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Enhancing Lecturers' Scientific Research Practices Through an AI-Based Training Program

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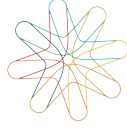
Abstract

This policy paper presents evidence-based recommendations for integrating AI tools into academic research, drawing on a study that examined the impact of an AI-based training program at the University of Technology and Applied Sciences (UTAS). The study demonstrated that AI tools significantly enhance research efficiency, boost lecturers' motivation, and promote ethical AI practices. Using a quasi-experimental design, qualitative interviews were conducted with 15 lecturers to explore their perceptions of the training. The results indicated that AI tools significantly enhanced research efficiency by facilitating research processes and improving the quality of research outputs. Additionally, the training program increased lecturers' research motivation by reducing anxiety, building confidence, and fostering team collaboration. It also influenced lecturers' understanding of ethical AI usage, encouraging the responsible application of AI tools and adherence to ethical guidelines. These findings highlighted the transformative role of AI in academic research and the importance of integrating AI-focused professional development programs into higher education.

Keywords: AI-based training; Research practices; Higher education; Professional development

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تعزيز ممارسات البحث العلمي لدى المحاضرين من خلال برنامج تدريبي قائم على الذكاء الاصطناعي

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ملخص

تقدّم هذه الورقة السياساتية توصيات مبنية على الأدلة حول دمج أدوات الذكاء الاصطناعي في البحث الأكاديمي، استنادًا إلى دراسة تناولت أثر برنامج تدريبي قائم على الذكاء الاصطناعي بجامعة التقنية والعلوم التطبيقية (SATU). أظهرت نتائج الدراسة أن أدوات الذكاء الاصطناعي تُسهم بشكل ملحوظ في تعزيز كفاءة البحث العلمي، وزيادة دافعية المحاضرين، وترسيخ الممارسات الأخلاقية في استخدام الذكاء الاصطناعي.

اعتمدت الدراسة على تصميم شبه تجريبي، وأجريت مقابلات نوعية مع 51 محاضرًا؛ لاستكشاف آرائهم حول البرنامج التدريبي. وأظهرت النتائج أن أدوات الذكاء الاصطناعي حسّنت كفاءة البحث من خلال تسهيل عمليات البحث ورفع جودة المخرجات البحثية. كما عزّز البرنامج التدريبي دافعية المحاضرين البحثية من خلال تقليل القلق، وبناء الثقة، وتشجيع العمل الجماعي. كذلك أثر البرنامج في وعي المحاضرين بأخلاقيات استخدام الذكاء الاصطناعي، مما شجّع على التطبيق المسؤول للأدوات والالتزام بالإرشادات الأخلاقية.

تؤكد هذه النتائج على الدور التحويلي للذكاء الاصطناعي في البحث الأكاديمي، وعلى أهمية دمج برامج التطوير المهني المعنية بالذكاء الاصطناعي ضمن منظومة التعليم العالي.

الكلمات المفتاحية: التدريب القائم على الذكاء الاصطناعي، ممارسات البحث، التعليم العالي، التطوير المهني

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1. Introduction

Artificial intelligence (AI) has changed how universities and applied sciences institutions work. Today, AI tools are integrated into teaching, research, and administration, which offers opportunities for efficiency and innovation (George & Wooden, 2023). These tools have the potential to significantly enhance lecturers' research efficiency and motivation. It also contributes to addressing the challenges posed by traditional, time-consuming research methods (Alaa, 2024; Silitonga et al., 2023).

Research efficiency plays a critical role in academic institutions' growth. However, research practices often consume much time and resources (Silitonga et al. 2023). AI-powered tools such as data analytics platforms, literature review systems, and project management software are innovative alternatives that accelerate these processes, thus improving research outcomes (Khalifa & Albadawy, 2024; Choi and Choo, 2023). These technologies also allow for faster data searches, citation management, and producing high-quality research, as highlighted by Alaa (2024).

Moreover, motivation is a key driver of lecturers' academic performance and their willingness to perform their research duties. AI tools can reduce administrative burdens; this helps lecturers to focus on more creative and impactful research activities (George & Wooden, 2023). Furthermore, these tools provide opportunities for professional development by helping lecturers stay relevant and confident as they adapt to new technologies. AI applications also offer valuable feedback on writing and data analysis. This helps effectively improve lecturers' skills and promote a more engaged academic environment (Jony & Hamim, 2024; Silitonga et al., 2023).

