GenAI in Learning, Teaching and Assessment

09

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AMA2222
Principles of Programming

Why did the instructor use GenAI for learning and teaching?

Adam had a keen interest in leveraging technology to enhance learning, teaching, and assessment. He successfully got the funding with other departments to explore the use of AI technology to enhance teaching and learning experience from the University Grants Committee. As part of this initiative, Adam piloted the use of Generative AI (GenAI) in his subject, AMA2222 Principles of Programming, which is a core subject in the BSc Scheme in Data Science, AMA. This case study aimed to examine the effectiveness of GenAI in promoting improved learning outcomes and to identify the challenges and solutions associated with its implementation.

How was GenAI used in this scenario?

Adam's primary objective was to investigate the extent to which teachers should allow or encourage students to use GenAI to enhance their learning outcomes. To achieve this, he incorporated GenAI into 5 out of 11 laboratory projects in AMA2222, while maintaining the same quiz and examination arrangements.

Before incorporating the GenAI into the laboratory projects. By comparing the learning process before and after the introduction of GenAI (Figures 1 and 2), Adam aimed to assess the impact of GenAI on student learning.

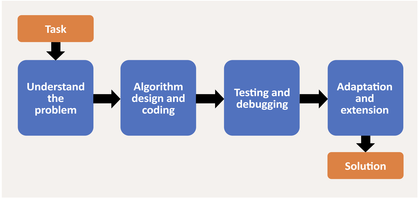


Figure 1 – Before the GenAI was incorporated into the laboratory projects.

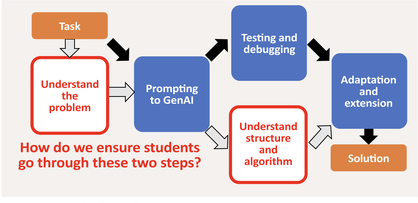


Figure 2 – After the GenAI was incorporated into the laboratory projects.

A comparison between the original laboratory projects and the GenAI-assisted laboratory projects was further elaborated in Figure 3:

(old) Lab 9: Electronic wallet	(new) Lab 10: Financial portfolio
AI and internet searching not allowed	AI allowed, only yahoo finance allowed
All the functions required within the class are stated clearly	The functions required are not stated clearly
Main program provided to testify correctness of students' coding	Main program can be modified by students to demonstrate their coding
Does not require explanation	Require explanation of their work
Grading only based on correctness and executability of the program	Grading based on correctness, executability and also creativity, rationality of the program

Figure 3 - A comparison between the original laboratory projects and the GenAI-assisted laboratory projects

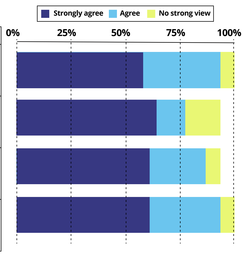
What was the impact on student learning?

The pilot study, conducted in Semester II of the 2023/24 academic year, yielded a response rate of 41.8% (38 out of 91 students). The results showed overwhelmingly positive responses to the use of GenAI in learning, teaching, and assessment. For instance, the mean rating of 4.4 indicated that students believed that AI-assisted laboratory projects could better assess their learning outcomes than traditional laboratory projects without AI. Additionally, a mean rating of 4.2 suggested that students could learn more from AI-assisted laboratory projects compared to traditional laboratory projects without AI.

Extra Questions

Item	Mean	Std Dev
1. Do you agree that generative AI is useful for writing your course project?	4.5	0.6
2. Do you agree that the use of generative AI should be included as part of assessment?	4.4	1.0
3. Do you agree that the AI workshops are useful to enhance your knowledge in AI?	4.4	0.9
4. Will you apply knowledge in using generative AI to other subjects?	4.5	0.6

5=Strongly agree; 4=Agree; 3=No strong view; 2=Disagree; 1=Strongly disagree



What were the challenges encountered during the implementation and what solutions were used?

Despite the positive outcomes, Adam encountered some challenges during the implementation of GenAI. Students reported concerns such as:

- **The randomness of AI-generated solutions, which could lead to inconsistent quality and undermine fairness.**
- **The use of syntax not taught in lessons, which could make it difficult for students to fix errors in AI-generated solutions.**

To address these challenges, Adam adhered to the following principles of GenAI-assisted assessment redesign:

1. **Inter-disciplinary:** The assessment involved the application of knowledge from other fields, promoting a more holistic understanding of the subject matter.
2. **Authentic work:** Open-ended question assessments were used, allowing students to demonstrate their creativity and problem-solving skills without limitations.
3. **Process and metacognition-based:** The assessment required students to explain how their code worked and reflect on its effectiveness and limitations, promoting a deeper understanding of the subject matter.

By following these principles, Adam aimed to ensure that students could ultimately benefit from the GenAI implementation upon completing the GenAI-assisted laboratory projects. Adam hopes that his experiences and practical advice can assist other programming subjects from other departments in implementing GenAI.