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Artificial Intelligence in Academic Research: Adoption, Opportunities, and Barriers among Faculty in Libya Higher Education

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Abstract

This study explores the awareness, adoption, and challenges of using artificial intelligence tools in academic research among faculty members at the University of Zawia, Libya. A mixed-methods approach was applied in the analysis, combining survey responses from 350 participants with interviews involving selected faculty members and administrators. The findings show that laptops (93.7%) and tablets (80.6%) are the most used devices for research. However, more than half of the respondents reported either no formal training in artificial intelligence tools (46.0%) or only a single workshop (49.7%). Internet access was generally rated as good (57.4%), but poor infrastructure (68.6%) and high subscription costs (84%) remain major barriers. Ethical and policy issues were also prominent, as 99.4% of faculty reported no knowledge of official university guidelines, and 98.9% expressed concerns about academic misconduct. Despite these challenges, 68.9% of participants stated that artificial intelligence had a strong positive impact on their research productivity. This research is one of the first studies to examine the application of artificial intelligence in Libyan higher education, specifically highlighting the intersection between infrastructure gaps, ethical concerns, and research productivity. It concludes that artificial intelligence adoption in Libyan universities is shaped not only by faculty willingness, but also by systemic gaps in infrastructure, policy, and institutional support.

INTRODUCTION

In recent years, artificial intelligence has become a powerful force across many disciplines, including higher education. In Libya, although universities have made progress in adopting digital technologies, this development has been slowed by weak infrastructure, limited training, and socio-political instability (Yahya et al., 2025). Still, Libyan universities are increasingly adopting artificial intelligence tools to support teaching, curriculum development, course design, and knowledge management (Baroud et al., 2025; Husayn et al., 2025; Mansour et al., 2025). These tools also help undergraduate and postgraduate students complete academic tasks

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and improve their learning skills (Alrumayh et al., 2025; Alsayd et al., 2025; M A Masuwd, 2024).

For faculty members, artificial intelligence offers clear benefits in writing, data interpretation, and translation. Yet, the actual use of artificial intelligence in research varies widely, especially in developing countries. Libya, and in particular the University of Zawia, provides an important case for studying how faculty members adopt artificial intelligence while facing infrastructural, cultural, and pedagogical challenges. Religious, cultural, political, and economic factors also push educators to adopt digital technologies (Masuwd & Baroud, 2025; Hasibuan et al., 2024; Almajri et al., 2025). Understanding these dynamics is crucial for building strategies that support research capacity while ensuring academic integrity and ethical practice.

Globally, digital literacy and artificial intelligence-driven research are becoming central to academic work. Fernando & Li (2025) show that students and lecturers use artificial intelligence for guidance, independent study, and curriculum support. At the same time, concerns about ethics and academic misconduct remain significant. In higher education, artificial intelligence can help with data analysis, literature reviews, collaboration, and knowledge sharing. However, institutions in the Global South, including North Africa, still face barriers such as poor infrastructure, cultural resistance, and unclear policies (Aderibigbe et al., 2023; Kasheem et al., 2025; Primarni et al., 2025). At the University of Zawia, understanding these issues is essential for creating policies and training that meet faculty needs instead of imposing top-down solutions.

Previous studies show that faculty attitudes toward artificial intelligence are shaped by both structural and cultural factors. For example, Alasmari (2025) highlights the shift in the region from general e-learning to specialized AI applications like mobile learning and ChatGPT. In Oman, Kumar et al (2025) found that artificial intelligence acceptance depends on attitudes, intentions, and self-confidence. In North Africa and the Middle East, Al-Zahrani & Alasmari (2025) report major differences in adoption between high- and low-income countries, with the latter facing financial and policy challenges.

Other studies show similar patterns. In Jordan, Al-Jaghoub et al (2025) found faculty concerned about ethics and legitimacy in the absence of clear rules. In the Kutemate (2024) noted benefits such as reduced workload and improved productivity, but also resistance, bias, and policy gaps. Research in Arab and Islamic education shows that digital tools support creativity but may reduce collaboration and satisfaction (Baroud & Aljarmi (2025); Budiningsih et al (2024); Zhang (2022). Studies on AI in Islamic education further emphasize that artificial intelligence must align with ethical and cultural principles to succeed (Aljarmi et al., 2025; Baround et al., 2024; Elihami et al., 2024). Overall, effective artificial intelligence integration in Arab higher education requires not only investment in technology but also culturally sensitive strategies that support faculty, address ethics, and overcome structural barriers (Al-Mughairi & Bhaskar, 2025; Lopez-Herrejon et al., 2022).

