

NotebookLM® and the generative artificial intelligence revolution in dental education, research, and clinical practice

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Dear Editor,

Artificial intelligence (AI) is defined as the ability of computer systems to perform tasks that have traditionally required human intervention, such as pattern recognition, natural language processing, and the analysis of large volumes of data. In its most advanced form, generative artificial intelligence (GenAI) is based on deep learning models trained on large volumes of data and capable of generating new content, such as text, images, or audio, based on learned statistical patterns (1).

In health sciences, and particularly in dentistry, GenAI has begun to transform learning, research, and professional practice. Based on large language models (LLMs), this technology facilitates the organization, interpretation, and synthesis of information, as well as the assisted generation of academic texts and educational materials, establishing itself as a versatile assistant in academic and professional settings (2–5).

A representative example is NotebookLM®, a GenAI system developed by Google that integrates natural language processing, semantic search, and contextual generation. Although it was not designed or validated as a diagnostic tool or for therapeutic decision-making, it can be used as a cognitive assistant for organizing and synthesizing information, as well as for the preliminary drafting of academic or clinical documents (6,7). This tool uses retrieval-augmented generation (RAG) techniques to generate content from sources provided by the user, thereby improving the reliability and traceability of responses through verifiable references (8).

In education, it can be used to support the development of clinical guidelines, assessment rubrics, and educational materials aligned with the learning objectives of each course. It also enables the creation of question banks, audio content, and explanatory videos, promoting more dynamic and interactive teaching. By reducing the workload associated with content preparation, faculty can focus more on mentoring and providing academic support to students (6). In research, it can assist in organizing and reviewing the scientific literature by synthesizing key findings and identifying potential knowledge gaps, thereby facilitating the design of new research projects (2).

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Despite its advantages, the quality and reliability of its responses depend directly on the documents provided. Therefore, if these documents contain incomplete, inaccurate, or outdated information, the generated content will reflect the same limitations. Consequently, all information should be interpreted with caution and validated by a qualified professional, as these tools do not replace clinical judgment or direct consultation of the original sources. On the other hand, privacy and confidentiality must be carefully considered, and sensitive or identifiable patient information should not be uploaded (8,9).

The use of GenAI in dentistry presents relevant limitations, including the risk of overreliance on clinically unvalidated systems, excessive dependence that could impair the development of critical thinking, and the potential reproduction of biases derived from the sources used (9). In this context, these technologies should be regarded as support tools rather than substitutes for professional clinical reasoning (8).

The responsible integration of GenAI into dental education, research, and practice represents an opportunity to strengthen professional training and optimize academic processes. Its adoption, guided by ethical, regulatory, and pedagogical principles, will facilitate progress toward a more reflective, personalized, and evidence-based model of practice (3,6). Promoting digital literacy and integrating GenAI competencies into the curriculum will make it possible to harness its potential without compromising patient safety or the quality of care (10). The way we learn has changed; the way we teach has changed as well.

Authorship contribution:

All authors contributed to the preparation of this manuscript.

Statement on the use of artificial intelligence:

ChatGPT was used to perform basic grammatical corrections and provide assistance with writing. The authors carefully reviewed and edited the generated content and assume full responsibility for the integrity and accuracy of the manuscript.

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