

Creating practice test items with Generative AI: A student-faculty collaborative approach

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Abstract

Description of the Problem: Educational delivery has been greatly impacted by the recent advancements in Generative Artificial Intelligence (GAI) and the expected further exponential advances within the field. While many studies have discussed the impact of GAI, it is commonly framed as either how faculty can make GAI work for them or how to “GAI-proof” educational assessment. A less considered option would be to partner with students on GAI use to augment their studying.

The Innovation: Students partnered with the course instructor to design and evaluate GAI-powered question sets to supplement the course material in a first-year pharmacy class of both on-campus and distance pathway students (n=54). The primary objective was to design a potential mechanism to openly collaborate with students in using GAI. Outcomes measured included question utilization, student perceptions of using the question sets, accuracy of the questions, and cost/time to create the question sets.

Critical Analysis: The student and faculty collaborative review questions were positively rated by the students and were feasible to design and implement, at no expense and of minimal time to create. Additionally, only 3 out of 425 questions were found to be incorrect upon faculty review. Of the 50 students who completed the author-developed survey, over 90% used the GAI question sets, perceived them to be helpful and perceived that they enhanced their learning; and 70% of students agreed that a professor should review GAI material before it is used. These findings suggest that a student-faculty partnership in the use of GAI may be one way to develop practice test items in pharmacy education, while addressing common concerns about GAI use, implementation, and accuracy.

Next Steps: Future steps include evaluating the success of these question sets in comparison to traditionally made questions as well as initiating student-faculty collaboration in other uses of GAI in pharmacy education.

Keywords: AI, generative artificial intelligence, student faculty collaboration, study tools

Description of the Problem

The use of Generative Artificial Intelligence (GAI), artificial intelligence systems that generate new content such as text, images, and code from learned patterns, has exploded since the release of OpenAI’s ChatGPT in late 2022¹ and Anthropic’s Claude AI in 2023.^{2,3} Pharmacy education is being fundamentally transformed by GAI, reshaping how we train the next generation of pharmacists,^{4,5} and though the technology is expected to be disruptive in many fields, education is expected to be especially affected.⁶ Within education, there are thought to be benefits for students in utilizing GAI such as assistance in the comprehension of complex material, brainstorming, and writing support.⁷ Faculty have successfully used GAI to create lesson plans as well as chatbots that allow students to get instant feedback or help with assignments, saving them time.^{7,8}

In general, students want to incorporate GAI in their education, with 86% of medical and dental students agreeing that they would like AI to be incorporated within their training, and 99% planning to incorporate AI in future practice.⁹ Among international pharmacy students, 72% endorsed a strong desire for increased AI education,¹⁰ and efforts continue to investigate how GAI can enhance learning outcomes, optimize teaching methodologies, and prepare pharmacy students for their future careers.⁴ However, there are a myriad of concerns about the use of GAI, including that students can use GAI to write papers for them or that faculty will use it to make lecture notes or grade assignments without human oversight.¹¹

One possible role of GAI in higher education has been defined as “augmented intelligence”^{5,12} which is the combination of GAI and human expertise and judgement. The use of augmented intelligence can be an ideal model in education, as GAI systems are known to make errors or even create information to fill gaps in its knowledge, and faculty can serve as the expertise to verify this information. Although GAI tools are improving, there are several concerns such as: hesitancy and reduced trust using GAI, or blind faith in information provided,¹³ misuse without consent or guidance¹⁴ and appropriateness of information generated by GAI.

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The Innovation

One way that educators can help students learn appropriately from GAI is to openly partner with them. This Note describes the development of such a collaboration between the course instructor and student representatives in a first-year pharmacy biochemistry course. In August 2024, a class discussion was held regarding how students planned to study the presented material in Biochemistry. Multiple students disclosed that they planned to upload the professor's lecture slides into a GAI platform to generate study tools. This led to a discussion regarding the positives of this approach (e.g. ease of use, low time commitment, extra material practice) as well as concerns of both the professor and students (e.g. uploading slides without permission, accuracy and relevance of content generated, unguided time spent studying). From this discussion, several students who were particularly interested in this topic lead an innovation with the course instructor to design a way to use GAI for study. A collaboration was developed in which the students and faculty would work together to openly use GAI to generate a popular requested study tool in the form of question sets, which would be powered by GAI but have augmented faculty review and oversight. The project also included a process to evaluate this innovation by measuring student engagement with the question sets in addition to gathering information regarding perceptions of its value and usefulness, concerns regarding its use, the accuracy of the questions as reviewed by the faculty member, as well as to measure the feasibility (cost and time) of the work. The semester-long intervention included first year biochemistry students in both on campus (n=28) and distance learning (n=26) pathways. This study was determined exempt by the University's Institutional Review Board.