On the other side, the rise of AI in academic research brings challenges related to data privacy, bias, and transparency (Borenstein & Howard, 2020). Addressing these concerns requires well-designed training programs that equip lecturers with the knowledge and skills to use AI responsibly (Younis, 2024). Such training should cover areas such as identifying algorithmic bias, ensuring data security, and maintaining transparency (Omar et al., 2023; Younis, 2024). Additionally, universities must implement institutional policies that promote ethical AI usage and support lecturers to incorporate AI tools into their research practices (George & Wooden, 2023).

In the context of Oman's higher education system, these challenges and opportunities are particularly relevant (Al-Saiari, 2022). The government's Vision 2040 emphasizes digital transformation and innovation to encourage universities to integrate AI technologies. Institutions like the University of Technology and Applied Sciences (UTAS) are uniquely positioned to lead this shift due to their focus on applied sciences and technology-driven education. However, one of the biggest gaps lies in equipping lecturers with the right AI tools and building a solid culture of ethical research that can guide this transformation in the right direction (Borenstein & Howard, 2020).

Existing training programs often fail to meet the specific needs of lecturers, especially in using AI to

enhance research efficiency, motivation, and uphold ethical standards. To build this gap, universities need specialized AI-based training programs designed to improve research outcomes. Thus, this study aims to investigate the impact of an AI-based training program on enhancing research efficiency, motivation, and ethical AI practices among lecturers at the University of Technology and Applied Sciences (UTAS). The research seeks to answer the following questions:

- RQ1: How does the AI-based program affect research efficiency among lecturers?
- RQ2: How does the AI-based program affect lecturers' motivation in research?
- RQ3: How does the AI-based program affect lecturers' understanding and application of ethical AI practices?

2. Literature Review

To provide a broader context for this study, the literature review explores the transformative role of AI in academic research and education, with a focus on its impact on research skills, motivation, and ethical practices. By synthesizing key findings, this section provides the groundwork for understanding how AI-based training programs can address the challenges in research efficiency and promote ethical research practices.

2.1 The Role of AI in Enhancing Research Efficiency

Recent studies emphasize the role of AI tools in revolutionizing academic research. For instance, Khalifa and Albadawy (2024) examined how AI supports academic research across six areas: idea generation, content structuring, literature synthesis, data analysis, editing, and communication. Their review of 24 studies shows the transformative impact of AI tools like ChatGPT in supporting research quality. Similarly, Alaa (2024) and Choi and Choo (2023) in their studies emphasized the value of AI in handling time-consuming activities like citation management and automating some research processes.

2.2 AI and Research Motivation

The use of AI to increase motivation in academic settings has received considerable attention. Silitonga et al. (2023) examined the impact of AI chatbots on the motivation of college students in English writing. Their study found that personalized feedback from chatbots helped increase students' motivation and engagement. Likewise, Song and Song (2023) investigated the experiences of Chinese EFL students, comparing traditional instruction with AI-assisted learning using tools like ChatGPT. Their mixed-methods study revealed that students who engaged with AI tools not only developed stronger writing skills but also reported higher levels of motivation.

2.3 Ethical Considerations in AI Usage

While AI tools offer significant benefits, their ethical use remains a critical concern. Mutanga et al. (2024) and Shakib et al. (2023) highlighted a strong correlation between researchers' satisfaction with AI tools and their understanding of ethical practices. Their findings emphasize the importance of fostering transparency, accountability, and fairness in AI-supported research environments. This aligns with the growing demand for ethical frameworks to guide AI integration in research.

2.4 Addressing Gaps in the Literature

Despite the growing focus on AI's role in academic research, there are still clear gaps in the literature. Much of the existing work tends to focus on individual tools such as ChatGPT without considering the broader landscape of AI applications that could support researchers. Moreover, there is limited exploration of the long-term impact of AI tools on research practices in higher education. Thus, this study aims to examine how AI tools collectively influence research motivation, efficiency, and ethical practices over an extended period.

