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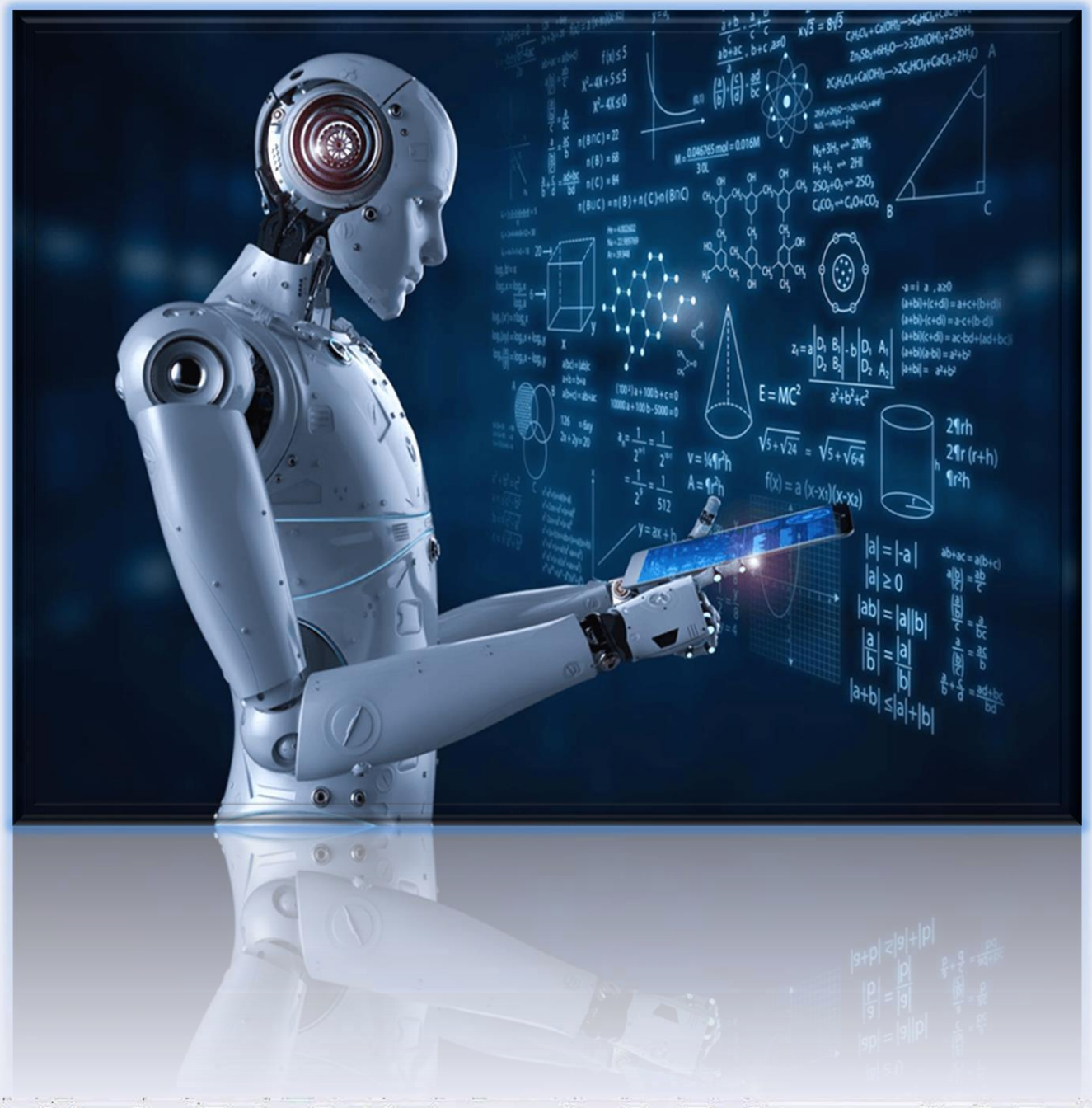

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Editorial Foreword

Editor-in-Chief

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Welcome to the new Issue of the Journal Of Computer Sciences and Mathematics JCSM. The topics covered by this Issue are related to the current trends of research, original research that uncovers sustainable development.

