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Using Generated Artificial Intelligence (AI) Educational Tools for Enhancing Classroom Teaching Efficiency

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استخدام الأدوات التعليمية للذكاء الاصطناعي (AI) لتعزيز كفاءة التعليم بالفصول الدراسية

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Abstract

ChatGPT is a language model (LLM) dependent text-generating artificial intelligence (AI). These LLMs are trained by being fed copious amounts of data to pick up statistical regularities which they then use, like a game of darts where they try to predict what word or action is most likely next and where it came from, without looking at pre-existing solutions or simply copying responses precisely. Considering the vast scope of tasks that can be automated reasonably well with such techniques, generative AI seems to mark another stride forward in this direction. Typically, some of the spots at the forefront of technology and creative sectors are those most vulnerable to automation. Like every other field, artificial intelligence too has had a monumental impact on educational setups. With AI developments, the teaching staff can avail themselves of many tools that make student learning more effective while also making teaching easier. Let us therefore concentrate in this article on the best AI tools for educators. These will transform pedagogy into an exciting process where imparting knowledge is easy and effective and will have a significant impact on the teaching profession. Such methodologies exploit artificial intelligence algorithms to escalate engagement, customization, and productivity in education, resulting in more inventive and inclusive areas for learning. In this regard, it is important to note that developers should carefully consider dangers that could be posed by distortions such as bias, low-quality information, and learner isolation.

Keywords: Large language models (LLMs), Breakthroughs' generated artificial intelligence (AI) systems, Classroom AI educational tools, Creative classroom learning environments, ChatGPT

الملخص

يعتبر (ChatGPT) نموذج لغوي (LLM) يعتمد على الذكاء الاصطناعي في إنشاء النصوص. يتم تدريب هذه النماذج عن طريق تغذيتها بكميات ضخمة من البيانات لاستيعاب القواعد الإحصائية، ومن ثم يستخدمونها مثل لعبة السهام حيث يحاولون التنبؤ بالكلمة أو الإجراء الأكثر احتمالاً في الخطوة التالية ومصدرها، دون النظر إلى الحلول الموجودة مسبقاً أو نسخ الردود بدقة. نظراً للنطاق الواسع للمهام التي يمكن أتمتتها بشكل معقول باستخدام تقنيات مثل هذه، يبدو أن الذكاء الاصطناعي الإنتاجي يمثل خطوة أخرى نحو الأمام في هذا الاتجاه. عادةً ما تكون بعض المناصب في مقدمة القطاعات التكنولوجية والإبداعية هي الأكثر عرضة للأتمتة. مثل أي مجال آخر، أثر الذكاء الاصطناعي كان ضخماً على البيئات التعليمية. مع تطورات الذكاء الاصطناعي، يمكن لأعضاء هيئة التدريس الاستفادة من الأدوات التي تجعل تعلم الطلاب أكثر فعالية مع تبسيط عملية التدريس. نركز في هذا المقال على أفضل أدوات الذكاء الاصطناعي للمعلمين. ستحول هذه الأدوات عملية البيداغوجيا إلى عملية مثيرة حيث يكون نقل المعرفة سهلاً وفعالاً وسيكون لها تأثير كبير على مهنة التدريس. تستغل هذه الأساليب خوارزميات الذكاء الاصطناعي لتعزيز التفاعل والتخصيص والإنتاجية في التعليم، مما يؤدي إلى امكانيات أكثر ابتكاراً وشمولية للتعليم. في هذا السياق، من المهم أن يأخذ المطورون في اعتبارهم بعناية المخاطر التي يمكن أن تتسبب فيها التشوهات مثل التحيز والمعلومات ذات الجودة المنخفضة وعزل المتعلمين.

1. Introduction

Artificial intelligence (AI) has rapidly advanced in recent years, having a profound effect on several industries, including education. AI tools, such as Chatbots, generative AI, analytics, and personalized learning experiences, possess the capacity to profoundly transform the landscape of education delivery and reception. These tools enable chances to increase learning effectiveness, offer personalized learning assistance, and streamline administrative duties. Even though Team GPT has intriguing opportunities, it's critical to recognize that AI in education is still in its infancy and has certain obstacles to overcome. Language challenges, cultural sensitivity, ethics, and student privacy are all legitimate concerns [1-3]. Educators must assess AI's effects on learning seriously and proactively address any risks or restrictions to ensure responsible use [1].

In this research, we are trying to show the steps as a supervision academic team to train a graduate engineering student at the department of chemical engineering at our home Elmergib University to conduct a successful research project thesis topic to earn a master's degree using up-to-date AI teaching tools. The process of training can serve as a highly efficient method to enrich the educational journey and equip the learner to engage in research within the specific discipline. When supervising an engineering master's student using AI tools for research, the approach goes beyond basic training. Training in AI research involves equipping with the right tools and knowledge. This article is a demonstration of powerful AI chatbot tools that can enhance student research experience.

Team-GPT is one of the new effective tool that brings research team together in one shared workspace to foster a culture of collective learning and progression. Establish effective AI-powered workflows while leveraging GPT models to their full potential. Team collaboration with AI shouldn't be a hassle that Team-GPT compares to ChatGPT in Team-GPT, research team can engage in shared powerful conversations together. They can learn from and reuse each other's chats to do things better and faster because chats are shared. Research team can always find what are looking for and know exactly where to find them in a confusion-free workspace because chats are organised in folders. In Team-GPT, members can choose the model that suits the unique work best. Team can use ChatGPT, Gemini, Copilot or even a custom one as can be shown in Figure 1.