For each lecture, the course instructor uploaded the lecture slides into Claude AI, which was available at no cost and familiar to the faculty member. The following prompt was used: "Please create 25 multiple choice questions using the attached slides. Please make them an assortment of remembering, understanding, analyzing and evaluation on the scale of Bloom's taxonomy." The instructor then checked each question set for errors and non-relevant content, which was fixed (if there was a simple wrong answer) or deleted from the question set (if not relevant to the content). GAI was not used to further edit the question sets. The student representatives then converted the questions into an interactive quiz using Microsoft Forms and shared the quiz link with the instructor who posted it in the course learning management system. Each question set was titled "GAI Question set" and carried a disclaimer at the top "We are testing the use of GAI as a studying tool. These questions were made by generative AI based on the lecture slides. They have been checked for glaring errors but could still contain some misleading or incorrect information. This is not a substitute for your own studying but can serve as a corrected GAI study tool for this lecture that we hope you find helpful." No incentives were given to students for using the question sets.

All platforms used in the study were free of charge and widely available to be used in other settings. In total, 17 GAI generated question sets were provided for each of 17 lectures, each containing 18-25 questions. After week 10, all students were given a voluntary survey regarding their perceptions of using this GAI study tool. The survey was designed by the faculty member based on a Technology Acceptance Model¹⁵ but adapted to fit the current intervention and piloted to the students involved in the project. This included 13 questions rated on a 5-point Likert scale that assessed perceived usefulness, past and future GAI use, confidence in GAI, and perceived risks of using GAI. Additionally, students were asked if and how many incorrect questions they thought were found and given the opportunity to include other free-response feedback. The students involved in collaboration for the project were able to utilize the question sets but did not participate in the survey.

Critical Analysis

At the end of the course, 50 out of the 54 enrolled students (93%) completed the study survey and of those respondents, 47 (94%) indicated that they used the GAI question sets. Before the course, 22 of 47 (47%) respondents had used GAI to study. After the course, 40 of 47 (85%) reported confidence in using GAI in future courses. In terms of engagement with the question sets, 33 of 47 (70%) reported reusing each set multiple times; on average, each question set was used 86 times (range, 67-106), and the mean time spent per attempt was 80 minutes.

Regarding the use of the GAI, 97.9% of students responded that they agreed or strongly agreed that "Using generative AI helped me understand the course material better" and 95.8% responded that they agreed or strongly agreed that "The use of AI enhanced my learning of the material in this course". Of the 3 students who didn't use the GAI question sets, reasons given were: "I didn't have time", "I felt confident studying my notes", and "I just like to hand write everything it makes it easier to memorize" (of note, they did not select choices related to not trusting GAI).

The students' perceptions on using GAI were also enlightening. On questions related to their confidence in using GAI, only 13% disagreed or strongly disagreed with the statement "I think a professor needs to review generative AI material before I use it" supporting the concept of using augmented intelligence to help ensure accuracy of material. Only 46% of respondents indicated they would use GAI on their own (without faculty guidance) in future studying, with a plurality (41%) neutral on that question. Yet, a majority (62%) did agree or strongly agree with the statement "I trust generative AI to use for my studying". Table 1 contains the full breakdown of responses to the survey questions. Free-response comments were unanimously positive and included that they found the GAI question sets very helpful and liked

that they knew it was reviewed by the professor before they saw it; selected comments are shown in Table 2.

Table 2. Selected Student Open Response Feedback regarding GAI Question Use

<i>"Love that the professor looked over the questions before releasing the set to us. I would not use this on my own without professor guidance".</i>
<i>"I think my professor has done a great job in providing us with perfect quiz question through GAI after reviewing".</i>
<i>"It is important that a professor or a person who is well-versed with the subject must go through the quiz question that the GAI generates".</i>
<i>"The GAI was very helpful for me in studying and reviewing topics. I feel that it is a great tool to include in studying and preparing for exams as well as figuring out which topics or concepts were not clear for."</i>
<i>"These were super helpful to help me prepare for the exams and I definitely recommend using them for your future students!"</i>
<i>"I really love them, they were honestly so helpful and I wished every class did them!"</i>

The approach used in this faculty/student collaboration in using GAI was quite feasible. The average time it took for the instructor and student representatives to upload information into Claude AI and proof/edit the questions was 5.59 and 5.76 minutes per set respectively. There were no costs associated with the creation of the study sets. Thus, the approach could be utilized in other courses and in other programs with no financial cost and a minimal expense of faculty and student time

Overall, the GAI generated questions were noted to closely align with summative course assessments in depth, content, and level. Of the 425 student-generated questions, 3 (0.7%) were determined incorrect by the instructor. Additional question removals for applicability, relevance, or difficulty averaged 3 per set (range, 0-7).

