Short Communication

Transforming Case Write-Up Evaluation with Artificial Intelligence: Insights from a Pilot Study at a Private Medical College

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Abstract

In this study, authors have explored use of AI tools in enhancing evaluation of undergraduate case writeups to determine uniqueness of the student-generated research questions. Case write-ups are used as continuous assessment method in department of Family Medicine at Shifa College of Medicine, Islamabad. The task for students involves documenting patients' medical information and developing research questions based on their respective cases. Work of 50 students from two consecutive batches rotating in Family Medicine was assessed. The originality of the submitted questions was assessed using GPT Zero, to identify AI generated material. To ensure academic integrity, plagiarism checks were also carried out using Google Scholar and Semantic Scholar to find any overlaps with already published material. From a sample of 150 research questions, nearly half of all the research questions (42.7 %) were plagiarized, 34% of questions were AI generated, and 23.33% were original questions.

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Introduction

Being skillful in scientific writing is essential for communication of medical information. It is not only an exercise that sharpens clinical skills but also promotes research capabilities among medical students.[1] Case write-up comprises detailed clinical information of patient, physical examination, diagnostic process, management plan and health outcome based on real time interaction.

The holistic approach in healthcare emphasizes on considering psychological and sociological aspects of illness along with biological factors in the evaluation and effective management of patients.[2]

Case write-up is a tool for student focused teaching that emphasizes critical reasoning and application of knowledge. Also, students go through scientific literature relevant to their cases encouraging self-directed learning.[3]

At Shifa College of Medicine, Islamabad case write-ups are commonly used method of continuous assessment in final year at department of Family Medicine. To promote evidence-based medicine, students are assigned to provide a write-up on patients' medical problems including a biopsychosocial history and a management plan. They are also required to develop at least 3 research

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questions from the above case that are worth investigating. At the conclusion of clerkship, faculty members mark the students' assignments. It involves giving timely constructive feedback on their performance. This strategy supports their learning as it helps them identify gaps in their knowledge, thus, improving learning outcomes.[4]

Case write-ups help medical students to integrate their knowledge with clinical reasoning to come up with a comprehensive management plan for their patients.[5] This is a holistic teaching strategy that aligns theoretical knowledge with the practical experience. When interacting with patients in clinical settings medical students can apply the knowledge learnt, make evidence-based decisions in patient care, rather than a mere learning process.[6]

The field of health care is continuously evolving as it is influenced by expansion in research and technology. This highlights the need for medical professionals to familiarize themselves with cutting edge technology. Beyond acquiring knowledge through conventional teaching methods, students can be better prepared for complex clinical scenarios using innovative educational approaches. Integration of technology, artificial intelligence, into medical education has potential to transform and make teaching methodology more efficient, representing the present day practice. AI can tailor educational experiences to individual learners' needs,[7] such as simulation of clinical scenarios, grading of assignments, generation of feedback,[8] and conception of curriculum etc.[9] AI-based tools are also integrated into hybrid formats of teaching that enhances students' learning to remote educational environments.[10] The teaching approaches of assessment encompassing continuous feedback and the integration of technology provide effective educational assessment, cater learning needs and student engagement.[11]

After gaining hands-on practice with various AI tools during a course on AI in research, the faculty of Family Medicine has integrated AI tools in assessment of students' assignments. AI powered tools such as Google Scholar and Semantic Scholar were utilized particularly to detect text plagiarism in the research questions proposed by the students as well as whether research ideas were generated through AI assistance.

Methods

This study was conducted at Shifa College of Medicine in the Department of Family Medicine. The participants included 50 final-year medical students from 2 consecutive clerkships. Each student selected one unique case, developed three research questions based on their chosen case. Students uploaded their case write-ups with research questions to "Case Write-Ups" folder on Google Classroom.

At the conclusion of each clerkship, assignments were graded by faculty. Dataset consisted of 150 questions altogether from 50 students.

Faculty members conducted a thorough evaluation of each case write-up, assessing the clinical relevance including biopsychosocial aspect of the case.