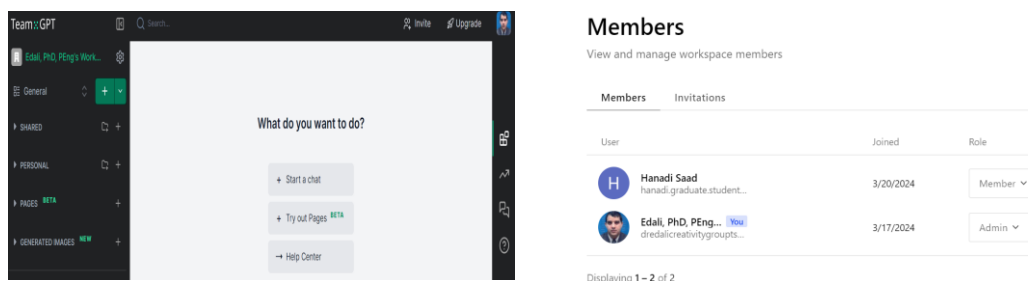


Figure 1: Team-GPT portal and graduate committee research team.

2. The Role of Generative AI on Curriculum and Instruction

AI programs that can produce original text, graphics, and video content are referred to as generative AI systems. Although the concept of generative AI has existed for some time, it gained significant traction following the introduction of Open AI's ChatGPT [4 -5]. Corporate entities alongside individuals were soon drawn to ChatGPT due to its exceptional ability to produce text of high quality for a variety of purposes and styles [6-9].

There is an extensive range of educational potential for this technology. It can generate interactive educational content, simulated settings for immersive learning experiences, and individualized learning materials [3]. The authenticity and correctness of the created content, however, raise moral dilemmas when using generative AI in the classroom. Techniques to guarantee the legitimacy and dependability of the instructional materials generated via artificial intelligence (AI) platforms are required [1-2].

Through its potential to greatly influence curriculum and instruction, generative AI provides instructors and students with new opportunities. This article provides a summary of its potential in transforming curriculum. Customized educational journeys including the use of student data analysis, generative AI can produce personalized learning programs with unique exercises, materials, and tests. This ensures that no learner gets bored

or falls behind by accommodating different learning styles and paces. Changeable and adaptable content textbooks have disappeared from society at large. Curriculum materials that are current and represent the most recent developments in any discipline can be produced via generative AI. Consider engaging in science experiment simulations or allowing learners to explore AI-powered historical tales. Culturally appropriate resources content can be customized by generative AI to reflect a variety of cultures and origins, promoting diversity and deeper knowledge.

The Team-GPT learning methodology empowering individuals and teams with the power of AI access a treasure trove of practical teaching and learning materials in our innovative workspace. Discover prompt templates, best practices, comprehensive online courses, and insightful written content, seamlessly enabling individual learners or team leaders to delve into the world of AI. Customizing your collaborative workspace take the insights gained from level 1 and shape them into a collaborative workspace tailored to your team's needs. Adapt our vast resources, establish an organizational structure with folders and subfolders, and populate them with pre-made chats, prompt templates, and shining examples. You craft the learning environment that best fits your use case empowering individuals and teams with the power of AI to share this dynamic workspace with your team or organization. Team-GPT is more than just a space for learning, it becomes a part of your daily workflow with its collaborative features, intuitive user interface, and direct access to Large Language Models (LLMs). Keeping track of team progress with usage and adoption statistics, and ensuring the team not only learns AI but adopts and excels with it.

Team-GPT, combining ChatGPT, Gemini, and Copilot has the potential to be a powerful teaching methodology by offering a unique blend of AI tools that can benefit students and instructors alike. It benefits students as personalized learning with ChatGPT can prompt them to create customized practice problems, quizzes, and explanations based on a student's strengths and weaknesses. Engaging activities such as using Copilot to help students write code collaboratively for a science project, or Gemini crafting interactive stories that reinforce historical concepts. This can make learning more interactive and fun in the classroom. Improved accessibility of ChatGPT can potentially translate lessons on the fly for students with language barriers, or generate captions for educational videos.

Benefits for instructor efficiency as to boost can be imagined by using Copilot to automate the grading of repetitive tasks or ChatGPT to generate different versions of lesson plans based on learning styles. This frees up valuable time for educators. Differentiation support of Team-GPT can help trainers cater to diverse learning needs to imagine using Gemini to provide students with different levels of explanation for a concept, or ChatGPT to generate scaffolding questions for struggling learners. The constant feedback provider of ChatGPT can be used to create formative assessments that provide students with immediate feedback on their work, allowing for quicker course correction. Here are some additional points to consider the instructor as a Guide while Team-GPT offers valuable tools, lecturers remain crucial for guiding discussions, fostering critical thinking, and providing human connection in the classroom. When discussing ethical considerations, it is crucial to remain vigilant about possible biases present in AI-generated content and to guarantee that students comprehend the function of these tools in their educational journey. In general, Team-GPT exhibits the capability to become a beneficial supplement to the arsenal of an educator, enriching the educational encounter for both learners and teachers. Nevertheless, it is imperative to bear in mind that AI tools are most advantageous when strategically utilized to support, rather than supplant, effective pedagogical approaches.

