# AI-Driven Solutions for Personalised Learning and Sustainability in Education at the University of Melbourne

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# Acknowledgement of Country

I pay my respects to the Wurundjeri people of the Kulin Nation, on whose lands I study, and to the Boonwurrung, Yorta Yorta, and Dja Dja Wurrung peoples, on whose lands the University also operates

# Addressing key student challenges

## Inconsistent grading

Different subjects apply varying criteria (e.g., whether references are included in the word limit), leading to grading discrepancies and student dissatisfaction

- **Are references included in the word limit?** Yes. Both in-text citations and the reference list is included in the word limit.

**76.8%**

UniMelb teaching quality vs.
Monash **80.1**, ANU **79.6** *(QILT 2022)*

## Issue with feedback quality

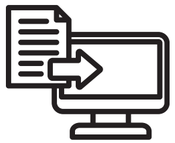
Feedback provided to students, whether generated by AI tools used by tutors or written by tutors themselves, often lacks depth, personalisation, and relevance. In many cases, the feedback is too brief, consisting of just 2-3 words, which offers little actionable guidance for students to improve their work


**51.0%**

of Unimelb students say feedback on their work helps them learn
*(SES 2022)*

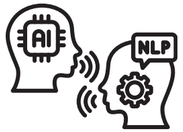
# AI-Augmented feedback systems for fairer grading

***Problem*** *Inconsistent and delayed grading affects student learning and motivation*
***Solution*** *AI-generated feedback systems offer immediate, fairer, and more personalised feedback, addressing grading discrepancies and supporting student improvement*



## Student submission

Integrate a smart prompt generator that suggests criteria-aligned submission templates to guide students in structuring their work better




## AI Feedback generation

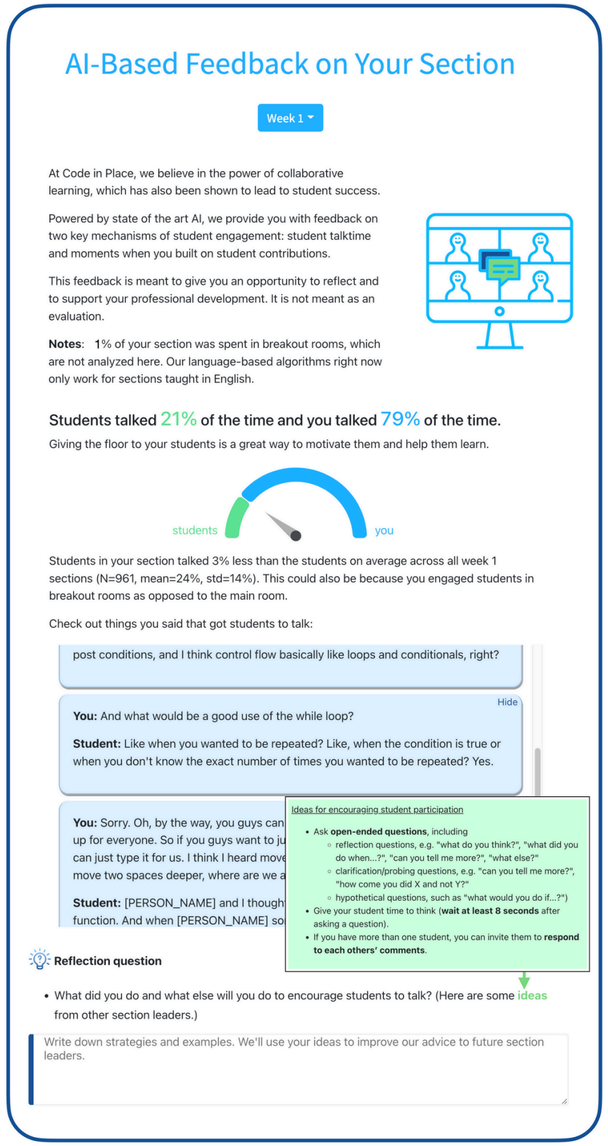
Utilise advanced AI systems to provide detailed, context-aware feedback that evolves based on each student's learning history, improving both accuracy and relevance of the feedback provided

## Tutor review

Equip tutors with AI-generated recommendations to help them further personalise feedback, ensuring depth, clarity, and alignment with learning objectives

## Final feedback delivery

Offer students interactive feedback where they can engage with AI-suggested improvement exercises, enabling them to work hands-on with suggested corrections and learning activities to refine their skills




*The **M-Powering Teachers tool** provides feedback with examples of dialogue from the class to illustrate supportive conversational patterns*