The JCSM Journal represents an international journal that effectively provides a forum for academics, professionals, graduate and undergraduate students, fellows and associates to share the latest developments and advances in knowledge and practice of Computer Sciences, Artificial Intelligence, Cybersecurity, Information Technology and Engineering, Technics and Technology implications in Businesses. Our interest in promoting high-quality research is clearly reflected in having an established peer reviewing process and a high-profile expert group of Associate Editors and Editorial Board Members.

Hopefully you find this Issue valuable and we definitely look forward to receiving your high-quality studies for the next issue of the Journal.

Prof. Dr. Bekim Fetaji
Editor

Journal of Computer Science and Mathematics

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The use of Artificial Intelligence for Creating Digital Content in the Learning Process

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ABSTRACT

In the paper the capabilities of artificial intelligence (AI) in generating digital content for use in the learning process with focus on the course Fundamentals of Electrical Engineering are explored. Using three modern AI tools- ChatGPT, Copilot and Gemini, power point presentations are created to analyze the different approaches each tool takes in generating educational materials. The goal is to evaluate the structure, most relevant content, useful examples and the most effective visual elements for the need of electrical engineering students.

Through the research, each AI tool is used to create presentations on various topics from the course, such as fundamental electrical laws, electrical circuits, network theorems and dc transients. The presentations are compared based on several criteria: (1) information structure- how clearly and logically the content is organized; (2) quality of the content- accuracy, detail and relevance of the material; (3) examples- whenever and how the tool generates examples to explain the concepts; and (4) visibility and shareability.

The paper analyzes the strengths and weaknesses of each tool, with a particular focus on their usefulness for educators and students. Also, a discusses how AI tools can assist in improving learning by automating content creation while highlighting potential limitations will be represented. The results of this research will be valuable to the academic community, offering insights into which AI tool provides the best educational materials.

KEYWORDS

Artificial Intelligence, ChatGPT, Gemini, Copilot, education, student.

1 Introduction

The rapid advancement of artificial intelligence (AI) is transforming various sectors, and education is no exception. In recent years, AI tools have increasingly been used to enhance the teaching and learning process by automating the creation of educational materials, [1], [2]. These technologies are being integrated into a range of platforms to support the professors in generating personalized, accurate and engaging content for students, [3]. The impact of artificial intelligence (AI) is particularly promising in creation of digital presentation.

This paper examines the use of AI tools for generating digital content for the course Fundamentals of Electrical Engineering. This course covers complex topics where clear and well-structured presentations are critical for student comprehension. To explore the effectiveness of AI, three AI-tools- ChatGPT, Copilot and Gemini, were used to create Power Point presentation on same various courses topics.

The purpose of this research is to analyze and compare the output presentation in terms of structure, content quality, included examples and visual elements. Additionally, the paper addresses the visibility and shareability of the AI- generated presentation, emphasizing how easily these materials can be distributed and accessed by students.

By evaluating the strengths and limitations of each AI tool, this research aims to provide insights into how AI- generated content can enhance the learning process in technical fields like electrical engineering. Ultimately, the findings will offer valuable

guidance to professors and institutions seeking to incorporate AI into their curriculum development process.

2 Literature review

In recent years, the integration of Artificial Intelligence (AI) into education has been widely explored with studies emphasizing its potential to enhance learning and teaching process. AI tools have been particularly impactful in automating content creation, personalizing learning experiences and supporting teachers and professors by reducing their workload. AI has increasingly been employed to improve the accessibility and quality of education. Research highlights the use of AI- driven platforms to generate quizzes, create plans and develop interactive content. Studies such as in [1] discuss the potential of AI to revolutionize education by enabling adaptive learning environment by tailoring content to individual learner needs. Similarly, Holmes et al. [4] explore the implication of AI in education, discussing how it can transform teaching practices, improve learning outcomes and address the challenges associated with its integration.