3. AI Chatbots Tools for Science and Engineering Research

Numerous AI Chatbots exist beyond ChatGPT, and the utilization of these entities may differ based on their respective strengths and weaknesses. Such technologies, which have garnered substantial financial backing, undergo continuous advancement and enhancement, thereby heightening both the anticipation associated with their potential and the sporadically disconcerting moral complexities. Nevertheless, a significant portion of the populace retains basic inquiries about artificial intelligence and its application by researchers.

3.1 ChatGPT

ChatGPT is an artificial intelligence tool created to assist with a variety of tasks, such as text generation, instruction, and informational support on a broad range. ChatGPT is effective at offering advice on how to organize, arrange, and polish written content. It can assist with idea generation, and concept clarification, and provide recommendations for enhancing the coherence and clarity of your writing. Its ability to produce explanations, illustrations, and insights on a wide range of subjects while utilizing considerable expertise is its greatest asset. It may help every step of the way through the writing process, giving you feedback and improving

your work as you progress. ChatGPT functions as a language model propelled by artificial intelligence, with the explicit purpose of providing support across various tasks. This includes aiding researchers in various disciplines and supporting students in their academic endeavors, as illustrated in Figure 1. Its credentials are the result of in-depth training on a wide range of textual materials, such as academic writing styles, scientific literature, and engineering principles. It can offer direction on how to organize a thesis, carry out evaluations of the literature, hone research questions, analyze data, and effectively communicate findings. Even though it isn't a human expert, it can provide insightful advice to help master's students get ready to submit their science theses to engineering research teams. Its support can supplement the knowledge and guidance given by human mentors, bringing fresh insights and resources to the study process.

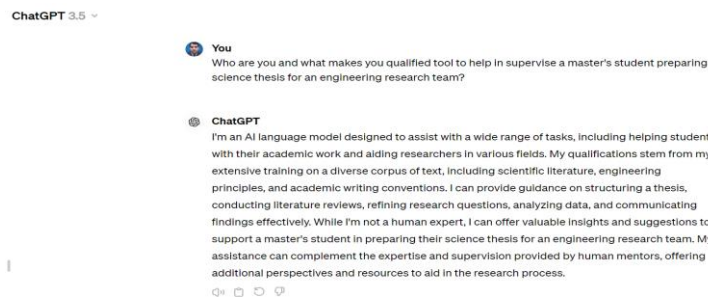


Figure 2: ChatGPT supporting researchers across multiple fields.

As the graduate student's research supervision committee in chemical engineering, we asked ChatGPT how we could use him to aid our student understand more about the study issue that he was given to handle. According to ChatGPT's recent response, it may be quite beneficial to use him as a teaching and mentoring tool for the graduate student conducting chemical engineering research offering few ways can take advantage of his skills. Regarding concept clarification, ChatGPT advises that to ask the student to clarify a notion to ChatGPT using student own words if she is having trouble understanding a certain theory or concept. After that, ChatGPT can offer clarifications, feedback, and further explanations to improve students' understanding. Student can submit their ongoing chemical engineering problems to ChatGPT for assistance with problem-solving. The student can use ChatGPT to break down the problem, find relevant equations or theories, and be guided step-by-step through the solution procedure. For the review of literature assist, ChatGPT is a useful tool for students performing literature reviews since it allows them to look up significant publications, describe important findings, and pinpoint areas where research is lacking. ChatGPT can help students with research planning by assisting them in creating research methods and plans. Students can describe the goals and limitations of their research, and ChatGPT can offer advice on how to organize experiments, analyze data, and avoid common mistakes. Student can use ChatGPT to exchange drafts of their reports, research papers, or thesis chapters for editing and criticism on technical accuracy, coherence, clarity, and organization. Furthermore, ChatGPT can offer suggestions for better writing and language usage. For modeling and simulation when a student communicates models to ChatGPT while working on modeling or simulation projects, ChatGPT can assist in fine-tuning strategy, resolving problems, and interpreting the outcomes of simulations. With the use of ChatGPT, the student can rehearse research presentations and offer comments on their delivery, slide layout, and content flow, assisting in the efficient dissemination of their ideas to various audiences. ChatGPT offers summaries of recent papers, conference proceedings, and industry news to assist students stay up to date on the newest developments and trends in research. Students can utilize ChatGPT to efficiently manage time by scheduling study sessions, setting deadline reminders, and prioritizing and organizing research activities. Beyond technical capabilities, ChatGPT may offer advice on career development, including networking techniques, conference preparation, grant and internship applications, and job market navigation. Research supervisors have the potential to enhance the educational journey of their students, nurture their ability to think critically and solve problems autonomously, and facilitate their transformation into proficient engineering researchers through the integration of these methodologies within the supervision framework.

The graduate student's first exercise involved approaching ChatGPT and posing a research question regarding whether ChatGPT could assist the student in their capacity as a graduate researcher in better understanding the fundamentals of fuel cell physics and technology, which demand a certain level of technical maturity. Fuel cells represent intricate systems that amalgamate principles from diverse fields such as chemistry, electrochemistry, thermodynamics, and materials science, as indicated in Figure 3 within the preliminary feedback provided by

ChatGPT. Next give the student a summary of some of the most important ideas related to the following topics, Operating Conditions, Electrochemical Reactions, Electrolytes, Fuel Cell Types, Applications and Challenges, and Efficiency and Performance Metrics. A strong basis for learning the subject will be provided for students who comprehend these basic ideas. Students will have a strong basis for learning the physics and science of fuel cells if grasp these basic ideas. Next, lay down some of the most important ideas related to Basic Principles, Fuel Cell Types, Electrochemical Reactions, Electrolytes, Operating Conditions, Efficiency and Performance Metrics, Applications and Challenges, and so on for the student. Students will have a strong basis for learning the physics and science of fuel cells if they comprehend these basic ideas.

