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Potential Uses of AI-Based Platforms in Teaching and Learning

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Abstract

Since its development more than fifty years ago, AI and AI-based platforms have been used in many areas including education. More recently, with the development and release of various chatbots and, in particular, platforms such as GPT-4 researchers and institutions of higher education are more seriously looking at the more meaningful, constructive, and ethical uses of AI in teaching and learning. In this editorial, we will briefly review the potential uses and expansion of AI-based technologies in support of innovative teaching and learning to intentionally, ethically, and economically help students, faculty, and higher education institutions to eliminate or at least reduce the educational gap that exists in many communities.

Keywords: AI, higher education, teaching and learning, assessment

Thank you very much, Joey F. George and Welcome new Editor-in-Chief Barbara Klein

On behalf of the editorial board of JMWAIS and myself, would like to sincerely say thank you to Joey George for his significant contributions and leadership for this journal over the last three years as Editor-in-Chief, author, recipient of the best paper award from this journal, and co-author of several articles published in JMWAIS. Joey also hosted one of our annual conferences at Iowa State University in 2014, sponsored and attended several other annual conferences. We will miss his significant contributions over the years and wish him the best for his retirement.

We are pleased to announce that Barbara Klein, Professor of Management Information Systems and Information Technology Management at the University of Michigan-Dearborn will be our next Editor-in-Chief. She has served as senior editor of this journal since its inception and has authored and co-authored a number of articles published in JMWAIS, and has made significant contributions to the journal for her always comprehensive and timely review of manuscripts, we have received. In addition to her significant academic experience, Professor Klein has also worked in the information systems field at IBM, Exxon, and AMP.

In an article in this issue, Professor Klein articulates her vision for the future of this journal.

1. Introduction

Artificial Intelligence (AI) has been making significant changes in many aspects of our lives all over the world for more than fifty years. It has become one of the major drivers of new technological innovations. It is incorporated into search engines, mobile personal assistants, and other useful applications. In some areas such as healthcare and medicine (Antaki et al., 2023), science, finance, accounting, sales, auditing, agriculture, military, hospitality, and tourism (Huang, et al., 2022; Gartner Inc., 2021; Tutun et al., 2023), manufacturing (Merhi & Harfouche, 2023), transportation, legal, education, environmental sustainability (Dwivedi et al., 2022; Tarhini et al., 2022) the impact has been very significant. Some recent articles (https://www.nature.com/articles/d41586-023-00191-1) speculate that these systems may be used as research assistants.

More recently, the pace of development has picked up to the point where in late March 2023, more than 1,100 tech and other business pioneers, including several AI-related pioneers, signed an open letter calling for a six-month halt in creating more advanced AI platforms. The signatories, specifically, have asked to halt the development of more powerful platforms than the current GPT-4. Although the National AI Institute Act of 2020 went into effect on January 2021 (House of Representatives 2020), some industry, business, and education leaders believe that more safeguards are needed for the development and use of advanced AI-based platforms.

On November 30th, 2022, a San Francisco-based AI company, OpenAI, announced the release of their ChatGPT (Chat Generative Pretrained Transformer – https://chat.openai.com) platform. The platform is capable of keeping long and fluid conversations, answering various questions, preparing various kinds of research papers and essays, generating computer codes in various languages and debugging computer codes, developing business plans, writing healthy recipes, answering medical questions, and even writing poems. It is also difficult to recognize what is generated by ChatGPT is not created by a human. We need to point out that there are cases where the generated responses are not correct but the system is improving. Indeed, the platform states that: "While we have safeguards in place, the system may occasionally generate incorrect or misleading information and produce offensive or biased content. It is not intended to give advice" (GPT platform).

The pace of technological innovation uses in general, and in the case of AI-based innovations, in particular, has significantly increased. For example, as it is reported by various news outlets, it took about ten months for Facebook to hit one million users but it only took ChatGPT five days to reach this milestone. Other platforms include DALL.E 2 (https://openai.com/product/dall-e-2) which is an AI-based platform that creates actual images from written instructions. Microsoft integrated GPT-4 in its Bing product (https://www.bing.com). Similarly, Google developed the Bard chatbot (https://bard.google.com). Other products include Stable Diffusion, a text-to-image diffusion model (https://stablediffusionweb.com), LaMDA, a general dialogue model by Google (https://lamda.google.com), Whisper, an automatic speech recognition (https://openai.com), DreamFusion, a text-to-image generative model, (https://dreamfsion3d.github.io) and BERT, an open-source machine language processing (https://cloud.google.com/ai-platform/training/docs/algorithms/bert-start). Search engine developers are taking steps in making them smarter, more user-friendly, and with more comprehensive responses for regular searches. The speed of development in AI-based systems has been so rapid that it has alarmed regulators.