To assess research questions, faculty members utilized AI tools such as GPT Zero. GPT Zero analyzes the text and assigns a probability score indicating whether text is AI generated or human generated. This tool was applied to determine whether the questions were generated independently by students or if AI assistance was taken.

According to the study presented in the article titled "Analysis of tools for detecting scientific texts generated by Artificial Intelligence (ChatGPT)", GPT Zero achieves 97.50% accuracy in categorizing machine-generated content.[12]

Furthermore, to ensure academic integrity, the research questions were cross verified using plagiarism checks- Google Scholar and Semantic Scholar.

The data collected from the AI tools and plagiarism checks was analyzed to assess the prevalence of AI assistance in generating research questions and integrity of questions posed. The analysis also involved a comparison of the quality of research questions developed independently by students versus those generated with AI assistance.

The study ensured confidentiality and anonymity of student submissions. The use of AI tools was transparently communicated to students as part of evaluation process.

Ethical approval for study protocol was obtained from Institutional Review Board & Ethics Committee. Informed consent was waived off by the committee for purpose of this study.

Results

In this study, dataset comprising 150 research questions generated by a study population of 50 students from final year was analyzed. The pie chart (figure 1) depicts over all percentages of different categories of questions developed by all students.

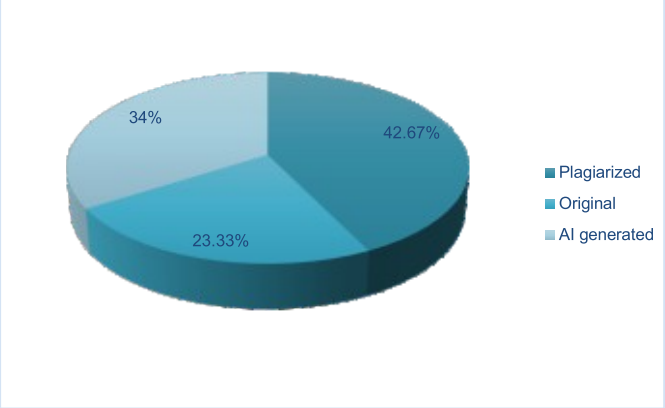

Figure-1: *Comparison of categories of student generated research questions*

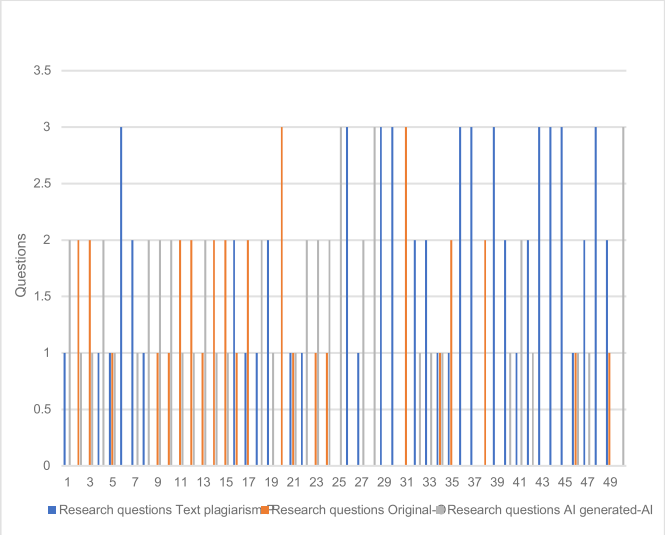

Figure-2: *Distribution of questions generated by an individual student across AI, original and plagiarism categories.*

Out of total 150 research questions, where each student submitted 3 questions, plagiarized questions formed nearly half of all the questions (42.67%). Around one-third (34%) of questions were AI generated, and 23.33% were original questions. The pie chart result show that a significant proportion of students used AI assistance, suggesting dependency of students on artificial intelligence more rather than their independent creative thinking.

The above given clustered bar chart (figure 2) shows distribution of different categories of questions created per student.

