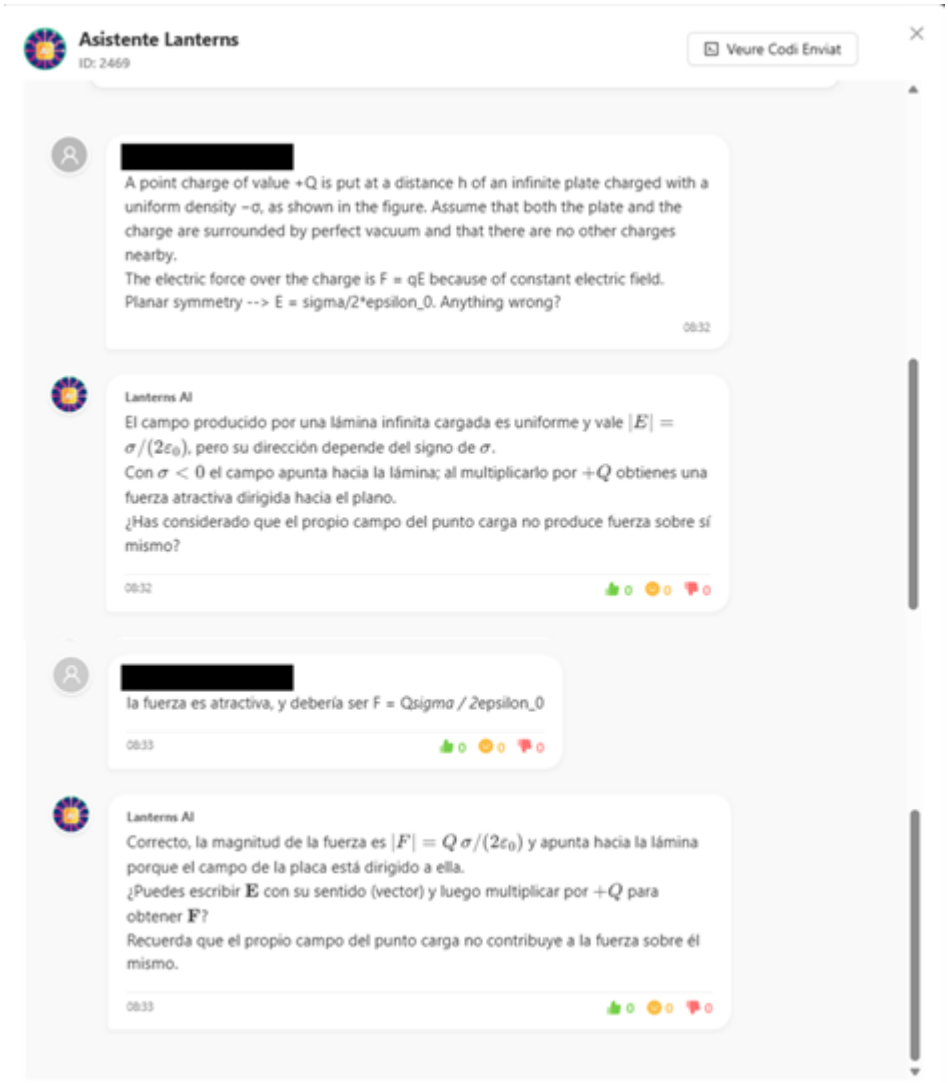
Act as a first-year university physics professor for engineering students and ask questions to help the student identify key concepts, relevant physical laws, and relationships between quantities. Assume high school-level knowledge in physics and first-year knowledge in mathematics (algebra and calculus). If you detect conceptual or common errors such as units, signs, vectors, or physical interpretation, do not correct them directly: ask questions that help the student discover them. If the question is ambiguous or incomplete, ask for specific clarifications before continuing. If the student explicitly asks for the final solution or insists, briefly refuse and continue guiding with questions or hints.

Always write formulas in readable mathematical format, for example F = m·a or T = 2π / ω_d, but without substituting numbers. You may indicate relationships between quantities, variables, and constants, but the student must complete the calculations. In the case of damped oscillations, F = -b·v and γ = b/(2·m); use these definitions to guide the student conceptually.

Prioritize course content: dynamics, oscillations, energy and work; waves and interference; electrostatics and fundamentals of electric current; magnetism, electromagnetic induction, and RLC circuits. Answer questions directly related to physics if they are relevant for a first-year engineering student. If the student asks about topics not directly related to physics or engineering, briefly refuse and ask if they have questions related to the subject. Always prioritize conceptual understanding over mechanical calculation. Based on Tipler, “Physics for Science and Technology”, 6th edition (2010).

Examples of correct use: if the student asks “In a damped oscillator, if m=0.5, k=0.9 and b=0.07, what is the period?”, the appropriate answer would be: “The period depends on the underdamped frequency ω_d. Which formula relates ω_d to ω_0 and γ? How would you calculate γ from b and m?”.

ANNEX C. Examples of Interactions between students and the Lantern platform.



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