Assessing the Use of Generative AI in Academic Teaching and Research

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Abstract

Generative Artificial Intelligence (GAI) is increasingly adopted in academic teaching and research environment because of numerous benefits such as data analysis, personalized learning, research design, focused tutoring. However, there are several concerns regarding academic integrity, research ethics and biases while adopting GAI in teaching and research. The primary objective of this study is to explore faculty perceptions of GAI in academia through insights from data analysis from the faculty members at the School of Engineering, Bowling Green State University (BGSU) along with the literature-based analysis. Faculty feedback was collected after conducting a seminar on AI in teaching and a presentation on AI in research. In teaching, findings show that most of the faculty agree about the potential of GAI in reducing their workload, skill growth, saving time, and personalized learning. They also recognized AI's potential in automating research processes, application in different fields, innovation in research as well as strong motivation to apply AI in the academic environment. Furthermore, the analysis of literature provides valuable insights into the ongoing discussions on AI adoption, ethical needs, faculty training and the importance of clear policies. The mixed method approach provides valuable information about the critical need of the integration of AI in academia.

Keywords:
Generative AI, Teaching, Research, Faculty Perception

1. Introduction

Generative Artificial Intelligence (GAI) is revolutionizing research and teaching in academia by opening new opportunities for data analysis, content creation, automated evaluation, and personalized learning. With the growing popularity of AI-powered tools like ChatGPT, Gemini, Claude, Perplexity AI, and MidJourney, the potential to improve productivity, creativity, and transform conventional teaching methods into an automated system is increasing day by day using AI assisted grading systems, tutoring, and research assistants. However, along with the academic integrity and ethical issues, the requirement for appropriate AI policy have created discussions about the long-term effects of AI-driven research and education (Chaudhry et al., 2023; Wirzal et al., 2024; Oc et al., 2025).

In teaching, AI-powered systems are improving student engagement, tailored learning experiences, and supporting flexible teaching strategies. By customizing content to student's needs, research indicates that AI-driven learning and assessment along with intelligent tutoring systems greatly improve student's performance (Singh, 2024; Xu, 2024). Additionally, AI-assisted grading and feedback systems help teachers by minimizing effort and improving teaching methods (Ahmed et al., 2024; Jha et al., 2024). However, academicians expressed worries about over-reliance on AI-generated information, the role of human teachers, and bias in AI-driven answers which necessitates for further research on AI's application in classroom (Batista et al., 2024; Vizconde et al., 2024).

In research, AI have transformed data analysis, academic writing, and research processes. The effectiveness of scientific research is increased by generative AI models by helping researchers automate literature reviews, generate research hypotheses, and evaluate large datasets (Ahmad et al., 2024; Zhang and Chang, 2024). In fields like

geoinformatics, engineering, and healthcare, AI-powered tools have proved their potential for creating datasets, analyzing complex data, and supporting predictive modeling (Ahmad et al., 2024; Priya et al., 2024). However, the fake information from AI and false research results, the academic integrity remains as a concern. Scholars' debates continue to focus on concerns about data security and ethical research (Chaudhry et al., 2023; Alshamsi et al., 2024; Chang et al., 2024; Oc et al., 2025).

The use of generative AI offers both benefits and concerns as it continues to influence academic environments. Though it increases productivity, accessibility, and creativity, its effects on research ethics and academic integrity demand continuous evaluation of its adoption. To minimize the negative effects, institutions must create AI policies, ethical norms, and regulatory frameworks (Ahmed et al., 2024; Batista et al., 2024; Oc et al., 2025).

This study combines insights from data collected from the Bowling Green State University (BGSU) School of Engineering faculty members and literature review. By incorporating literature and faculty perspectives, this study provides insights into GAI's role in academia by highlighting both opportunities challenges that must be addressed.

2. Methodology

This study uses a mixed-methods approach which combines data from faculty feedback and a review of the literature. The main goal is to find out how the faculty at Bowling Green State University's (BGSU) School of Engineering feels about the use of Generative AI (GAI) in research and teaching. There was a seminar organized on GAI in teaching and a presentation on GAI in research. Then, faculty feedback was collected about their understanding of the perceived advantages and challenges of AI. Faculty members who attended were the source of data collection. Survey questionnaires were used to get faculty input. Ggplo2 in R programming was used to evaluate survey data to extract those insights.

3. Literature Analysis

The impact of AI in research and teaching is analyzed in this section which includes key findings in different viewpoints along with conflicting viewpoints from the recent scholarly articles.