Automating content generation is growing area of AI research, particularly in creating educational materials like presentations, summaries and tutorials. Tools like ChatGPT which leverage natural language processing have demonstrated capabilities in generating coherent and contextually relevant textual content. Research by OpenAI underlines ChatGPT's ability to assist in drafting educational resources with minimal user input. Copilot, a tool developed by GitHub, is primarily designed to assist programmers by suggesting code snippers. However, its use has been extended in generating technical content and explanations, as noted in studies on its role in educational programming environments, [5]. Meanwhile, Gemini is emerging AI tool that combines natural language processing with multimedia generation, making it a promising candidate for creating visually appealing educational content.

While existing literature highlights the general benefits of AI in education, limited studies focus on evaluating AI tools specifically for generating course materials in technical subjects like electrical engineering. This study addresses this gap by comparing ChatGPT, Gemini and Copilot in their ability to create Power Point presentations for the course Fundamental of electrical engineering.

3 Methodology

This study evaluates the capabilities of three modern AI tools- ChatGPT, Copilot and Gemini in generating digital content for educational purposes, specifically Power Point presentation for the course of Fundamental of electrical engineering. The methodology includes a systematic process of content creation, evaluation and comparison on predefined criteria.

Each AI tool was tasked with generating Power Point presentations on key topics from the course including fundamental of electrical laws, electrical circuits, network theorems and dc transients. The input guidelines provided for each tool were standardized to ensure consistency in output across all topics. The generated presentations were assessed based on following criteria:

(i) Information structure: how clearly and logically the content is organized.

(ii) Content quality: the accuracy, relevance and comprehensiveness of the material.

(iii) Examples: the inclusion of illustrative examples to explain concepts and their clarity.

(iv) Visual appeal and shareability: the effectiveness of visual elements and the ease of sharing the presentation.

4 Results

In this section a comparative analysis of the presentations generated by ChatGPT, Copilot and Gemini are represented highlighting their strengths and weaknesses across the specified evaluation criteria.

The first criterion is information structure of the Power Point presentation is evaluated based on the logical flow, clarity, use of headings and subheadings and overall ease of understanding for the students. ChatGPT demonstrated excellent organization and logical flow in the presentations. Each topic was divided into sections and subsections with clear headings and subheadings. For example, when creating a presentation on electrical circuits, ChatGPT structured the content into sequential slides covering definitions, key principles, examples and summary points making it suitable for theoretical and concept- heavy subjects. But, despite the strong organization, the presentations created with ChatGPT tend to be verbose often including excessive text that might overwhelm the students. On the other hand, Copilot concise and structure outputs focusing on technical aspects. For instance, when generating content on network theorems, Copilot divided the content into clear and well-defined sections for each theorem with brief explanation and examples. Its structure is excellent for highly technical content or numerical examples but has limited ability to independently structure non- programming content effectively. Gemini excels in balancing content organization

and visual appeal. The tool organizes information into logical sections and pairs it with corresponding visuals, such as diagrams, charts, or graphics. For example, in presentations on DC transients, Gemini seamlessly structured the slides to introduce key concepts, followed by graphs illustrating voltage and current over time. While the structure is visually engaging, Gemini prioritizes design over logical flow. This may lead to slides that look appealing but require additional effort to understand the connections between sections.

The second criterion is content quality and was evaluated based on three key factors: accuracy, relevance and comprehensiveness of the material generated by these AI tools. ChatGPT demonstrated a high degree of accuracy in its textual explanations and the content was well- researched and the concepts were correctly defined. The content generated is highly relevant to the course topics and the examples provided facilitate the learning process of the students. The presentations generated by ChatGPT are comprehensive and to ease the studying process each topic is divided into smaller sections followed by examples. Copilot is excellent in technical accuracy especially when numerical problems or equations were involved and produces highly relevant content. However, its focus on concise technical outputs meant that contextual relevance was sometimes missing, making it less suited for introductory content. Copilot is less comprehensive compared to ChatGPT and it needs supplemental explanation on the topics. Content generated by Gemini was generally accurate but there were instances where the focus on visuals led to slight oversimplification or generalized explanations. However, Gemini sometimes simplified complex topics too much to fit its visually appealing design, which could leave gaps in understanding for advanced topics.