3. Methodology

The study adopted a qualitative research design to explore how AI tools shape research efficiency, motivation, and ethical practices among lecturers. This approach allowed for a deeper understanding of participants' experiences, perceptions, and reflections on using AI in their academic work (Creswell & Poth, 2016). Through in-depth interviews and thematic analysis, the study examined how the AI-based training program influenced lecturers' ability to conduct research more effectively and ethically, as well as its role in enhancing their motivation to engage in academic writing.

3.1 Instrument

This study employed semi-structured interviews for data collection. The interviews provide a flexible and in-depth method to understand lecturers' experiences regarding the AI-based training program. Semi-structured interviews are effective in exploring personal thoughts and discovering the underlying factors that led to changes in research practices (Magaldi & Berler, 2020).

The questions were developed depending on the literature review and aligned with the study's objectives. Participants were asked about how the training program helped them improve their research competencies, how it motivated engaging in research, and how their awareness of ethical AI use had changed.

The training program was conducted in April 2024, and the follow-up interviews were conducted six months later, in October 2024. The six-month gap was intentional to ensure that lecturers had

adequate time to integrate the training into their research practices. This extended period allowed the study to assess the sustained impact of the training, not only short-term effects (Walk et al., 2015). The interviews were conducted face-to-face and were audio-recorded to ensure accuracy in data analysis.

3.2 Sample

The study sample consisted of 15 lecturers from the University of Technology and Applied Sciences (UTAS). The participants included lecturers from fields such as engineering, computer science, business, Math, and English language. Participants were chosen based on their willingness to complete the AI training program. Efforts were made to ensure a variety of gender and professional experiences. The sample consisted of 7 male and 8 female lecturers, with varying levels of experience: 4 participants with less than 5 years of experience, 8 participants with 5 to 15 years, and 3 participants with more than 15 years of experience. This distribution was intended to gain a wide range of perspectives and contexts. This also helps to generalize the results in other contexts (Etikan & Bala, 2017).

3.3 Validity and Reliability

To ensure the validity of the study, the interview questions were carefully piloted with two lecturers not involved in the sample, to ensure clarity, relevance, and alignment with the study objectives (Lincoln & Guba, 1985). This piloting process facilitated the identification of any ambiguous questions that could lead to inaccurate results. Feedback from the pilot study was used to improve the interview questions. Furthermore, the selection of participants from diverse academic departments and varied experience levels contributed to the **validity** and allowed applying the findings into a broader context.

For reliability, two independent researchers conducted thematic analysis of the interview data to ensure objectivity and consistency in coding. They discussed any differences in their interpretations to reach consistency in data analysis. Additionally, detailed records of each stage of the sample, data collection, coding, and analysis process were presented to ensure transparency. Participants were allowed to review and validate their responses (Lincoln & Guba, 1985). This process allowed participants to ensure that their views were accurately represented.

3.4 Data Analysis

The data collected were transcribed and analyzed using thematic analysis (Braun & Clarke, 2006). This analysis was employed to identify recurring patterns, categories, and themes within the data regarding how AI-based training influenced research efficiency, motivation, and ethical AI practices. First, the data were familiarized, and followed by systematic coding. Initial codes were organized into main themes that reflected the core areas of the study: improvement in research efficiency, increased research motivation, and enhanced ethical AI awareness. Additionally, sub-themes were identified

within each main theme to offer a more detailed understanding of the participants' experiences. This layered approach helped to understand broader and specific patterns of the data.

4. The Study Results

The results of this study showed clear evidence of the AI-based training program's positive impact on lecturers' research efficiency, motivation, and ethics, as they are detailed below:

4.1 Improvement in Research Efficiency

The AI-based training program enhanced the research efficiency of the participants by facilitating time-consuming tasks and improving the overall quality of their research outputs.

4.1.1 Facilitating Time-Consuming Tasks

Participants consistently highlighted how AI tools reduced the time required for tasks like literature reviews, data analysis, and manuscript preparation. These tools accelerate workflows, thus allowing researchers to focus on critical aspects of their research. One lecturer described the impact:

“Previously, I would spend weeks collecting and organizing articles for writing the literature review. Now, these AI applications can help me complete this in hours, so now I have more time for critical analysis, which is very important in doing research.”