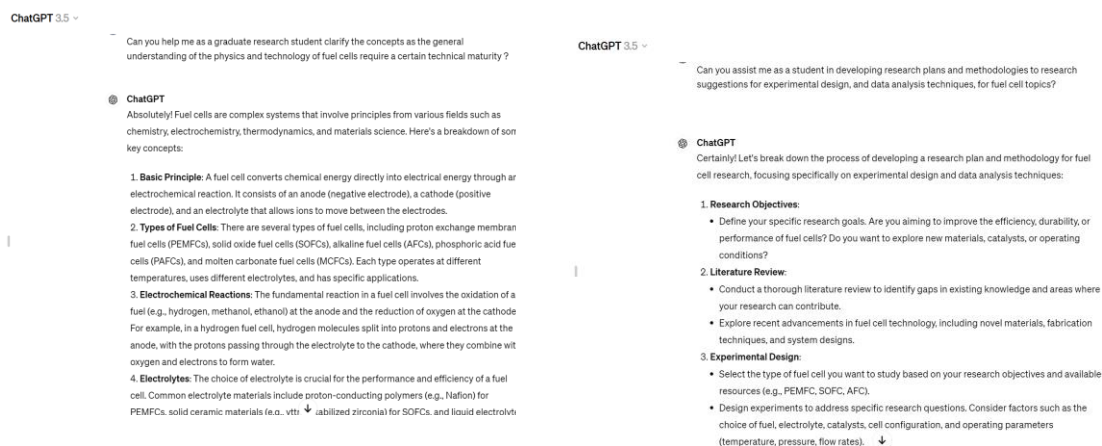


Figure 3: Graduate student's first exercise involved approaching ChatGPT and posing a research question.

Researchers can use creative maps to visualize and arrange a whole field of study with the aid of Heuristica powered by GPT3.5 exploring a topic in depth from any field, including the industry, software development, or physics. Gain a thorough grasp quickly by just pressing buttons. Discover new perspectives by studying the implications, importance, or fascinating aspects of a topic. Gain an in-depth knowledge of any topic with ease. Choose insightful inquiries to make on any topic. One can always ask unique questions to get a more tailored investigation. Concept maps are useful for organizing and visualizing a topic of study such as fuel cells. Here's how to use concept mapping and heuristics in your fuel cell study. Developing the Main Ideas begins with a list of the fundamental concepts and components related to fuel cells. These may include fuel cell types (e.g., PEMFC, SOFC, AFC), materials electrolytes, catalysts, electrochemical reactions, operating conditions, performance measures, applications, and difficulties. A system of hierarchy making the concept map have a hierarchical structure, with more focused sub-concepts branched out below and larger concepts at the top. A top-level concept such as "Fuel Cell Chemical Engineering Research" as shown in Figure 4, might include branches for each distinct type PEMFC, SOFC, etc., and other branches could have sub-topics within each type. Connections and relationships recognize the links and relationships between various concepts within the field. How do various fuel cell types compare, for example, in terms of applicability, efficiency, and operating temperature. Nodes, branches, colours, and arrows are instances of the visual elements that are used in creative maps to express concepts and relationships.

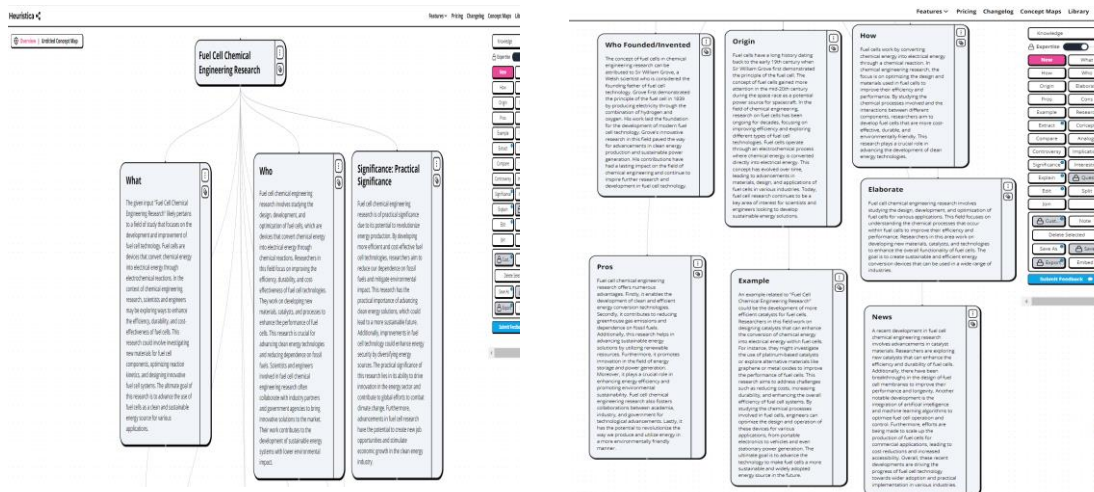


Figure 4: A system of hierarchy making the concept map with more focused sub-concepts branched out below and larger concepts at the top such as "Fuel Cell Chemical Engineering Research".