Out of 50 students, 20 had created one or two original questions that represented their individual work. On the other hand, one or two text-plagiarized and AI-assisted questions were submitted by 22 and 30 students respectively.

In terms of highest frequency of each type of question, 2 students made all their questions independently, without depending on AI or plagiarism. Whereas 3 students generated all questions using AI, showing their dependence on AI. Eleven students submitted all text-plagiarized questions. The clustered bar graph reflects trend similar to that of above given pie chart, revealing that only a limited number of students (4%) showed independent effort in formulating research questions. This raises concerns about over dependence of students on AI and its potential implications on academic integrity.

Discussion

Our investigation focused on the originality of questions and use of AI based tools in academic assignments of students, a relevant and contemporary issue in medical colleges.

According to given statistical information, students have adopted a combined approach to generate questions for their assignment. A greater proportion of research questions belonged to text-plagiarized or AI -assisted categories in comparison to those who produced original work.

The study used entire dataset without exclusion, with a sample size of 150 research questions which is reasonably large dataset for analysis within single institution. For plagiarism detection use of Google Scholar and Semantic Scholar helped in identifying textual similarities with published literature.

This study has potential to be extended over a longer time period enabling assessment of long-term trends, given that this is a pilot study.

The high occurrence of non-original questions highlights issues with academic integrity along with reliance on AI tools to complete their task. This necessitates creating awareness about research misconduct and plagiarism. Deceit in scientific research not only compromises the quality of scientific data[13] but also leads to financial losses from misused research funds, poses a threat to human life, as it can form the basis for unsafe medical treatments.[14] A study from Hong Kong described incorporation of UPCC (Understanding, Paraphrasing, Citations and Checks) teaching model enabled students avoid plagiarism.[15] A considerable percentage of AI-driven questions suggests that AI can be effectively employed as a learning support in medical education. The use of AI in educational institutes has enhanced students' learning experience through a personalized learning platform that provides immediate feedback, automated evaluation of assignments and facilitates creative writing efficiently. While AI can assist in generating ideas, it also underscores importance of original thought. Moreover, AI raises concerns regarding academic integrity and originality of content. The risk of plagiarism, text ownership and ethical lapses are other prominent issues associated with inappropriate use of AI. Therefore, a balance is crucial to ensure that students develop critical thinking skills while leveraging AI effectively. Although fewer than other categories, a substantial number of students were able to create their own questions. This emphasizes students should be encouraged to develop their own research questions through guided exercises and feedback. To keep up with the growing need for integrating AI in medical education, there is pressing need for creating AI tools specifically designed to preserve academic integrity. Such tools can support scientific writing and detect artificially formulated content while maintain professional accountability at the same time. A small sample size can weaken our study, limiting its generalization on a larger population. Another limitation would be for checking AI factor in research questions only one tool (GPT Zero) was applied.

Conclusion

The study concludes that smallest proportion of research questions were generated by students themselves, while approximately half of submitted questions were plagiarized. This signifies encouraging undergraduates to create original work. The intelligent use of AI can help young researchers to explore literature and contribute in scientific literature allowing them to focus on their original contribution and become ethical professionals at the same time.

To ensure fair usage of AI systems, it is essential to be conscious of AI ethics particularly the need to mitigate biases and protect data privacy. This could be done in the form of training workshops, seminars etc. by concerned ethical authorities.

The study recommends multiple AI systems can be applied to evaluate originality of student's work and compare results generated by other AI tools. In future research can focus on long-term patterns of study and evaluate improvements in students' original work after AI education. As AI based knowledge is limited at undergraduate level, supervised access to AI resources with hands-on practice to our students could prevent misuse and promote ethical use. Also, it is essential to incorporate AI education into medical curricula, including training in its practical applications and responsible use to make students' learning more effective. This approach can foster an environment where students develop their own research ideas while maintain high standards of academic integrity.

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Authors' Contribution:

AR: Conception & design, acquisition of data, analysis & interpretation of data, critically revision for important intellectual content

QK: Acquisition of data, analysis & interpretation of data

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