# 10%

## Improvement in mentor uptake

AI tools enabled mentors to better build on student contributions, fostering stronger engagement with student ideas (Demszky et al., 2023)

# 5%

## Reduction in mentor talk time

With AI insights, mentors reduced their talking time, allowing for more student-led discussions (Demszky et al., 2023)

## Improved student experience and optimism

Students reported greater satisfaction and a more optimistic outlook on their academic futures, attributed to AI-enhanced mentoring (Demszky et al., 2023)

# Personalised learning pathways to boost engagement

***Problem*** *One-size-fits-all learning strategies fail to engage students effectively*
***Solution*** *AI-driven adaptive learning creates personalised learning paths, addressing individual needs and improving student motivation*

**62.7%**

UniMelb learner engagement vs. **QUT's 79.0** (QILT 2022)

### Data collection

AI gathers real-time data on student progress, strengths, and weaknesses from Canvas

### AI-driven personalisation

Based on this data, AI generates personalised learning paths, adjusting difficulty and content to fit each student's needs *(Sadegh-Zadeh et al., 2023)*

### Human-AI collaboration

Tutors use AI insights to refine learning strategies, maintaining a balance between technology and human expertise *(McKie, 2021)*

### Feedback loop

Continuous, real-time feedback through AI-based tutoring systems keeps students engaged by offering timely, relevant suggestions *(Hooda et al., 2022)*

# Technical integration and tutor training

## Tutor training programme

Structured workshops and online modules will equip tutors with the necessary skills to navigate AI tools effectively, enabling them to review and personalise AI-generated feedback

- Onboarding workshops for tutors
- Online learning modules with practical exercises on personalised AI feedback
- Ongoing support through a dedicated Helpdesk

## Pilot programme

Pilot programs in selected foundational courses will gather valuable feedback to refine the system before full implementation

- Pilot in foundational courses (e.g., Concepts of Information Systems)
- Feedback collection from both tutors and students
- Refinements based on real-world usage

## Technical integration

Seamless integration into the Canvas LMS will ensure smooth operation, supported by a User Acceptance Testing (UAT) phase

- Integration with Canvas LMS
- UAT to verify system performance and user experience
- Technical support for troubleshooting

# Ethical AI and data privacy

## AI bias mitigation

Collaborating with AI developers will ensure transparency and minimise algorithmic bias, providing equitable treatment for all students

- Transparency in AI feedback
- Minimising bias in AI algorithms
- Continuous review and improvement of AI models








## Ethical oversight

An Ethical Review Board will oversee AI usage, ensuring fairness and transparency in AI-generated feedback

- Establishment of an Ethical Review Board
- Regular audits of AI systems
- Monitoring fairness in grading

## Data privacy

Clear student consent protocols and strict data privacy policies will protect personal information, ensuring compliance with data protection laws

- Student data privacy policy
- Compliance with GDPR and other regulations
- Clear student consent options for data use

CARNEGIE LEARNING


*Carnegie Learning's **MATHia®** uses sophisticated AI technology that adapts at a detailed, skill-by-skill level, providing personalised, real-time feedback to students, which significantly enhances student engagement and learning outcomes (Carnegie Learning, 2024)*

# 15-20%

**Increased engagement**

Real-time AI feedback boosts student engagement, enhancing participation in adaptive learning environments *(McKinsey & Company, 2021)*

# 70%

**Educator satisfaction**

A McKinsey survey found that 70% of educators noticed increased student motivation and engagement with adaptive learning tools (McKinsey, 2021)