To generate dynamic and interactive concept maps, researchers can utilize software tools such as Heuristica or other mind-mapping software. Combining different literary works incorporates the concept map's insights from your literature review. Add authors, important research articles, and foundational works that are relevant to each idea. This will make it easier to see how various studies and concepts relate to one another within the discipline. Concept mapping is an iterative technique. Make constant improvements and updates to the concept map as colleagues conduct tests, gather new information, and study more literature. A concept map should change over time to reflect the field's expanding understanding. When discussing research ideas and findings with supervisors, peers, and colleagues, concept maps can also be useful tools for collaboration. Sharing a concept map with others can help you get their opinion, share ideas, and find new lines of inquiry. Making use of the concept map to guide the strategy and planning for the research. Based on the gaps and opportunities shown in the concept map, determine what areas require more research, what kinds of questions to ask, and what experimental strategies to try. Visualization of progress using a concept map, follows advancements and significant events in the fuel cell industry. Identifying the specific domains in which significant advancements were achieved or crucial objectives were attained, while indicating the domains requiring further attention. The utilization of heuristica and concept mapping methodologies empowers scholars to generate a comprehensive and structured depiction.

3.2 Copilot

Open AI created Copilot, an AI tool that can help users with a range of tasks. It is intended to help direct and offer support, whether needed for research, generating computer programming, or simply searching for information as in Figure 6. It takes work to process the content in research papers, but it would be outstanding if academics could have AI explain papers as they read, on any topic. They would receive an explanation of each complex equation they come across in research articles, all on the same screen and a researcher can ask as many questions as needed and receive prompt answers. Researchers can obtain explanations and responses on any study article while they read by using the Copilot AI assistant. Works with terminology, equations, tables, graphs, and even long text passages. Also, their flow of learning won't be interrupted where the foundation of research is critical thinking and problem-solving skills. In real time, Copilot gives a researcher all the contextual information they want. It allows a researcher more time to reflect on the data and concentrate more on developing relevant findings and deductions. A Copilot functions similarly to a researcher's research aid. It lies atop our research repository and is driven by artificial intelligence (AI). The AI research assistant is available to clarify papers, respond to inquiries, and supply context as needed all on the same page for researchers in need of assistance.

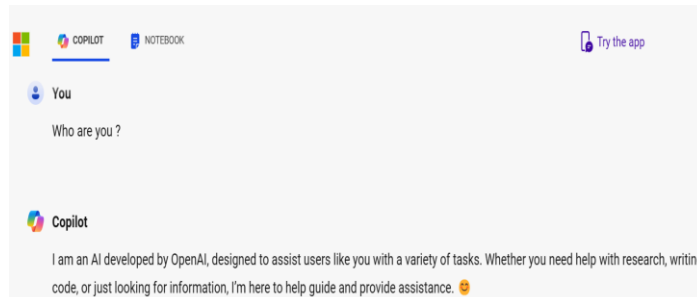


Figure 5: Open AI Copilot help direct and offer support for research

SciSpace Copilot is an artificial intelligence tool created to help scholars better comprehend scientific papers. It can answer research questions, condense large academic texts, and give understandable explanations of difficult concepts. As indicated in Figure 7, in order to access the SciSpace Copilot website as a researcher, you must first register by providing your email address, password, research experience, and field of study. Researchers will be able to read research publications more quickly and comprehend academic content on a deeper level with SciSpace Copilot.

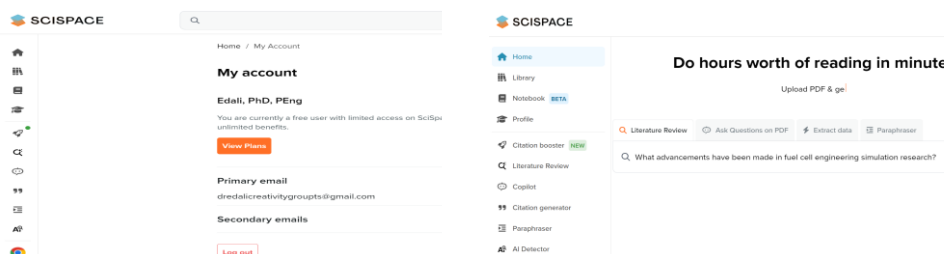


Figure 6: SciSpace Copilot Researchers tool to research articles more quickly and comprehend academic material on a deeper level.

All papers in the SciSpace database can be accessed with the AI researcher assistant, SciSpace Copilot and simply can be used to conduct a search for the document or subject as shown in Figure 8. Alternatively, a researcher can upload the PDF to SciSpace if it's already on the device. Copilot provides the necessary clarifications and responses for each scenario. It might be helpful whether a researcher is reading for enjoyment, staying up to date on recent advancements in the subject, or working on a literature review. Let's look at how SciSpace Copilot explains publications and helps researchers read, analyze, and understand them more effectively as indicated in Figure 8.