Another participant emphasized how AI tools improved theoretical frameworks by saying:

“AI has helped to improve a lot. For example, we learned to use an application named [elicit.com](#) during the program to quickly find relevant studies, categorize them by themes, dates, or results, and extract research gaps. Just with one click, we could create a table summarizing all the studies we need for review.”

Accelerating repetitive tasks, such as translation and citation, was another area where participants observed significant improvements. For instance, one participant highlighted their experience with AI applications introduced during the training, such as Zotero and Reka:

“Before attending the program, citation and translation were like never-ending tasks. Now, Apps like Zotero, Reka, and ChatGPT could handle these tasks effortlessly.”

While the majority appreciated the features of AI, some participants raised concerns about the accuracy of AI outputs. For instance, one lecturer remarked:

“AI can help a lot, but it sometimes gives wrong references or makes mistakes. I always double-check the results to ensure they are correct. AI is to assist us, not to replace our judgment.”

This finding highlights the need for using AI as a supportive tool rather than a substitute for a researcher's judgment. Researchers must verify AI outputs to ensure the integrity and accuracy of their work.

4.1.2 Improving Research Quality

Many Participants observed that AI tools played a crucial role in enhancing the overall quality of their research by refining research questions, ensuring precision in data analysis, and improving manuscript clarity. One participant explained how AI helped him to create more focused questions:

“The AI tools, especially ChatGPT and Academic Help that we employed in training before, guided me to write my research questions to be more focused and better aligned with my research objectives.”

AI-driven statistical tools were effective in enhancing accuracy and reducing errors in data analysis. A participant shared:

“The AI tools flagged inconsistencies in my data and suggested adjustments, ensuring reliable results.” Additionally, another lecturer noted how AI simplified data interpretation: *“AI visualized patterns in minutes before I spent hours doing this.”*

Participants further emphasized how AI tools assist in revising their papers and identifying issues often missed during manual editing. One lecturer explained:

“Now, also with tools like QuillBot, Stealth Writer, and ChatGPT, I can proofread my writing easily. They help to detect mistakes in language and structure. I feel like having an expert editor reviewing my work.”

Although some participants initially expressed concerns that relying on AI tools might hinder the improvement of critical thinking skills, their responses when asked about this concern were unexpectedly positive. Many noted that AI enhances their skills and abilities rather than hinders them. One participant explained:

“Using AI for editing taught me to know which patterns of my writing I often make mistakes. It wasn't just about fixing errors; it helped me to avoid them and understand how to write better.”

4.2 Enhancement of Research Motivation

The results showed that the training program raised participants' motivation for research as it helped them discover their passion for research, enhance their confidence in research skills, and foster research collaboration.

4.2.1 Reducing Research Anxiety

Participants widely agreed that the training effectively reduced anxiety related to research tasks, particularly for those who had never published. The training provided the necessary AI tools that encouraged them to start writing their research. One first-time researcher expressed: *“I always hesitated to start my research because I was afraid that I wouldn’t manage research tasks, and now, because of the training, I am preparing my first paper with less fear.”*

Moreover, the training program created a supportive environment where lecturers could openly discuss their research challenges and fears. This helped to build a sense of shared experience and increase their motivation. A participant clarified this point, saying: *“The sessions during the training allowed us to share our struggles and worries regarding research. When I realized that I wasn’t alone in having these worries, that raised my motivation.”*

Consciously, participants’ confidence increased to manage research tasks more effectively, and they felt more capable of handling any challenges in research projects. One lecturer explained how the training changed her mindset:

“I always avoided large projects because I feared the workload. After the program, I feel confident enough to participate in these projects because I know AI tools would make things easier.”

4.2.2 Confidence in Research Skills

The findings indicated that the training program led to an increase in participants’ publication rates by making research processes faster and more efficient. One participant mentioned:

“Before the program, I used to publish one paper at a time, and it would take a lot of effort. After the training program, I used the summer break to apply the AI tools and skills I learned. I worked on three papers instead of one as before. One of my research papers has already published, and the other two have been accepted.”

