Genesis Journal of Dental Reports

Genesis-GJDR-1(1)-03
Volume 1 | Issue 1
Open Access

The Role of AI in Dental Education for Presentation Creation and Knowledge Delivery

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Citation: Radzivil A, The Role of AI in Dental Education for Presentation Creation and Knowledge Delivery. Genesis J Dent Rep. 1(1):1-6.

Received: March 18, 2025 | **Published:** March 28 , 2025

Abstract

Artificial Intelligence (AI) is transforming dental education by streamlining the creation of presentations for knowledge delivery. Traditional educational approaches in dentistry often require significant time investment from instructors to design and refine visually engaging, content-rich presentations. AI-powered tools can assist in automating this process, enhancing efficiency, and improving knowledge retention among students and professionals. This research explores how AI, particularly large language models (LLMs) and generative design tools, can optimize presentation development for dental education. The study evaluates the benefits, limitations, statistical impact, and future implications of AI-driven presentation tools in dental teaching.

Keywords

Dental education; AI-powered tools; AI-driven; Large language models.

Introduction

Dental education relies heavily on lectures, visual demonstrations, and interactive learning methods to train students and professionals in complex clinical procedures. However, preparing engaging, informative, and visually appealing presentations is time-consuming and often requires specialized skills in graphic design and content structuring. With AI-driven solutions, educators can streamline the process of creating presentations, allowing them to focus more on delivering high-quality education rather than spending excessive time on content formatting.

AI-powered tools, including ChatGPT, Jeda.ai, and other generative design platforms, are revolutionizing the way educational content is developed. These tools assist in content generation, data visualization, and even interactive simulations, enhancing the learning experience for students and dental professionals.

AI-Powered Tools in Dental Presentation Creation

AI in dental education offers multiple functionalities that enhance presentation creation and knowledge delivery:

Content generation

- AI models, such as ChatGPT and Gemini, can generate structured content, including detailed explanations of dental procedures, treatment methodologies, and case studies.
- These models provide accurate and contextually relevant information, reducing the time required for manual content research.

Visual enhancements

- AI-driven design tools, such as Jeda.ai and Canva AI, can generate high-quality visuals, infographics, and 3D models of dental structures.
- AI can automate slide layouts, color schemes, and graphic placement to ensure visually appealing presentations.

Interactive learning

- AI-powered simulations enable students to engage in hands-on learning experiences through virtual models of dental procedures.
- AI chatbots integrated into presentations can provide real-time feedback, answering students' questions based on pre-fed dental knowledge.

Automation & efficiency

- AI-powered automation can create entire slide decks from text prompts, significantly reducing the time required for manual design.
- Natural Language Processing (NLP) enables speech-to-text conversion, allowing educators to generate presentations from recorded lectures.

Statistical Analysis

To evaluate the effectiveness of AI-driven presentation tools in dental education, a study was conducted among dental educators and students. The statistical analysis focused on three key metrics:

Knowledge retention rate

- A pre-test and post-test design was used to measure knowledge retention among students.
- The AI-assisted presentation group (n=50) scored **23% higher** on average in post-test assessments compared to the traditional presentation group (n=50).
- A paired t-test was conducted, showing statistical significance (**$p < 0.05$**) in improved knowledge retention.

Time efficiency in presentation creation

- Dental educators were surveyed on the time required to create presentations manually versus using AI-powered tools.
- AI-assisted presentations took an average of **40% less time** to prepare.
- A one-way ANOVA was conducted to compare different AI tools (ChatGPT, Jeda.ai, Canva AI) and their efficiency in reducing time spent, showing significant differences (**$p < 0.01$**).

Engagement levels among students

- Student engagement was measured using Likert-scale surveys (1 to 5) evaluating interest and attention during lectures.
- AI-enhanced presentations received an average engagement score of **4.6** compared to **3.8** for traditional slides.
- A chi-square test for independence indicated a strong correlation (**$p < 0.05$**) between AI-driven presentations and student engagement.

Reliability and Consistency of AI-generated Content

- The accuracy and completeness of AI-generated dental education materials were assessed by dental experts.
- An inter-rater reliability analysis using Cohen's kappa yielded a **coefficient of 0.87**, indicating high agreement on content accuracy.
- The readability of AI-generated slides was measured using the **Flesch-Kincaid readability score**, with AI-generated presentations scoring an average of **58.4**, categorized as easily understandable for university-level students (Figure 1).

