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Artificial Intelligence with a Focus on the Stem Disciplines

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Abstract: Artificial intelligence (AI) is a set of technological tools, computers and software, that is geared to make decisions like a human in a faster and more intelligent manner. This article illustrates the potential uses of AI employment emphasizing those which are particularly suited for the STEM disciplines. It broaches the potential benefits and detriments to student learning related to the implementation of its use. It addresses both institutional and student activities to promote beneficial applications of technology.

Keywords: artificial intelligence, STEM disciplines, benefits, detriments

INTRODUCTION

Artificial Intelligence (AI) is a set of technological tools that is geared toward enhancing knowledge and solving complex challenges, thus helping students, educators, professionals, and people in general to analyze and facilitate the resolution of problems. From an academic viewpoint we need to consider whether the use of AI tools is hindering the natural ability of our students to further their own knowledge by enabling them to retrieve solutions by providing too much guidance; on the other hand, using these AI tools can enhance our students understanding of the material and spur their thirst for knowledge. Success standardly spurs the desire for further information.

POPULAR AI TOOLS

Some of the more popular AI tools today include Chat GPT, Canva , DeepL QuillBot and WolframAlpha. These tools are popular due to their adaptability, ease of use, and the range of their applications.

ChatGPT is very popular among university students; it simulates human discourse through voice interaction or text chats or both. ChatGPT can be used for tasks like responding to questions and generating creative content; the more specific questions posed to it, the more direct the responses. Faculty as well as students are quite comfortable with this tool. This tool is considered a solution for many queries and has monthly visits on average exceedingly approximately 4.7 billion per month (Ramki, 2025).

Canva Is used for creating a wide variety of visuals, including graphics, presentations, and social media content; it is popular for both personal and professional use; its interface is touted as being uber accessible (Ramki, 2025).

DeepL is a translation tool for different languages; in addition to its obvious benefits, it will allow an employer to hire based on skill rather than language ability (Ramki 1).

QuillBot is a tool used to improve written documents; its capabilities include the enhancement of grammar and sentence structure (Ramki, 2025).

Google Translate, as its name indicates, is used for translations. Its strength includes its speed, accuracy and its incorporation into the Google environment (Ramki, 2025).

DeepSeek is popular in the open-source AI environment. DeepSeek allows users to modify the AI's reasoning capabilities, thus offering a level of transparency and personalization that exceeds other tools; It is intended for developers and organizations favoring open-source solutions and customization (Ramki, 2025).

There are other AI tools as well, Midjouney, Grammarly and Lensa to mention three. The former is used mostly by graphic designers and artists to generate images. Grammarly is used for grammar and writing improvement, and Lensa is used for photo editing (Ramki, 2025).

A MORE DETAILED EXAMPLE

Wolfram|Alpha, a computational knowledge engine, can be a valuable tool in STEM education as it provides access to a wide range of information, calculations, and visualizations. Included in its features are step-by-step calculators, data analysis, and custom visualizations. This allows students to explore concepts, practice problems, and explore deeper into various STEM fields. As a more specific application for STEM education, its abilities include:

- Calculations and Computations: Students can perform complex calculations, solve equations, and examine different mathematical and scientific concepts.
- Data Analysis and Visualization: Students can upload and analyze data, creating custom visualizations to better understand trends and patterns.
- Problems: For problems like calculus, algebra, or chemistry, Wolfram|Alpha provides algorithmic explanations, helping students understand the problem-solving process.

Students can access significant information on various scientific topics, from nutritional values of food to orbital calculations.

Wolfram|Alpha can be used for practice, homework help, and research in areas like mathematics, physics, chemistry, biology, and engineering (WolframAlpha, 2025).

USES OF AI IN EDUCATION FOR INSTRUCTION AND LEARNING

Artificial intelligence is being used more and more in the educational environment to augment instruction and student learning. More specifically, with regard to instruction it is used to anticipate student performance; examine syllabi for customization based on course goals; tailor student work; and enhance academic work beyond the classroom.

For learning it used to apply adaptive learning techniques; address learning issues of students and work with the students accordingly. (Chen et al.,2020)

As pedagogues we can use AI to formulate sound syllabi and homework and review work of course content for our students. Our students can implement outlines for studying.