The third criterion is the use of examples that are critical components in evaluating the effectiveness of AI generated presentation. The examples help clarify complex concepts and enhance the learning process. ChatGPT, Copilot and Gemini generated the same examples. For example, on the topic Ohm's Law an example was generated for simple circuit with given voltage and resistance, calculating the current, as shown in Figure 1. But the generated examples from all three AI tools are generic and lack specificity to advanced electrical engineering topics, requiring further refinement to align with course objectives.

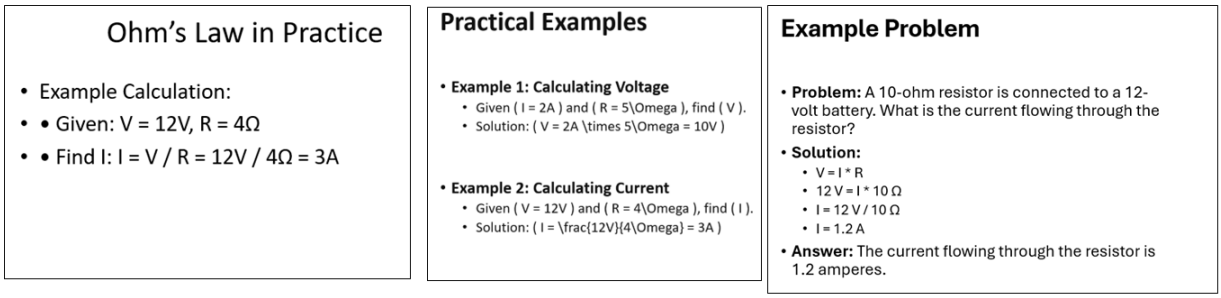

Figure 1: Generated example for Ohm's Law: (a) ChatGPT (b) Copilot (c) Gemini

The last criterion is visual appeal and shareability of the generated Power Point presentations. The visual appeal of educational materials plays a critical role in engaging students and ensuring distribution on the generated presentations. ChatGPT generated text-based content that can be customized for presentations. While it lacks built-in visual design capabilities, its output can be formatted into visually appealing slides using tools like PowerPoint or Canva. For example, ChatGPT provides structured bullet points and logical sequences that lend themselves to easy transformation into slide format. Outputs are flexible and can be adapted to various formats, including PowerPoint, PDF, and Word documents. This adaptability makes sharing across platforms straightforward. Copilot focuses on generating precise technical content, including equations and tables which are highly valuable for educational presentations. While it does not generate visuals, the structured output can be paired with graphs or diagrams to enhance the presentation. But the main weakness of Copilot is limited direct support for creating presentation-ready materials. Gemini excels in visual design, offering integrated support for diagrams, animations, and aesthetically pleasing layouts. For instance, when generating slides on DC transients, Gemini includes time-domain graphs and waveform illustrations that enhance understanding. Its ability to combine text and visuals into a cohesive design makes it particularly effective for topics that benefit from graphical representation, such as circuit diagrams or network theorems. The tool supports exporting presentations in multiple formats, including PowerPoint and PDF, ensuring compatibility with most platforms.