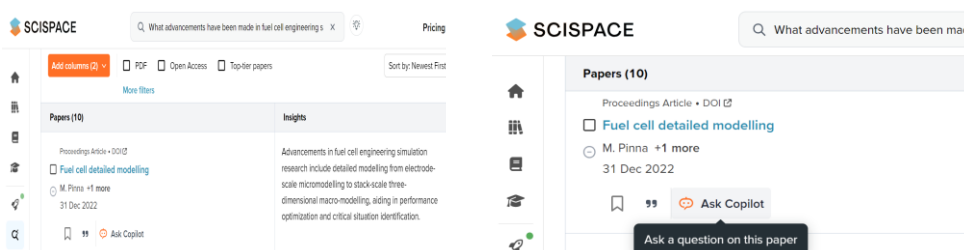


Figure 7: SciSpace Copilot accessing and explains papers and assists a researcher in efficiently reading, and comprehending them.

Although SciSpace Copilot does not directly cite publications in writing software applications it does provide a useful workflow that makes the citation process more efficient. It is necessary to upload the research article or locate it via SciSpace Copilot's library. Next, extracting important information by underlining the paper's relevant portion that has the data required to cite. SciSpace Copilot will provide an overview of the segment and pertinent information. While SciSpace Copilot does not automatically create citations within documents, some sources indicate that third-party citation management tools can be integrated with SciSpace by selecting the appropriate

citation style (APA, MLA, etc.), double-checking the requirements, and formatting the citation appropriately as in Figure 9.

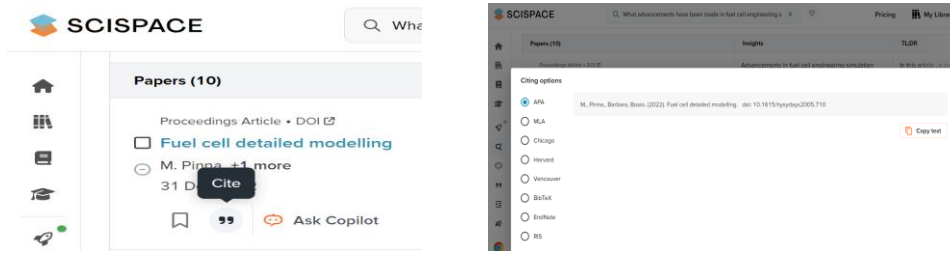


Figure 8: SciSpace Copilot selecting the appropriate citation style (APA, MLA, etc.).

The next step is to review a paper regarding fuel cell progress as a recommended starting point for getting started with reading scientific articles using SciSpace Copilot. Whether a researcher is just reading for pleasure or needs help getting started on a literature review, SciSpace Copilot can help. Let's examine how SciSpace Copilot clarifies articles and aids in a scholar's ability to study, analyze, and comprehend them successfully. When reading a research paper, highlight any unfamiliar terms or acronyms to help you grasp the content better as in Figure 10.

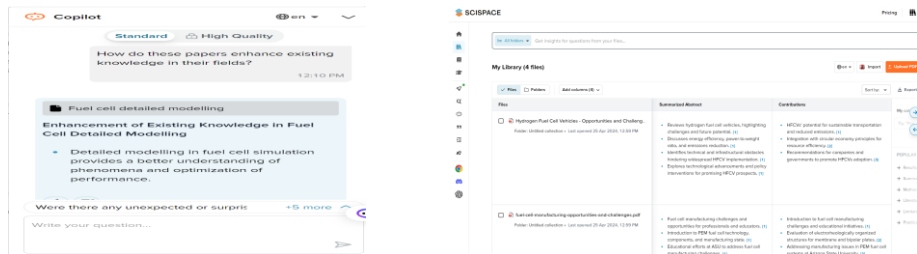


Figure 9: SciSpace Copilot clarifies articles and aids in a scholar's ability to study, analyze, and comprehend.

To better understand the thesis statement, just highlight it in Copilot to receive an explanation on the same screen or to have it translated into researcher mother tongue language as indicated in Figure 11, and it functions for paragraphs as well. Thus, the next time a researcher stops when reading a document, they just need to pick the passage that needs more explanation, then the process of learning is a done process where the background knowledge on the topics, theories, and methodologies covered in the passage and how they relate to the paper.

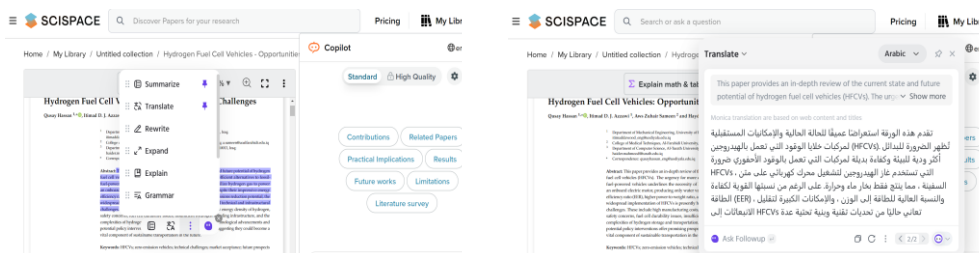


Figure 10: Copilot to receive an explanation on the same screen or to have it translated into researcher mother tongue language.

Once the graduate student is well trained on all main useful available AI chatbots uses in preparing research thesis, the main research topic is introduced. Significant progress has been made in fuel cell engineering simulation studies. Precise modelling techniques improve performance and offer a deeper comprehension of fuel cell processes [4]. Proton exchange membrane fuel cell design has made use of artificial neural networks (ANN) [5]. Fuel cell simulation, design, and optimization are aided by numerical models, such as lumped parameter stack models and distributed parameter models. Optimizing operating conditions, materials, and component architectures is made easier by mathematical modelling, which is essential for assessing mass, charge, heat

transfer, and electrochemical processes. For further research opportunity still the student has to go deeper in discovering all features of using AI research chatbots tools as can be seen in the next sections of this article.