3.1 Generative AI in Teaching

Table 1 below lists the role and scope of various AI tools in efficient and effective teaching in terms of student engagement and learning, course content creation, peer collaboration and feedback, autonomous learning etc.

Table 1: The role of AI tools in various elements of teaching

Focus Area	Role and Scope	Source
Student Engagement and Learning	AI tools provide personalized learning which improves motivation and comprehension. AI-driven VR/AR technologies create greater learning experiences.	(Singh, 2024; Wirzal et al., 2024; Xu, 2024)
Course Content Creation	AI helps in generating course materials and assessments. However, AI-generated materials require human review.	(Ahmad et al., 2024; Chang et al., 2024; Rush et al., 2024)
Peer Collaboration and Feedback	AI-powered NLP improves peer feedback quality but raises concerns over AI's influence on assessment credibility.	(Bauer et al., 2023; Tlili et al., 2023)
Autonomous Learning	AI boosts student confidence, though some students remain skeptical.	(Kwon, 2024; Yang et al., 2024)
Equity and Accessibility	AI-driven adaptive learning benefits students with disabilities.	(Ahmed et al., 2024; May et al., 2025)
Creativity and Innovation	AI driven experimental learning in STEM supports real-world problem-solving.	(Ahmad et al., 2024; Zhang and Chang, 2024)
Reducing Teacher Workload	AI automates grading and course content creation, which increases student engagement.	(Ahmed et al., 2024; Jha et al., 2024)

AI and Sustainable Development Goals (SDGs)	AI contributes to global education and sustainable education initiatives.	(May et al., 2025)
Ethical and Academic Integrity	AI raises concerns about plagiarism and dishonesty.	(Chaudhry et al., 2023; Oc et al., 2025)

This literature reviews suggest the important role of AI in teaching, but it also indicates the importance of safeguards to prevent academic misconduct.

3.2 Generative AI in Research
Table 2 below highlights the contribution of various AI tools in impactful research and scientific innovation, data privacy and security, maintenance of academic integrity, entrepreneurship and innovation etc.

Table 2: The role of AI tools in various elements of research

Focus Area	Role and Scope	Source
AI in Research and Scientific Innovation	AI-generated datasets, analysis, and modeling are increasing research efficiency.	(Ahmad et al., 2024)
Data Privacy and Security	AI's role in research raises concerns about data privacy and intellectual ownership.	(Oc et al., 2025)
Maintaining Academic Integrity	AI-generated research content should be verified to ensure credibility.	(Chaudhry et al., 2023; Oc et al., 2025)
Entrepreneurship and Innovation	AI helps researchers with different innovative tools	(Ahmad et al., 2024; Zhang and Chang, 2024)

This literature reviews the potential of AI in research but ensuring data security and integrity is a must.

