GenAI in Learning, Teaching and Assessment

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Instructor
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Department
Department of Applied Mathematics (AMA)

AMA1D04
Understanding Social Conflicts by Game Theory

Why did the instructor use GenAI for learning and teaching?

Adam initially had reservations about the use of Generative Artificial Intelligence (GenAI) tools in Mathematical Reasoning, Spatial Sense, and Calculation. However, he was intrigued by the potential of language-based GenAI in mathematics subjects. He proposed the final six weeks of the CAR course, "Understanding Social Conflicts by Game Theory," for students to choose to complete their projects with or without GenAI tools. His interest lays in exploring the extent to which language-based GenAI impacted students' learning in this subject.

How was GenAI used in this scenario?

Adam specified that the GenAI tools available at https://genai.polyu.edu.hk and https://poe.com were permitted to be used by students for their project writing. Since most students, if not all, were new or unfamiliar to the use of GenAI for project writing, To help introduce this new approach to his students, two GenAI workshops were conducted in Week 10 and Week 13, namely, 'How to Write a Project Proposal with GenAI?' and 'Writing Your Project with Generative AI'. The workshops were offered to 59 out of 68 students, who opted to write their project reports with GenAI tools.

Some key learning principles covered in the workshops are as follows:

1. **Creative thinking**
   How to choose a suitable and interesting topic for brainstorming and scoping in GenAI?
2. **Prompting**
   How to communicate efficiently with GenAI?
3. **Digital literacy**
   Which GenAI tool should I use and how to use it?
4. **Understanding limitations of GenAI**
   Can GenAI do everything? What is GenAI good/bad for?
5. **Critical thinking**
   Shall I trust the result produced by GenAI?
6. **Adaptation**
   Which part should be done by GenAI/human?
7. **Reproducibility**
   Can the GenAI-generated results be reproduced?
8. **Ethical issues**
   Plagiarism? Copyright? Academic integrity? Biased result?
9. **Avoid over-relying**
   What is my responsibility and meaning of being a human?

The last 6 weeks of AMA1D04 was as follows, with 59 out of 68 students opting to write their projects with GenAI tools:

- **Week 10** — AI Workshop 1
  How to write a project proposal with GenAI?
- **Week 11** — Submission of proposal
- **Week 13** — AI Workshop 2
  Writing your project with GenAI
- **Week 15** — Submission of project

In contrast with the previous delivery of AMA1D04, the grading criteria for those students opting for writing their projects with GenAI tools was revised to include 'explaining the use of AI for proposing the topic' in the project proposal stage and 'explaining the use of GenAI for the work' in the project report stage.

The rubrics for the GenAI report is also provided below:

Score	Description
0	The student didn't involve the use of AI for the elements above at all.
1-2	The student involved the use of AI for any of the elements above, but didn't make any further explanation.
3	The student involved the use of AI for any of the elements above, and tried to define which part involved the use of AI.
4	The student involved the use of AI for some of the elements above, tried to define which part involved the use of AI, with a critical evaluation of the suitability using AI for each part.
5	The student involved the use of AI for some of the elements above, tried to define which part involved the use of AI, with a critical evaluation of the suitability using AI for each part, also reflected the advantages or limitations of the use of AI in the project.

What was the impact on student learning?

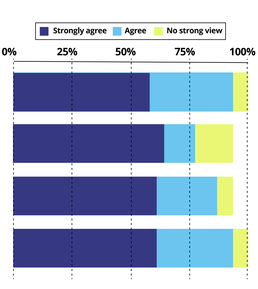
With all dedicated efforts from Adam and his students, he was glad to receive some exemplary student reports that were enhanced by the use of GenAI tools. As Adam requested students to record and explain the method and prompts they used to help them with their project proposals and reports, he found that these high achievers could, for example, use multiple GenAI tools or platforms, as long as they are more suitable for the purpose; verify the GenAI generated results, especially factual knowledge, by comparing to different sources; integrate the result collected from different sources or generated by different GenAI tools or platforms; clarify which part has been done by GenAI/human; generate the writing part according to the structure to ensure quality, etc.

Extra questions from the SFQ (31/68, 45.6% response rate, 4 Likert scale questions) also showed students' views on the usefulness of the redesigned AMA1D04 with an overwhelmingly positive mean rating of 4.4 or above.

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?

One reported challenge was that, in some GenAI workshops, students could easily generate answers using GenAI to achieve full marks without any effort. Additionally, it was noted that the randomness of GenAI led to varying quality in solutions, even when the same prompts were used with the same GenAI tool. In response to this feedback, Adam implemented an assessment redesign for GenAI integration. Instead of focusing solely on outcomes (e.g., students' answers), he required students to explain how they utilized AI in their work.

In the future, Adam will consider using GenAI workshops and other support aiming at enhancing students' digital literacy to see how an eclectic approach would better facilitate students' learning in utilising GenAI.