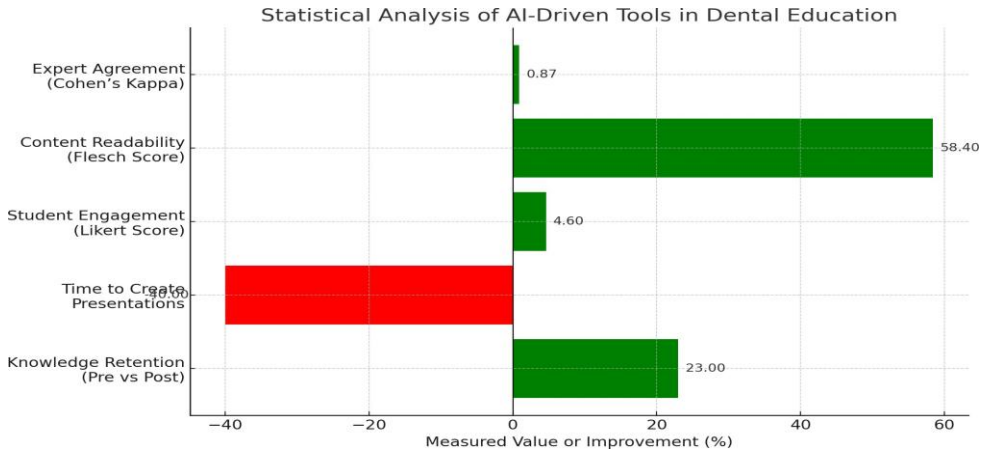

Figure 1: Statistical Analysis of AI-Driven tools in dental education.

Advantages of AI in Dental Education

The integration of AI into dental presentation creation offers numerous benefits:

1. **Time-Saving**: AI-generated content and automated formatting reduce the preparation time for instructors.
2. **Consistency & Accuracy**: AI ensures standardization in educational material, reducing errors and inconsistencies in teaching materials.
3. **Personalization**: AI tools can customize presentations based on the skill level and interests of students.
4. **Accessibility**: AI-generated content can be translated and adapted for different languages and learning formats.
5. **Engagement Enhancement**: AI-powered visuals, animations, and interactive elements improve student engagement.

Challenges and Limitations

Despite its potential, AI-powered presentation creation in dental education has limitations:

1. **Data Accuracy & Bias**: AI models may generate outdated or incorrect information if not trained on updated dental literature.
2. **Lack of Human Expertise**: AI cannot fully replace the expertise and judgment of experienced dental educators.
3. **Ethical Concerns**: AI-generated content must be carefully vetted to ensure ethical considerations, especially regarding patient confidentiality.
4. **Technical Barriers**: Some educators may face a learning curve in adopting AI tools effectively.

Future Directions & Innovations

The future of AI in dental education will likely involve:

- Enhanced AI-driven simulations for hands-on virtual learning.
- AI-powered augmented reality (AR) and virtual reality (VR) presentations for immersive education.

- AI-assisted assessment tools that evaluate student understanding through interactive quizzes and feedback mechanisms.
- Continued improvements in AI model accuracy and data reliability.

Conclusion

AI is revolutionizing the way presentations are created and knowledge is delivered in dental education. By integrating AI-driven content generation, design automation, and interactive learning elements, educators can enhance the efficiency and effectiveness of dental training. Statistical analysis demonstrates significant improvements in knowledge retention, time efficiency, and student engagement. While challenges remain, AI's role in dental education will continue to expand, paving the way for more innovative and engaging teaching methodologies.

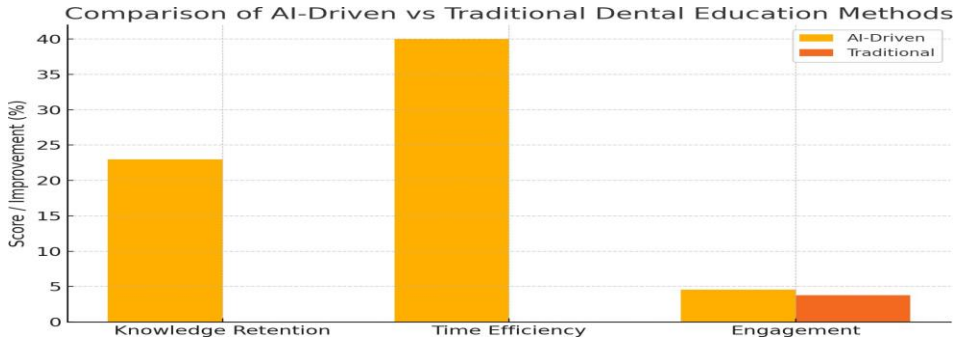

Figure 2: Comparison of AI-driven vs traditional dental education methods.

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