4. Data Analysis and Discussion
4.1 Faculty Perceptions of AI in Teaching
Figure 1 Summarizes the findings about faculty feedback from the seminar of AI in Teaching.
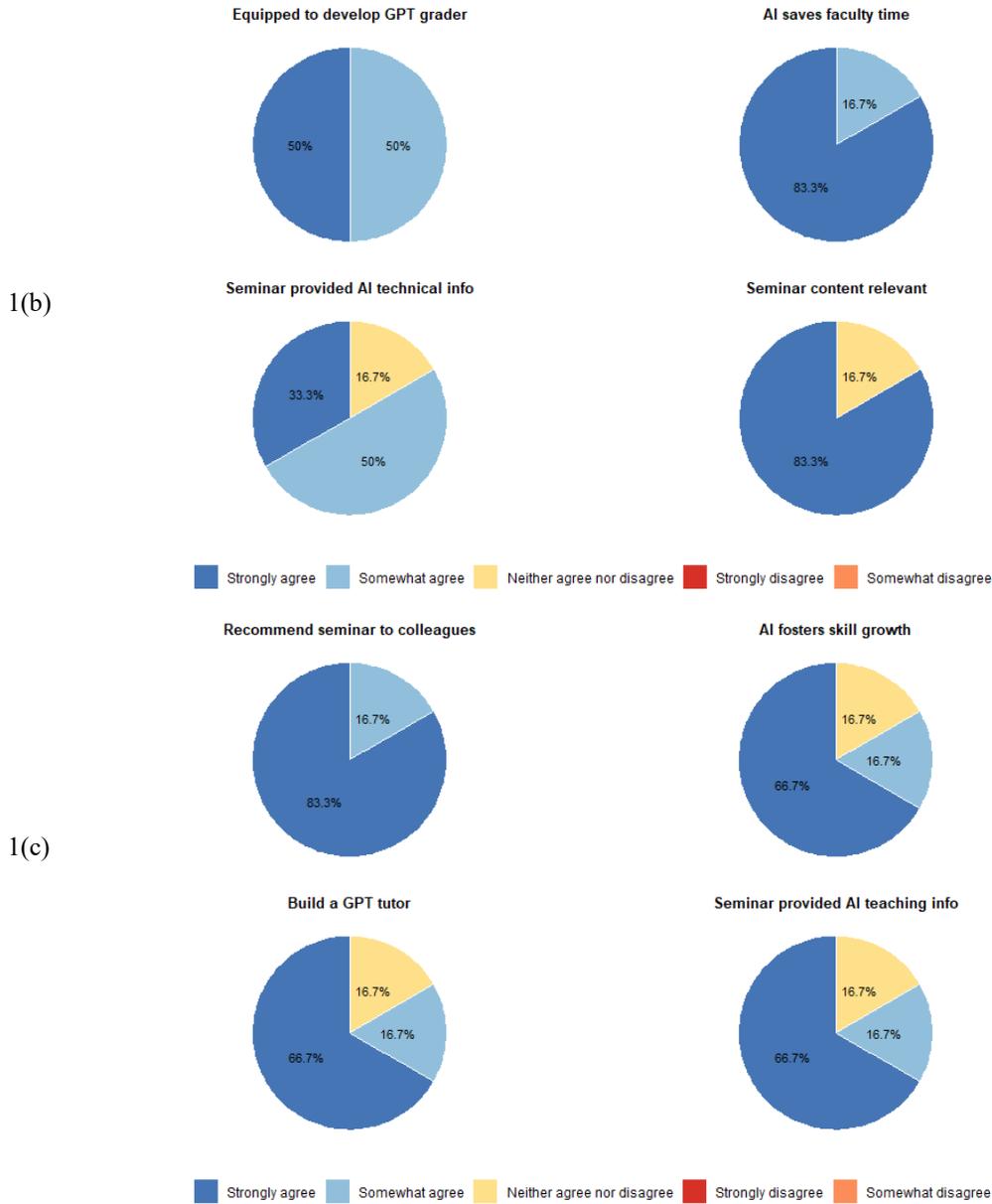

1(a)
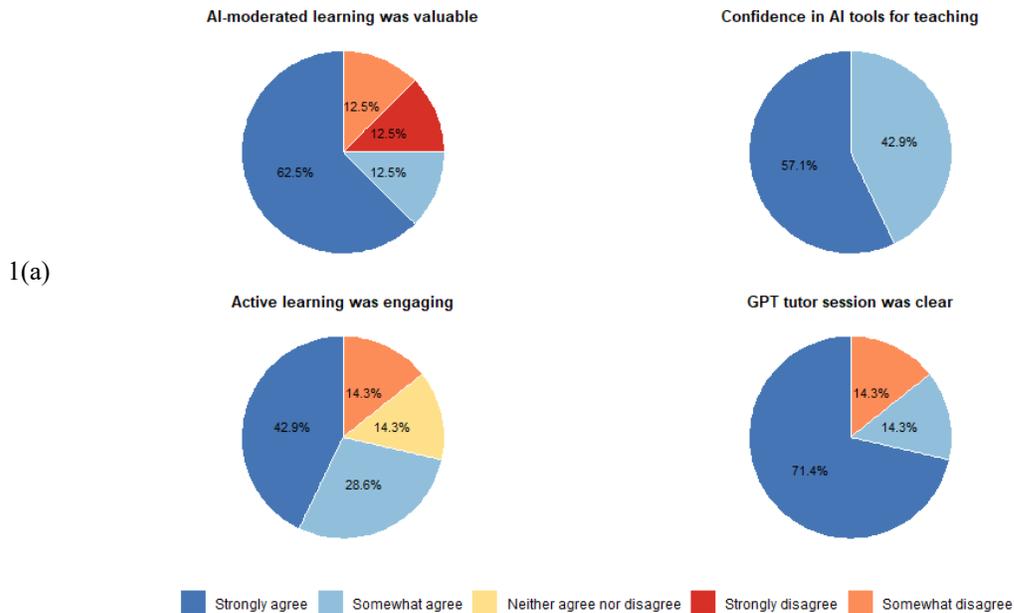
Figure 1(a, b, c): Faculty feedback from the seminar of AI in teaching

The findings highlight that Generative AI (GAI) increases teaching efficiency, reduces workload, and fosters skill growth. However, 16.7% of them remain neutral on developing a GPT tutor, skill development and active learning due to lack of experience and technical knowledge which suggests that further training is required. The overall results indicate the need for AI integration in teaching and proper training along with clear AI policy on data security, AI ethics, academic integrity and institutional policy.