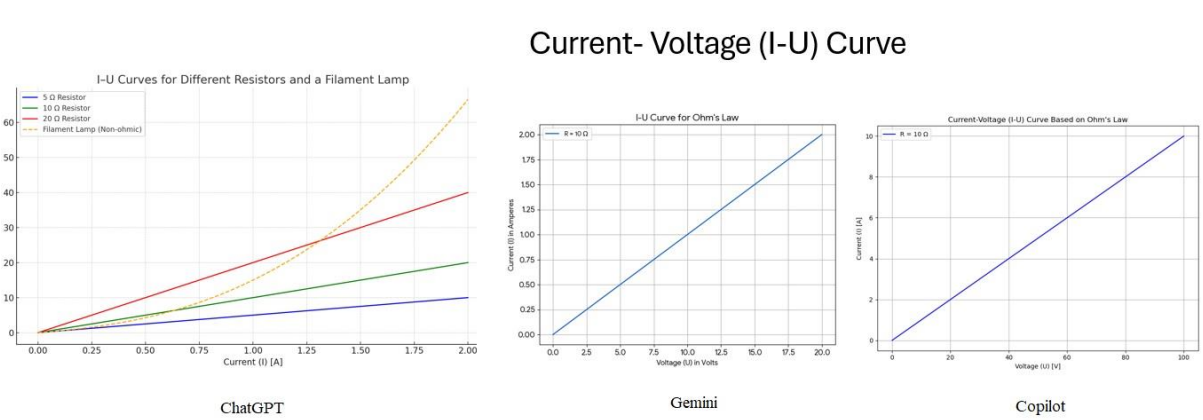

Figure 2: Generated current- voltage curve: (a) ChatGPT (b) Gemini (c) Copilot

Although ChatGPT and Gemini do not generate graphics and images within the presentation itself, these AI tools can subsequently generate images that could later be inserted into the presentation. For example, all three AI tools were given command to generate the current- voltage characteristic of Ohm's Law (Figure 2). The graphics generated by Copilot and Gemini accurately represent a linear relationship consistent with Ohm's Law. The graph generated by ChatGPT is the most comprehensive because it shows not only I-U curves for three different resistors but also includes lamp which correctly demonstrates a non- linear relationship.

5 Conclusion

This paper explores and evaluates the capabilities of three moder AI tools- ChatGPT, Copilot and Gemini, for generating digital presentation to support the learning process on the course Fundamental of electrical engineering. By comparing these tools across key criteria such as information structure, content quality, included examples, visual appeal and shareability, the study provides insights into their strengths, limitations and potential to enhance the educational materials for students.

ChatGPT performed best in information structure and content quality, offering logically organized, accurate and comprehensive material that is highly relevant to course objectives. However, its tendency toward verbosity and lack of built-I visuals may require manual adjustments to avoid overwhelming students. Copilot excelled in technical accuracy, especially for numerical problems and equations and produced clearly segmented content on each topic. However, it lacked depth and contextual completeness and requires additional visual presentation. Gemini stood out in visual appeal, effectively integrating diagrams and layout design to create engaging slides. However, its focus on aesthetics sometimes comes at the cost of depth and logical comprehensive for more advanced topics.

In summary, ChatGPT is most effective for generating structured, accurate, and comprehensive presentations, especially in theoretical domains. Copilot is ideal for technical precision, while Gemini offers superior visual presentation, best used when graphical illustration is a priority. Educators may consider blending outputs from these tools—using ChatGPT for core content, Copilot for technical depth, and Gemini for visual enhancement—to achieve the most effective learning materials.

REFERENCES

[1] Luckin, R., Holmes, W., Griffiths, M., and Forcier, L. B. (2016). Intelligence Unleashed: An Argument for AI in Education. *Pearson.*

[2] Kumar, S., and Jha, S. (2020). AI-based Approaches in Education: Leveraging Learning Analytics and Automated Content Generation. International Journal of Educational Management, 34 (7), 1354-1369.

[3] Baker, R. S., and Siemens, G. (2014). Educational Data Mining and Learning Analytics. Review of Research in Education, 39 (1), 57-82.

[4] Holmes, W., Bialik, M., and Fadel, C. (2019). *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Center for Curriculum Redesign

[5] Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., Neelakantan, A., Shyam, P., Sastry, G., Askell, A., Agarwal, S., Herbert-Voss, A., Krueger, G., Henighan, T., Child, R., Ramesh, A., Ziegler, D. M., Wu, J., ... & Amodei, D. (2021). Language models are few-shot learners. *Advances in Neural Information Processing System*s, 33, 1877-1901.