As various news outlets have reported, ChatGPT is in the process of releasing a commercial version of the product with a relatively easy user interface that potential subscribers could use with their internal products and services. This is possibly a significant development that could have implications for literally many products and services. This could also impact employment opportunities in the near future. In the service sector, some suggest that AI advances make drastic changes to the point that AI will fully take over from humans (PEW, 2023) (https://www.pewresearch.org/internet/2023/06/21/expert-essays-on-the-expected-impact-of-digital-change-by-2035/)

It is essential to point out that in the case of many applications, for example, in the health care area, these systems should be used as an assistant rather than a replacement for a human being. Another point is that AI cannot completely replace human creativity and innovation or at least not yet.

We experimented with ChatGPT and asked it to perform the following tasks: i) write a Java code to convert Celsius to Fahrenheit, ii) write a brief undergraduate course description for Business Analytics, and iii) write a short essay about Diversity, Equity, and Inclusion (DEI). The followings are the responses.

"Here's the Java code to convert Celsius to Fahrenheit: ```java import java.util.Scanner; public class CelsiusToFahrenheit { public static void main(String[] args) { Scanner input = new Scanner(System.in); System.out.print("Enter temperature in Celsius: "); double celsius = input.nextDouble(); double fahrenheit = (celsius * 9 / 5) + 32; System.out.println(celsius + " degrees Celsius is " + fahrenheit + " degrees Fahrenheit."); } } ``` This code creates a `Scanner` object to get input from the user (in this case, the temperature in Celsius). It then converts the Celsius temperature to Fahrenheit using the formula `fahrenheit = (celsius * 9 / 5) + 32`, which is the standard conversion formula. Finally, the code outputs the result to the console. To use this code, simply compile and run it in a Java IDE or from the command line, and follow the prompts to enter the temperature in Celsius"

We run the above code and here is the result:

"Enter temperature in Celsius:" 10
"10.0 degrees Celsius is 50.0 degrees Fahrenheit"

"Course Title: Business Analytics Course Description: This course provides an introduction to the fundamentals of business analytics, including data management, statistical analysis, predictive modeling, data visualization, and decision-making. Students will learn how to analyze and interpret data to make meaningful business decisions that can drive growth and profitability. The course will cover a range of topics related to data analysis, including data preparation, data exploration, and data visualization techniques. Students will also learn how to use statistical methods and predictive modeling to solve business problems, and how to leverage data visualization tools to communicate insights from complex data sets. In addition, the course will focus on key business analytics applications, including marketing analytics, financial analytics, and operations analytics. Students will learn how to apply business analytics techniques to real-world problems in these areas and will work on individual and group projects to develop their skills and knowledge. By the end of the course, students will have a firm understanding of the fundamentals of business analytics and will be well-equipped to apply these concepts to a wide range of business contexts. Whether students seek to launch a career in data analytics or simply wish to use data-driven insights to make smarter business decisions, this course will provide a strong foundation in the field of business analytics."

"Diversity, Equity, and Inclusion (DEI) has become an increasingly important topic in recent years. With the global pandemic bringing about unprecedented changes across the world, DEI has taken center stage as more and more people are starting to recognize the importance of creating a more equitable and inclusive society. Diversity is nothing more than a reality of life. In today's world, it has become crucial to have people from different backgrounds, cultures, races, gender identities, and abilities working together in harmony. When we have a diverse group of people working towards a common goal, we can pool our individual strengths and experiences to create more innovative and effective solutions to complex problems. However, diversity alone is not enough. To truly create an equitable society, we must focus on equity as well. Equity takes into account the individual and systemic barriers that prevent certain groups of people from having the same opportunities and access as others. It is important to note that equity does not mean treating everyone the same. Instead, it means recognizing the different needs and circumstances of different individuals and providing them with what they need to succeed on an equal footing. This could mean providing additional resources or support to those who need it or challenging systemic practices that create barriers for marginalized groups. Inclusion is the final piece of the DEI puzzle. It involves creating an environment where everyone feels welcome, respected, and valued – regardless of who they are. Inclusion means actively seeking out diverse perspectives and ensuring that everyone's voice is heard. It also means creating a workplace or community culture that celebrates differences and embraces the unique qualities that each person brings to the table. Overall, DEI is essential if we want to build a society that is truly inclusive and supportive of all individuals. It requires a commitment to recognizing and dismantling systemic barriers, valuing diversity, and creating an inclusive culture where everyone can thrive. By doing so, we can harness the power of diversity to create a better future for all."