Artificial intelligence (AI) is used by AI summary generators to automatically create and summarize text. They evaluate text and pinpoint important information using machine learning methods and natural language processing (NLP). In today's world, there are an enormous number of research paper summarizers accessible to assist researchers in condensing their papers and changing the way that research papers are read. AI summarizers are extensively employed in many facets of scholarly writing, satisfying the demands of scholars across a broad spectrum of disciplines. Here are some notable examples of how AI summary generators are altering the way academics do their work. AI summarizer can help academics by rapidly summarizing a significant number of scholarly articles, enabling them to undertake thorough literature reviews. This makes it possible for researchers to find relevant studies, assess important discoveries, and compile data from many sources and carrying out a comprehensive evaluation of the literature in the language of your choosing. AI summary generators offer concise and useful synopses of proposed research, which can assist researchers in crafting more attractive and convincing grant submissions. These synopses have the power to clearly communicate the importance of the study and its possible influence on the field. An AI summary generator can help researchers write more coherent and informative research papers by arranging arguments, highlighting important points, and guaranteeing that the information is presented clearly. These AI summarizers can facilitate writing and support scholars in producing highly qualified research articles as indicated Figure 12. The way researchers approach academic writing is being revolutionized by summarizing tools, that offer a powerful instrument to boost productivity, advance comprehension, and promote teamwork. These instruments will surely become progressively more important in stimulating innovation and quickening the rate of scientific advancement as they develop.

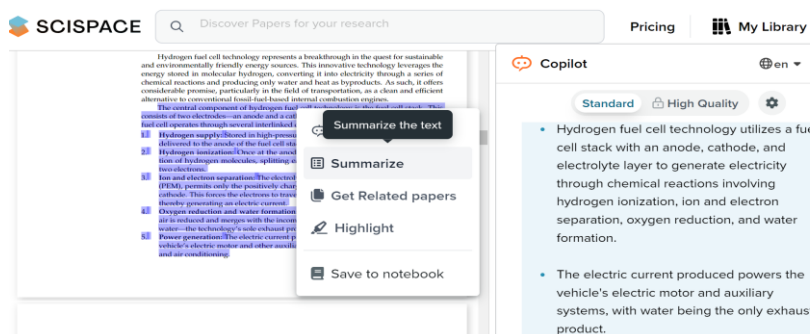


Figure 11: AI summary generator can help researchers write more coherent and informative research papers.

It might be challenging to understand the mathematical in a study, so it can be useful to extract formulas and tables from published studies in order to gain an understanding of their consequences. There is a better choice, and Copilot can scan and read the findings fast. Simply clip each equation onto a piece of paper to get Copilot to explain the math. You can also get more understanding by examining equations and learning what they mean, as shown in Figure 13.

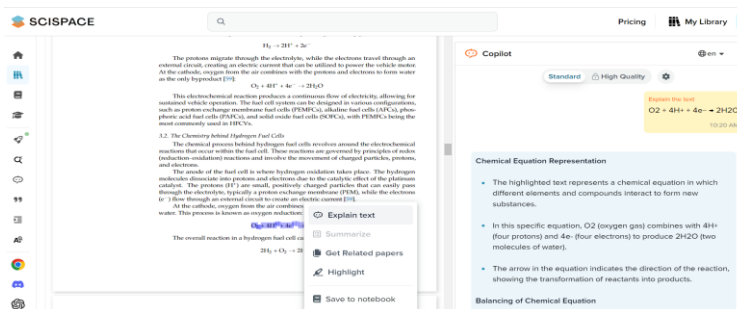


Figure 12: Copilot to explain the math, clip each equation on a paper and gain additional understanding.

As can be seen in Figure 14, cropping tables give an overview of the data but should also support more thorough investigation and analysis of the data, providing additional context for the author's conclusions. Learning cannot be fully achieved without questions. Asking questions is the best approach to draw connections between new and existing information. A researcher can, of course, refer to another text or ask authors or colleagues questions.

Copilot makes that quick and easy by typing a question and the AI research assistant will answer on the same page with relevant information while a researcher read. A researcher can ask as many questions as would like regarding the study, regardless of whether they are theoretical, technical. Now, when SciSpace Copilot responds to any query with a citation-backed response, it first chooses the focus by selecting the plus button at the bottom left of the screen. Choosing the information source to use for Copilot comes next. The next step is to pose a question to the Copilot about the material that are now reading. With every response, there are citations to the PDF where the Copilot got the information. Users can examine the exact PDF section containing the solution and obtain the information's source by choosing the citation. By providing direct citations, a researcher may promptly verify the accuracy and relevance of the response, ensuring that the AI hasn't just generated a haphazard or incorrect response.