They can generate test questions for themselves and enhance their written work. They can research detailed explanations of problems and situations. They should not use AI tools to shorten their desire to form their own conclusions.

SPECIFIC USES OF AI IN STEM EDUCATION

- Mathematics: Students are involved in group projects where each group needs to select an application of integration (differentiation) that involves their major. If students cannot find such an application based on their own research, they can ask an AI program to make suggestions. Students are required to do their own analysis once the topic is zeroed in on.
- Physics: Use of the AI tutor"PS2 Pal" guides the student after assessing their knowledge and targeting assessed more specific student knowledge and offers specific academic directed practice. This tool is known for helping students increase their knowledge more rapidly than without its use. (Barshay, 2024)
- Chemistry: AI is sometimes used to generate visuals of complex chemical structures and reactions, making abstract concepts more accessible and engaging for students (Albert Co., 2025).
- Biology: Generative AI models, can help scientists predict the impact of genetic changes within an individual, and within and between populations. This can help identify which mutations are involved in certain diseases (Costa, 2024)
- Technology: AI algorithms can learn from data and make predictions or decisions without explicit programming, thus allowing students to focus on coding in a computer science class. It is useful for tasks like spam detection or fraud detection (Codespell, 2025).

DETECTION OF STUDENT USE OF AI TO REPLACE GENERATION OF THEIR OWN WORK

Comparing student's previous work with present work including writing style, vocabulary and format, Inapproirate citations, level of presentation not appropriate, Lack of personal presentation, & Use of an AI detector software, e.g. Scribbr AI Detector: Identify AI-generated content from ChatGPT, Copilot, and Gemini with our advanced AI Checker. (Just Done, n.d.)

INSTITUTIONAL ACTIVITIES TO PROMOTE AI

Every institution had its own priorities. A short survey that can be distributed among colleagues to determine what direction is on its immediate trajectory is

- Your discipline
- Will you integrate AI into your course(s)?
- If so, which courses?

- Which AI tool(s) will you use?
- How will you use the tool?
- Do you think AI will enhance or detract from student learning? Why?

Unfortunately, all too often the response to surveys is not statistically significant; other activities can be undertaken to promote the ethical and responsible use of AI. The institution can develop its unique police reflecting academic integrity and the use of the popular tools for both faculty and students. A greater emphasis should be placed on integrity rather than just on plagiarism.

The institution can promote an AI campaign. This can include posters and even a competition among the students regarding what appropriate AI tools usage is.

STUDENT ACTIVITIES TO PROMOTE AI

One project is to have the students compare the results of different AI tools for a given project. Based on this, they can develop their own ideas and enhance the AI results.

Another motivating project is to supply the students with a box of objects and ask an AI took to create a product based on the objects selected. The students can then modify the suggestions (Mollick et al., 2024)

The next generation of AI is in the hands of our students. They can write a report suggesting their opinion of the impending uses of AI from their perspectives. They should include the STEM applications of their major field of students when appropriate (AJJan, 2024)

THE FUTURE OF AI

The industry has already shifted its focus from closed-source models to AI-based search engines. Now, as the AI models evolve toward specialization, these tools are already carving out different niches: design, companionship, and research.

There are perceived changes for expectations of what a tool should deliver in terms of ethics and innovation. The consumers in the AI world will likely exhibit emerging shifts in their predictions of these tools can be made by keeping these parameters in mind.

Presently there are many AI tools being used and as this article comes to fruition many others are being developed.

CONCLUSION

We all agree that we want our students to become lifelong learners. We want to prepare them for the future. Artificial intelligence is and will continue to be integrated into the workplace. As pedagogues we want to support the fluency of the latest tools. The best way to do this is to include the relevant tools in our courses. This, however, is where we must set boundaries. The unrestricted use of the AI tools would be detrimental to the overall knowledge. We should not allow our students to use the AI tools on exams. The obvious reason for this is that that will limit their desire to solve problems. Preparing for the exams

to enhance their presentations will incorporate the use of the tools into their knowledge base. To prepare for the overall benefit of society, we need to help our students develop problem solving skills.

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