The above three examples demonstrate the potential use and abuse of these kinds of systems in teaching and learning. In the following sections, we focus on how these systems can potentially be used ethically and appropriately for teaching and learning.

2. AI and Related Platforms in Teaching and Learning

The Internet and the Web significantly impacted how educational institutions deliver their courses in the last thirty years after the introduction of Netscape back in October 1994. Since then, the use of technology in courses and program delivery has significantly increased. In particular, in the past few years with the Pandemic, we need to wonder what would have happened if the technology to deliver education was not available worldwide using the Internet, the Web, and related platforms and technologies. Now with the more widely available AI-based platforms, we need to find ways to see how these platforms can be used to more effectively support students, faculty, and institutions in ethical and sustainable ways. We need to maintain and enhance learning quality no matter what technology is incorporated into teaching and learning while properly addressing challenges related to the ethical uses of such technologies.

As is usually the case when a new technology is introduced, there are hesitations and questions raised about their proper applications and of course, we should address these concerns. However, we should not outright reject their potential. Some authors (Chui et al., 2022; Pringle, 2023b) have stated that generative AI-based technologies could potentially change many jobs as well as threaten some of them. It is well-known that when the automated telephone came about, there were some complaints as to what will happen to the position of phone line operators in the central phone company offices. Can you imagine if the phones would not have been automated because of the loss of jobs how many people we would need in the entire world these days to do phone line and IP address switching? Several times more than the entire world population. The same types of questions were raised when the Web was introduced. The introduction of AI in teaching and learning is not an exception either. There are ethical use-related questions that need to be answered. With proper safeguards in place, AI can be used ethically by students, faculty, and institutions. In the next sections, we will focus on students, faculty, and colleges/universities' potential uses of AI technologies.

2.1 How Could Students Ethically Use AI-Based Platforms such as ChatGPT

As we saw in the examples provided above, there is significant potential for plagiarism-related issues with the use of ChatGPT or other similar systems by students. For example, essay writing, code generation, financial analysis, marketing, and business plan development. Gafen and Arinze (2023) state that generally, there are serious concerns about using generative AI platforms in an academic environment. We experimented with ChatGPT to see if the platform can recognize essays and/or codes generated using AI platforms and our conclusion is that it cannot. But there are also potential positive implications for the availability of these systems for students.

Student engagement with the contents is increased by allowing learners to experiment with these kinds of systems. If proper safeguard is in place, AI can be used ethically. Courses' home works and other assignments may need to be modified to minimize potential plagiarism issues. Some authors (Bliszczyk, 2023) have asserted that the use of these systems not only should not be prohibited but also these systems are the "future of learning."

In areas such as language learning the real-time translation capabilities of these systems, makes it easier for students to learn new languages more quickly. Similarly, for code generation in a new programming language, students could use these systems to learn how to generate codes in different languages. Other potential learning areas include business and marketing plan development to evaluate not replace the learners' own written assignment. Students can potentially write their own plans and then compare and contrast their plans with the platform-generated plans and submit both to the faculty for assessment.

2.2 How Could Faculty Ethically Use AI-Based Platforms

Faculty should incorporate AI tools in instruction. They can use these tools to facilitate students' engagement and increase interaction with them. They can use these tools as teaching assistants and create instructional

content. Faculty could try to prepare students with the needed skill set and hands-on experiences with innovative technologies currently and in the near future used in various industries. This will allow learners to discover their own creativity and innovative ideas. They can be used to improve students' writing. To be able to do these, faculty need to first log in to the site (https://chat.openai.com) and familiarize themselves with its capabilities and pitfalls.