A recent scoping review of GAI highlighted the gaps in studies of AI use specific to pharmacy education finding generally limited data.⁴ Of the seven studies identified in this 2024 paper, five focused on teaching and learning and only two were conducted within the United States.⁴ Since that publication, additional works have demonstrated the effectiveness of using GAI as a virtual tutor,¹⁶ to enhance communications education,^{17, 18} and generate valid exam questions.^{19, 20} Thus, the use of GAI continues to grow but

most of these methods still lack an explicit collaboration of the use of GAI between students and faculty to optimize learning, as was used in this innovation.

Limitations to this work include that the study was performed at one program, for one iteration of one course and the results may not be generalizable to other settings. It is possible that a faculty student collaboration to use GAI to make practice questions may be more useful in a foundational science course such as biochemistry compared to a social science or skills-based lab course where complex patient cases or ethical dilemmas are involved. It is also possible that the demographics of the students in the study may be different compared to those at another program, however, the students included in this study were from two cohorts, including a range of ages and many non-traditional students in the distance learning pathway.

Students are using GAI platforms to help them study, by summarizing materials and breaking it down to key points, and this often occurs without faculty knowledge, guidance or input.¹⁴ This Note highlights one way in which faculty can incorporate GAI use into the classroom. The student and faculty collaborative review questions were perceived positively by the students and provided a way for students to use GAI information that had been corrected and verified. It also allowed faculty to be aware of at least some of the GAI material students were studying. Students perceived being more comfortable using the GAI generated questions knowing that the instructor had reviewed the material before releasing it. Additionally, by being upfront about the fact that the questions were created by a GAI, this intervention avoided the potential student outrage others have experienced when not disclosing this information.²¹

Next Steps

These findings suggest that student-faculty partnerships to develop and review GAI generated questions sets may be one way to develop practice test questions in pharmacy education, while addressing common concerns about GAI implementation and accuracy in the professional curriculum. Next steps would include comparing the use of GAI generated question sets to human generated question set use, including feasibility, accuracy, and student perceptions, as well as measuring assessment performance differences with the use of GAI generated question sets. Different levels of faculty supervision of student use of GAI, from minimal guidance to intensive collaboration, could also be compared. This type of partnership can also be expanded to other components of coursework. By expanding this collaborative framework beyond question generation, institutions can harness both student insight and faculty expertise to create more effective, engaging, and relevant learning tools across the curriculum.

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Disclaimer: The statements, opinions, and data contained in all publications are those of the authors.

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Table 1. Student Perceptions of GAI Practice Question Set Use*Questions Related to GAI Use*

	%				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Using GAI helped me understand course material better (n=47)	61.7	36.2	0	0	2.1
The AI generated study materials were relevant and useful for preparing for exams (n=46)	69.6	23.9	2.2	2.2	2.2
I felt that the AI tools provided additional support beyond traditional study methods (n=47)	66	29.8	2.1	0	2.1
I have used generative AI as a study tool prior to this class (n=47)	19.1	27.7	6.4	27.7	27.7

Questions Related to Perceived Usefulness of GAI

	%				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The use of AI enhanced my learning of the material in this course (n=47)	51.1	44.7	2.1	0	2.1
The feedback provided by the AI was accurate and helpful for my academic progress (n=47)	42.6	42.6	12.8	0	2.1
I am confident in my ability to use generative AI effectively in future studies (n=47)	40.4	44.7	10.6	2.1	2.1
I would recommend the use of generative AI tools to other students for studying (n=47)	51.1	38.3	8.5	0	2.1

Questions Related to GAI Confidence, Accuracy and Safety

	%				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I trust generative AI to use for my studying (n=47)	21.3	40.4	31.9	2.1	4.3
I believe that generative AI is almost always correct (n=47)	6.4	40.4	42.6	2.1	8.5
I think a professor needs to review GAI material before I use it (n=47)	48.9	21.3	17	8.5	4.3
I would use generative AI on my own (without faculty guidance) in future studying (n=46)	15.2	30.4	41.3	6.5	6.5
I have concerns about using generative AI for studying (n=47)	4.3	10.6	42.6	31.9	10.6