Additionally, the training program inspired some participants to take a significant academic step, which is to pursue doctoral studies. Two participants highlighted that the program reduced their fear about writing research proposals, publications, and meeting academic requirements. One participant expressed:

“I always wanted to complete my PhD studies, but I hadn’t published enough. After the training, I participated with the team, and we published a paper. This gave me more confidence to do doctoral studies, and now I have already received approval from my workplace to start my PhD.”

4.2.3 Collaborative Research Teams

The training program also had a transformative impact on fostering collaboration among participants. Participants were encouraged to collaborate and discuss with their colleagues from different departments, enabling them to form new research teams. Participants felt that working together improved their research experiences. One lecturer shared:

“Before this program, I didn’t realize how many of my colleagues had similar research goals. Now, we have formed a team to work on a funded project.” Another participant added:
“Collaborating with colleagues from other fields opened my eyes to new creative ideas.”

Another participant noted that the program provided them with platforms and tools where participants could communicate and coordinate effectively. One lecturer said, *“Being part of a research team keeps me motivated. We encourage each other, and it feels good to know we are all working towards one shared goal.”*

4.3 Increased Awareness of Ethical Practices

The training program significantly improved participants’ awareness and understanding of ethical AI use, addressing misconceptions and improving responsible research practices.

4.3.1 Increase Responsible Use of AI Tools

Participants emphasized the program’s role in increasing their awareness of ethical issues associated with AI use, particularly regarding biases, transparency, and academic integrity. One lecturer reflected:

“Before, I didn’t think much about biases in AI tools. Now, I carefully review how these tools process data to avoid misleading results.”

Another participant highlighted the importance of transparency in research, stating:

“The training taught me to document how I use AI tools in my studies. I now include clear notes in my methodology or acknowledgment section so others can trust my findings. I learned that being open and honest is an advantage, not a mistake.”

The program also reinforced the importance of employing AI without affecting academic integrity. A participant noted:

“AI is a powerful tool, but we need to be careful when using these tools. The program taught me not to treat AI-generated outputs as final results. I should always review the AI outputs.”

4.3.2 Addressing Misconceptions Towards AI

The analysis of participant responses revealed that the training effectively addressed common misconceptions about AI, like concerns about data privacy, over-reliance on AI, and fears of job replacement. One lecturer admitted:

“I used to believe that AI tools would replace jobs, researchers, and many other things, but this program clarified that AI is a complement to facilitate our lives, not a substitute. It really changed my negative thoughts about AI.”

Another participant added, *“I was hesitant to use AI tools because of privacy risks. The program showed us how to use AI securely and ethically. This gave me more confidence to use AI.* These reflections highlight the program's role in reshaping participants' attitudes toward AI and reducing misconceptions about AI's tools.

4.3.3 Exposing to Ethical Guidelines in Research

The results revealed the significant impact of the program in providing participants with clear and practical steps for integrating ethical considerations into research work. Participants appreciated how these guidelines assisted them in avoiding ethical risks. One participant explained:

“We learned that AI use isn't just about not making errors. It is more about ensuring fairness and avoiding biases.” Another participant highlighted the value of embedding ethics early in the research process: *“I have started considering ethical implications from the very beginning, like choosing the right AI tools and using them responsibly.”*

The program enhanced effective ethical awareness by introducing participants to international ethics related to AI in research, such as the UNESCO guidelines on AI ethics. They could be applied to these guidelines to ensure fairness, transparency, and accountability in their work. Additionally, the program exposed participants to national policies related to AI applications in the Sultanate of Oman.

5. Discussion

The results of this study highlight the pivotal impact of the AI-based training program across three critical dimensions: research efficiency, motivation, and ethical AI practices.

5.1 Research Efficiency

One of the most vital outcomes of this study is the improvement in research efficiency. AI tools facilitated tasks such as literature reviews, data analysis, citation management, and translation, dramatically reducing the time and effort required for these activities. These findings are consistent

with Khalifa and Albadawy (2024), who highlighted the efficiency gains AI provides by automating repetitive tasks and managing large data effectively. Similarly, Choi and Choo (2023) observed that AI systems streamline data management, document creation, and overall research workflows, which enhances productivity in research.

