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Commentary and Opinions

The impact of artificial intelligence on case-based learning during pre-clerkship education

L'impact de l'intelligence artificielle sur l'apprentissage par cas pendant la formation préclinique

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Introduction

In recent years, medical education at many schools in Canada, including the University of Toronto and Western University, have implemented case-based learning (CBL). In CBL, students, with the support of a tutor, work through medical cases in small groups to answer questions related to a set of objectives.[1] This teaching style aims to empower students to direct their own learning, collaborate with their classmates, and encourage active application of concepts to develop students' clinical reasoning skills for long-term retention.

The rise of artificial intelligence (AI), however, has contributed to many changes in the way that students understand medical education. AI provides numerous benefits for students, allowing for the synthesis and presentation of greater amounts of knowledge in substantially less time.

Within our classes, we have noticed that our peers frequently use AI to prepare for small group CBL sessions, saving superfluous time spent looking through articles, allowing them to allocate their remaining time completing other tasks.

Implications of AI in CBL

The purpose of CBL is to facilitate deep learning through active interaction with the content. This process starts when we first read the case and attempt to answer the questions using our own knowledge. Typically, this is not enough to answer the intended objectives of the case, however, and we instead turn to a diverse set of resources including YouTube videos, lecture material, and class notes. After finishing the case, we meet with our small groups to discuss our findings; a preceptor is also present to help guide our discussion if we struggle to come up with an answer suitable for our level of training.

The CBL process demands several advanced levels of the cognitive domain within Bloom's taxonomy, specifically by evaluating potential solutions, researching and analyzing case-related content to deepen understanding, and applying the newly obtained knowledge.[2] We then reinforce this new information by sharing our thought processes during small group discussions. This format purports to increase long-term retrieval of knowledge.[3] With AI's ability to critically reason, however, we have noticed that much of the struggle to gain knowledge consolidation and find applications within a case-based context is taken away from the student.

Furthermore, AI will typically summarize the broadest conclusions of studies, omitting the context of the study which highlights areas of potential bias.[4] From our experience, this manifests in the homogenization of

students' problem-solving heuristics, resulting in less diverse conclusions. In practice, we have observed that small group discussions become less effective, as multiple students will produce a similar answer based on the same line of reasoning used by popular AIs. Especially in a field where having a range of lived experiences and backgrounds is essential to supporting individuals from various communities, we feel that being limited to one fixed way of thinking has the potential to have detrimental impacts on our clinical reasoning.

Proposed modifications to the current CBL model

Within our classes, we have observed some approaches to resolving these issues with the current CBL model. One modification is to introduce new cases during live sessions to encourage knowledge consolidation prior to and after the session. In this model, students receive three to five new cases each session and individuals give a short oral presentation about their differential diagnosis without utilizing their technology or notes. In our experience, when students are unable to rely on AI to prepare cases in advance, most come to class more prepared, leading to greater engagement with the content and greater benefits from the CBL model.

Another alternative that we have observed during our CBL sessions is to continue with pre-assigned cases, with the implementation of additional follow-up questions. Although students may rely on AI to prepare the original case, during the session, the discussion goes more in detail into how students' approach would change when different scenarios and variables are introduced. This encourages critical thinking in the moment and allows students to share their unique thought processes.

Conclusion

CBL can be an effective tool when students actively engage with several levels of learning. AI simplifies the thinking process, however, so that students are not required to critically evaluate the content to arrive at an answer. Thus, the curriculum should change to adapt to the increasing accessibility of AI. As a result, we propose that learning modalities like CBL should be changed to account for AI's impact on the critical thinking and rationalization skills typically used during case-based learning.

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