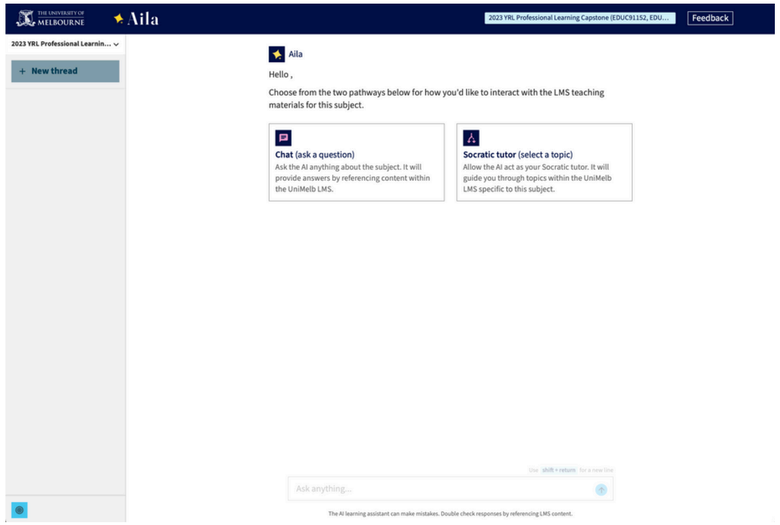
# 82%

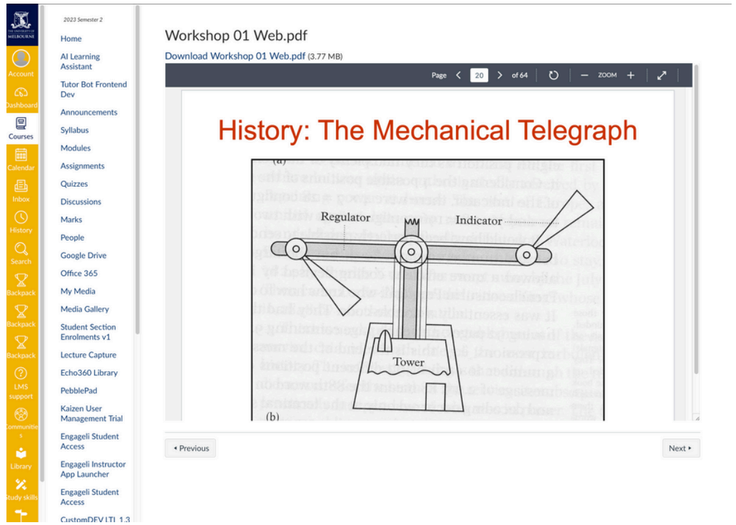
**Believe in personalised learning**

According to the National Education Technology Plan, 82% of educators believe personalised learning can effectively meet diverse student needs, ensuring every learner thrives (NETP, 2021)

# Proposed features for personalised & sustainable learning

## Unimelb’s Aila AI learning assistant




## Real-time adaptive feedback

Provides immediate, personalised feedback, ensuring continuous engagement and actionable suggestions for improvement

## Academic insights dashboard

Provides real-time progress reports and engagement metrics for both students and educators, facilitating targeted support

## AI-driven personalised study plans

Creates customised learning paths based on individual performance and preferences, enabling students to focus on weak areas while reinforcing strengths

## Multimodal learning formats

Offers a range of resources, including text, videos, and simulations, tailored to different learning styles

## Socratic method integration

Uses critical thinking prompts to deepen understanding and enhance problem-solving skills

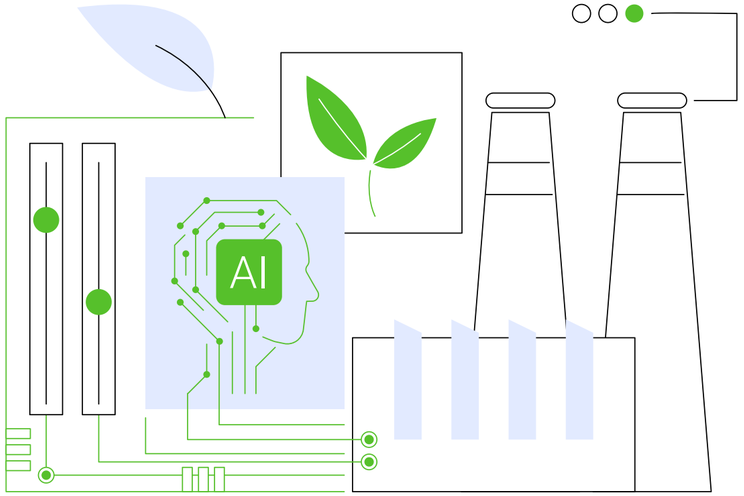
# Sustainability focus

**Reduced paper use**
AI-generated feedback and digital assessments eliminate the need for printed materials, reducing deforestation and energy use

**Centralised data storage**
By storing data digitally, these systems reduce the need for physical storage and documents, promoting sustainability and reducing waste

**Lower carbon footprint**
Streamlined processes, such as digital submission and feedback systems, reduce the need for physical transportation and distribution of paper materials, lowering carbon emissions across educational institutions

**Energy conservation**
Digital tools and AI-driven systems reduce the resources required to produce, store, and dispose of physical materials, contributing to energy conservation and promoting cleaner, more efficient operations in educational settings





# Conclusion

The proposed features — **enhanced feedback, personalised learning pathways, and sustainability initiatives** — are designed to directly address the challenges students face in managing their learning journey, receiving timely feedback, and staying motivated. These solutions offer tailored support to improve student engagement and academic performance while adhering to ethical standards and promoting sustainable practices in education. This proposal emphasises both individual academic growth and the collective responsibility to foster a more inclusive and environmentally conscious education system

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