Participants also acknowledged the improvement in the quality of their research, as AI tools aided in collecting relevant studies, categorization of themes, and citation tasks that previously demanded much time and effort. This finding is in line with Alaa (2024), who demonstrated that AI tools could perform various research processes; thus, researchers could engage in higher-level cognitive tasks. According to cognitive load theory, reducing the manual workload allows researchers to pay more attention to critical thinking and innovative research outputs (Mostyn, 2012).

However, the results also revealed concerns regarding the over-dependence on AI tools, which might decrease critical active engagement in research processes. This concern aligns with the warnings of Yasin and Al-Hamad (2023), who cautioned that while AI boosts efficiency, it might hinder creativity and critical thinking. These findings indicated the importance of balanced AI integrating tools and active human involvement to ensure research integrity and innovation.

5.2 Motivation and Research Engagement

The AI-based training program significantly increased participants' motivation towards academic research. By reducing anxiety and enhancing their confidence in conducting research projects, participants reported a noticeable increase in their research output. These findings are similar to Silitonga et al. (2023), who found that AI tools lead researchers to greater motivation and a stronger sense of accomplishment.

Moreover, the program facilitated collaboration among researchers, as participants reported increased teamwork and coordination. This aligns with the findings of Jony and Hamim (2024), who argued that technological tools play a pivotal role in improving collaboration by simplifying communication among team members. This contributed to a notable increase in the number of research publications among participants. Oman's Vision 2040 emphasizes encouraging innovation and increasing the number of publications as part of the country's strategic plan to build research capacity (Ministry of Economy, 2020).

5.3 Ethical AI Awareness

A key finding of this study is the improvement in participants' understanding of ethical AI use, particularly concerning issues such as data privacy, algorithmic bias, and transparency. This outcome is in line with a study conducted by Omar et al. (2023), who underscored the importance of ethical AI

practices in enhancing research capabilities while maintaining integrity. Ethical considerations in AI are critical since less responsible use of AI could lead to biased research outcomes.

Shakib et al. (2023) further emphasized the need for continuous ethical training in AI to address its risks. The participants in this study expressed a heightened awareness of the ethical challenges posed by AI tools and acknowledged the importance of ensuring fairness and transparency in AI-driven research. The training program, therefore, not only improved technical research skills but also engaged participants in responsible AI usage.

6. Contributions to the Field

This study makes a significant contribution to understanding the long-term impact of AI-based training programs on academic research practices. Unlike previous studies that primarily focus on short-term effects, this research provides a deeper understanding of how AI tools influence research efficiency, motivation, and ethical AI practices over an extended period. By exploring the sustained effects of AI, this study highlights the potential for AI tools to become an essential part of academic planning.

Additionally, the study addresses a critical gap in the literature on the use of AI in research in academic settings. It explores key ethical concerns such as bias, data privacy, and transparency. This contributes to increasing awareness of the ethical challenges of implementing AI in education and research.

Moreover, this study is pioneering in the Arab region, as it is the first to examine the effects of AI-based training programs on academic research. An extensive review of existing literature revealed no prior studies from the region that comprehensively address this topic; therefore, it sets a pathway for future research in the region.

7. Limitations

While this study offers valuable insights, several limitations should be noted. First, the interviews were conducted six months after the program, which presented challenges as some participants had forgotten specific details. To mitigate this, we reviewed prior notes and asked reminder questions to help participants recall important information. Additionally, two participants had left their jobs, making it challenging to conduct interviews with them. Despite these challenges, we made considerable efforts to ensure that all key points were covered during the interviews.

8. Further Research

Researchers could consider employing alternative methods, such as surveys or follow-up questionnaires, to gather data from participants. Additionally, expanding the sample size could also help strengthen the findings.

9. Ethical Considerations

Ethical approval for the study was obtained from UTAS. Participants were informed of the study's purpose, procedures, and their rights to withdraw at any time without repercussions. The data were anonymized during analysis.

10. Conclusion

In conclusion, the AI-based training program significantly improved research efficiency, motivation, and enhanced ethical awareness among participants. By incorporating AI tools, researchers improve their efficiency and foster a culture of innovation and ethical responsibility in their research practices. The study's findings support the program's value in increasing research productivity and aligning with international AI standards and Oman's vision of fostering innovation and research.

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