5.2 Faculty Perceptions of AI in Research
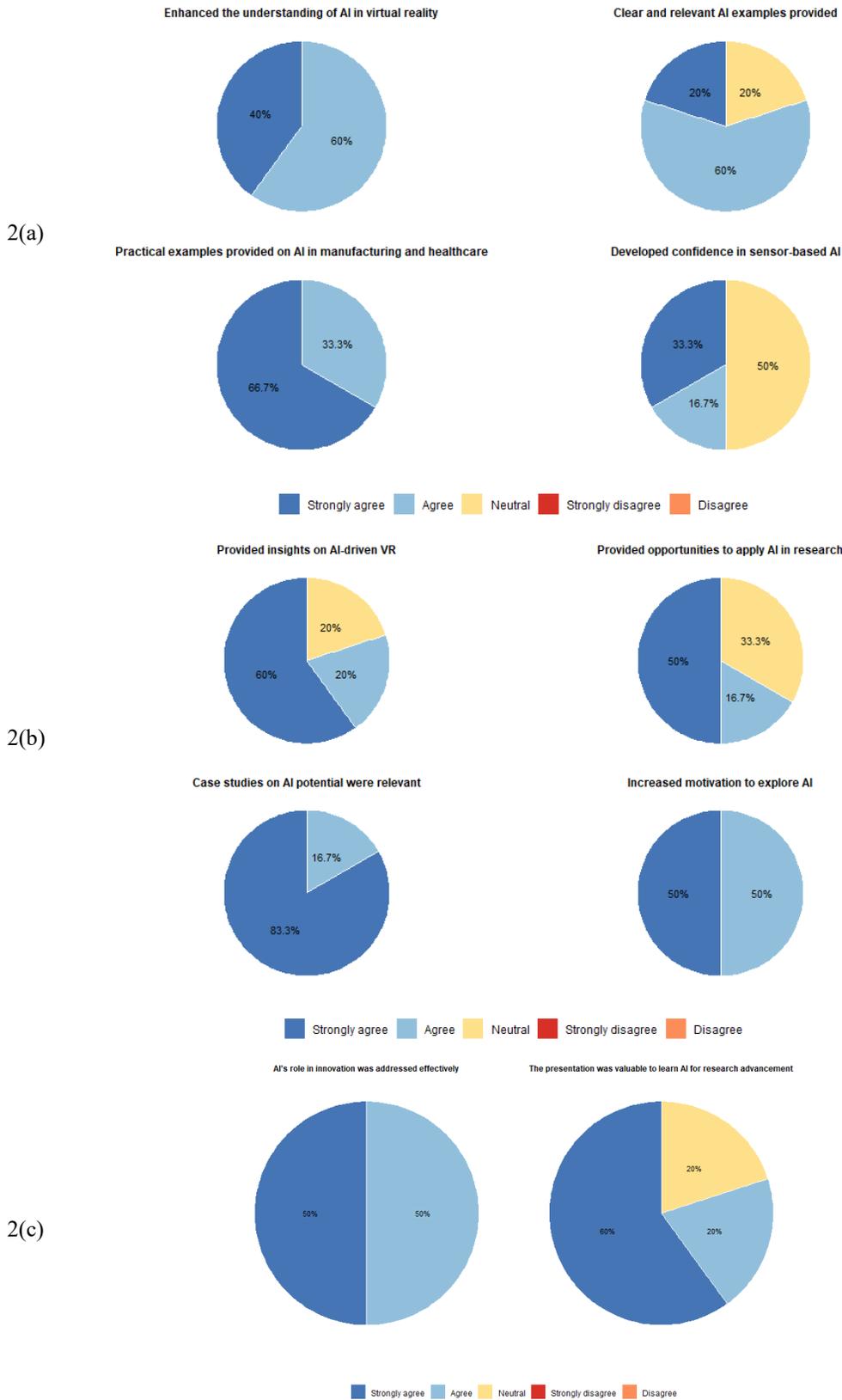The insights of the faculty feedback from the session on AI in research are summarized in figure 2:

Figure 2(a), 2(b), 2(c): Faculty perceptions from the session of AI in research

The presentation increased faculty understanding of AI in research specifically in the field of virtual reality, manufacturing, and healthcare applications. Some of them remained neutral on using sensor-based AI which indicates a need for training. Overall, the session motivated faculties to explore AI research innovation and problem-solving.