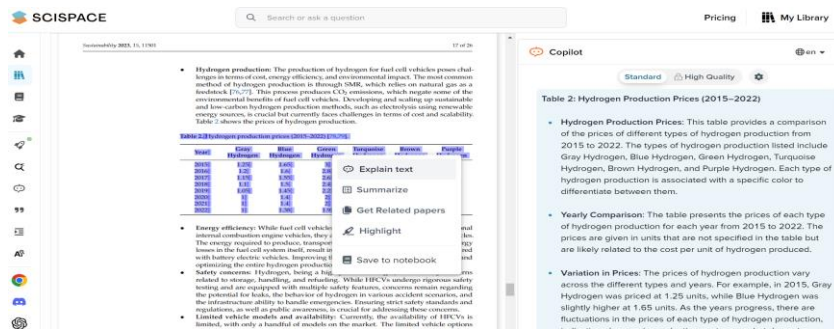


Figure 13: Cropping tables, aid in a more thorough analysis and examination of the data.

Copilot SciSpace's paraphrase tool facilitates the creation of new paragraphs by rephrasing existing ones. It employs advanced natural language processing algorithms to assess the input text and generate reworded copies that are semantically identical to Figure 15. Writers who wish to avoid plagiarism and use different language while adhering to their original thoughts will find this option very useful.

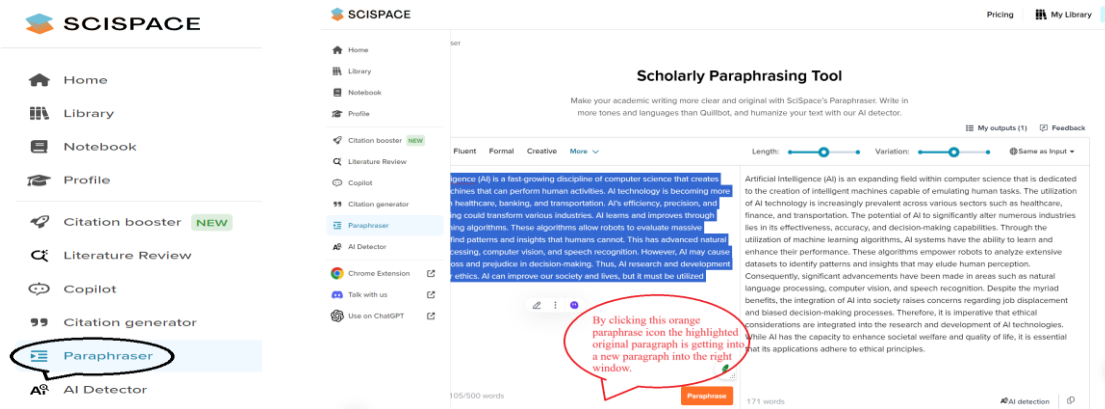


Figure 14: Paraphrasing tool in Copilot SciSpace helps to create new paragraphs by rephrasing previous ones.

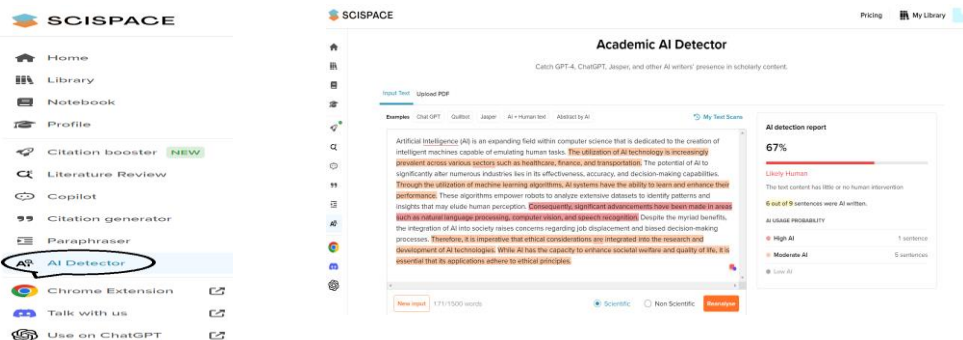


Figure 15: AI detector in Copilot SciSpace recognizes the syntax, semantics, context, and structure of a paragraph among other things, creates content that is relevant and coherent

The AI detector in Copilot SciSpace recognizes the syntax, semantics, context, and structure of a paragraph among other things. After analyzing the input text to determine the intended meaning, it creates content that is relevant and coherent. It may also recognize styles, patterns, and language usage to customize the output to the user's preferences or the demands of the current work as in Figure 16. The artificial intelligence also takes into account writing norms and grammar rules to guarantee that the generated paragraph is proper both stylistically and grammatically. All things considered, Copilot SciSpace's AI powers allow it to help users create excellent, contextually relevant paragraphs for a variety of uses.

Conclusion

In conclusion, this work investigated how engineering research graduate students, researchers, and practitioners might acquire, grasp, or recall fundamental concepts in their field of study utilizing two large language models: ChatGPT and Copilot. It's essential to be mindful that while ChatGPT has demonstrated the ability to deliver precise and educational responses to a variety of queries, it can occasionally deliver inaccurate or deceptive responses, especially when addressing more complicated or specialized subjects. SciSpace Copilot is a paradigm shift for science research. These AI resources have the potential to revolutionize research. They provide a concise overview of research publications, simplifying difficult concepts so that even novices may understand them. Multilingual assistance is one feature that increases efficiency even further. However, keep in mind that before making any judgments, you should confirm the AI's findings with trustworthy sources. There is a lot of potential with ChatGPT and Copilot for researchers and engineers. However, it's crucial to use them sensibly in conjunction with other resources. Despite their strength, these AI technologies shouldn't take the place of human expertise. Their actual worth comes from enhancing our capabilities. Good research still requires critical thinking, subject expertise, and creativity skills that AI cannot replace.

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