As has been said by others (Cano, et al., 2023; Lametti, 2022; McMurtrie, 2023) these kinds of platforms are going to change how we teach. An important step for faculty is to develop an academic integrity policy about the ethical use of AI-based platforms when submitting course assignments. They need to establish rules for their classes including how to cite content from these platforms. Faculty should make in-class assignments to have a good understanding of the students' written ability levels. The nature of the course assignments in some areas may need to be changed. For example, faculty can ask learners to use these platforms for assignments and write a critique and evaluation of the generated response. The University of Calgary's resources on AI in teaching and learning site list a good number of hints about the proper use of these tools (https://taylorinstitute.ucalgary.ca/teaching-with-AI-apps).

Faculty can demonstrate how these tools can be used for idea generation. They can also use these tools to improve assessment efficiency by for example evaluating the accuracy of generated codes. Faculty can demonstrate how these tools can be used as support services for students and encourage life-long learning practices.

2.3 How Could Educational Institutions Ethically Use AI-Based Platforms

The first useful step for educational institutions to consider the use of an AI-based platform in an educational setting is to create a small committee consisting of faculty, staff, student group representatives, information technology professionals, and administrators to study the feasibility of using these platforms at their institution. The possible areas of use to consider include recruitment, admission, registration, financial aid, student affairs, counseling, career services, academic advising, housing, business and financial operations, facilities, libraries, alumni, advancement, and of course teaching and learning and scholarship.

It is important to emphasize that due to the rapid technological development in all areas, all students should graduate with some basic knowledge and understanding of AI but also learn how to use these tools ethically. Campuses need to develop appropriate and ethical use policies. These tools indeed can facilitate closing the educational gaps that many institutions are planning to accomplish. These tools can potentially increase efficiency and hence reduce operational costs.

Campuses need to be aware of the potential pitfalls of these tools and have preventative measures in place if a decision is made to use them. Examples of these pitfalls include increasing cyber security risks. The lack of data privacy, and incomplete, false, and misinformation are other potential risks associated with the use of these tools.

3. Conclusion

As we have seen time and again, nothing could and should prevent the appropriate and ethical use of innovative teaching and learning methods and technology use. Technology is the best tool to positively impact teaching and learning and at the same time increase productivity and efficiency. Many institutions are aiming to eliminate or at least significantly decrease the educational gap that currently exists in many communities. What better tools than technology to utilize to achieve these necessary goals in ethical, sustainable, efficient, and effective ways? Perhaps, it is not unreasonable to state that AI literacy needs to be expanded not only for faculty and students but also for staff members who can use these tools to increase productivity and operational efficiency.

4. Overview of the Contents of this Issue

This issue of the journal includes one traditional research article. Thomas Root, Troy Strader, and Yu-Hsiang (John) Huang in their interesting and timely article conducted and reported on a two-decade-long article review

of the use of machine learning for property valuation. They conclude that indeed machine learning can be used to improve the property valuation assessment process and more accurately come up with the valuation.

The third article in this issue is a collection of opinions from several of JMWAIS editorial board members about generative AI in general and GPT in particular. Although AI and its applications have been around for several decades now, in November 2022 when the ChatGPT came about it created significant interest as well as skepticism. We wanted to seek the opinion of MWAIS colleagues. We asked the editorial board members of JMWAIS if they wish to respond to the following questions:

1) What is your overall opinion of GPT and similar platforms? 2) GPT's potential implications for teaching,
2) learning, and other student services? And
3) Have you already seen evidence of GPT in student work or in anything else where it might have come across, like research?

The third article of this issue includes responses we received.

Our new Editor-in-Chief shares her vision for the future of JMWAIS in the fourth article of this issue.

We appreciate and wish to acknowledge the contributions of reviewers for this issue of the journal, including David Biros (Oklahoma State University), Queen Booker (Metropolitan State University), Mari Buche (Michigan Technological University), Omar El-Gayar (Dakota State University), Sean Eom (Southeast Missouri State University), Barbara Klein (University of Michigan, Dearborn), Dahui Li (University of Minnesota, Duluth), Kevin Scheibe (Iowa State University), and Troy Strader (Drake University).

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Joey F. George is a Distinguished Professor Emeritus in the Ivy College of Business at Iowa State University. His bachelor's degree in English is from Stanford University (1979), and he earned his doctorate in management from the University of California Irvine in 1986. Dr. George's research interests focus on the use of information systems in the workplace, including deceptive computer-mediated communication, computer-based monitoring, and group support systems. He was recognized with the AIS LEO Award for Lifetime Achievement in 2014.