5. Limitation Of the Study

The study is based on the feedback from about 10 faculty members which is very small to generalize the findings about the larger academic population. The results might be skewed as it does not represent broader faculty views of BGSU. The study includes the perceptions of faculty members from the School of Engineering at BGSU and it does not include the views of faculty from other disciplines who might have different opinions on AI adoption in academia. Moreover, this study is centered on faculty perceptions but if it could incorporate the views of students and administrative personnel, then the result could be stronger. Finally, the study acknowledges concerns related to ethical issues, whereas it does not include any data analysis on how this impact teaching and research. This study did not use advanced statistical tests like the Wilcoxon Signed-Rank Test or Kruskal-Wallis Test, which could have given better comparison results. Despite its limitations, the study emphasizes the growing needs of AI's role in education and research.

6. Conclusion

The study explores the faculty perceptions from the School of Engineering at Bowling Green State University (BGSU) on GAI in academia. The study makes it evident that AI adoption in teaching increases efficiency, reduces workloads, fosters skill growth and increase personalized learning experiences. Also, it shows that faculty can utilize AI in research process automation, innovating research processes and applying in multiple disciplines. To minimize the drawbacks of AI in research and teaching, its integration in academia should be strategic, moral, and complimentary. The literature analysis indicates the need for clear AI policy, ethical perspectives and proper training on AI adoption in academia. Future studies should incorporate perceptions from students, administrators and faculties from multiple disciplines. Further research could be done on long-term AI impact, teacher and student AI literacy initiatives, and ethical AI principles.

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Biographies

Tarequl Islam is a graduate student in Logistics Systems Engineering at Bowling Green State University, Ohio where he also works as a Teaching Assistant. He holds a Bachelor of Science in Industrial and Production Engineering from Shahjalal University of Science and Technology (SUST), Bangladesh. Before joining BGSU, Tarequl worked as a Capacity Planner at Avery Dennison Bangladesh, a Fortune 500 US based multinational company. He also has industry experience in the RMG, FMCG, and packaging sectors, focusing on operations and supply chain optimization. His primary research interests include optimization modeling, advanced manufacturing, and supply chain systems. Passionate about both teaching and research, Tarequl aims to pursue a Ph.D. in Industrial and Systems Engineering and contribute to academia through impactful research and mentorship.

Dr. Md Adilur Rahim is an Assistant Professor of Research at the Louisiana State University Agricultural Center, where he focuses on advancing disaster resilience through innovative applications of data science, artificial intelligence, and engineering. His work bridges flood and wind hazard assessment, insurance affordability, and community resilience, with an emphasis on developing AI-driven tools and decision-support systems that translate complex data into actionable insights for policymakers, practitioners, and the public. He has published widely in leading journals, contributed to collaborative research projects at national and international levels, and co-authored a book on deep learning applications for engineers. Beyond research, Dr. Rahim is committed to teaching and

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Dr. Imran Tusar is an assistant professor of Industrial and Systems Engineering in School of Engineering at Bowling Green State University (BGSU). His research focuses on advanced manufacturing, renewable energy, and supply chain systems. Dr. Tusar has extensive expertise in manufacturing system design, wind farm characterization, turbine installation, operations and maintenance, transportation logistics, and inventory systems. He leverages his expertise in mathematical programming, modeling and simulation, and big data analytics to advance the fields of operations research, supply chain systems, production, and manufacturing. His research articles have been published in top-tier journals and conferences. Dr. Tusar's research interests coincide with various multidisciplinary projects funded by prestigious organizations, including the National Science Foundation (NSF), Department of Energy (DoE), U.S. Department of Transportation (DOT), U.S. Department of Agriculture (USDA), National Oceanic and Atmospheric Administration (NOAA), National Academies of Sciences, Engineering, and Medicine, and U.S. Department of Defense (DOD). Throughout his academic career, Dr. Tusar has taught a variety of undergraduate courses and supervised students on both their senior design projects and senior theses.