Although previous studies have explored the adoption of artificial intelligence in the Middle East and North Africa region (Al-Zahrani & Alasmari, 2025), research discussing the specific challenges faced by Libyan universities amid socio-political instability remains limited. This gap underscores the urgency of investigating how infrastructural constraints, ethical concerns, and institutional support shape artificial intelligence adoption in the Libyan context.

Based on this background, the study focuses on several key research questions, namely the current level of artificial intelligence use among faculty members at the University of Zawia in their research activities, the types of artificial intelligence tools most commonly employed, and the challenges and opportunities encountered by faculty members in integrating artificial intelligence into their research. By addressing these questions, the study contributes to the growing body of literature on artificial intelligence in higher education and enriches the wider discussion on digital transformation in developing countries.

METHODS

This study uses a descriptive quantitative research design to examine the use of artificial intelligence tools in academic research among faculty members at the University of Zawia. This design is appropriate because it allows systematic collection of data that reflects patterns, perceptions, and real practices of artificial intelligence use without manipulating variables (Engkizar et al., 2025; Takona, 2024). By focusing on observable trends and self-reported practices, the study provides an evidence-based understanding of both the opportunities and barriers surrounding artificial intelligence adoption in the Libyan higher education context (Baroud et al., 2025; Okenova et al., 2025). The study population included full-time faculty members at the University of Zawia across faculties such as humanities, sciences, engineering, and education. A purposive stratified sampling technique was used to ensure representation across disciplines and academic ranks. A total of 350 faculty members were selected, which is considered sufficient for descriptive and inferential analysis while maintaining representativeness (Engkizar et al., 2025).

Data was collected through a structured questionnaire developed for this study, based on existing literature on artificial intelligence and technology use in higher education (Baround et al., 2024; Masoud et al., 2025; Padang & Kasheem, 2025). The questionnaire included sections on demographic information, types of artificial intelligence tools used, frequency and purposes of use, perceived benefits, and challenges of adoption. It combined multiple-choice and multiple-response items to capture the diversity of experiences. To ensure validity and reliability, the questionnaire was piloted with 30 faculty members prior to the main study, and expert review was sought to refine item clarity. Cronbach's Alpha was calculated ($\alpha = 0.87$), indicating high internal consistency and reliability of the instrument (Feng, 2023; Taber, 2018).

The questionnaire was distributed online through Google Forms to improve accessibility and response rates. Participants were informed of the study's purpose, and data collection took place over four weeks in the spring semester of 2025. Data analysis involved descriptive statistics such as frequencies, percentages, means, and standard deviations (Fitri et al., 2025; Kamaludin et al., 2023). These methods summarized overall patterns of artificial intelligence use, types of tools adopted, and reported benefits and challenges. In addition, open-ended responses were analyzed thematically to provide qualitative insights that complemented the quantitative findings (Az-Zahra et al., 2025; Kassymova et al., 2025; Mutiaramses et al., 2025).

RESULT AND DISCUSSION

Section A: Demographic and Background Information

The demographic characteristics of the respondents show that the University of Zawia has a young and diverse academic community. Among the 350 faculty

surveyed, most were female (237; 67.7%), while 113 (32.3%) were male. This high female representation reflects the increasing role of women in Libyan higher education, consistent with broader trends in the Middle East and North Africa region, where female participation in academia has steadily grown over the past two decades (El-Kogali et al., 2020). Such representation is important because women in higher education often face unique challenges and opportunities in adopting digital tools.

Age distribution also indicates a relatively young workforce. The largest group was 30–39 years old (124; 35.4%), followed by those under 30 (99; 28.3%) and 40–49 (94; 26.9%). Only a small group were above 50 years, with 26 (7.4%) aged 50–59 and 7 (2.0%) aged 60 or older. This concentration of younger academics suggests a community that may be more receptive to technological change. Previous research shows that younger faculty members often display stronger digital literacy and greater willingness to experiment with educational technologies compared to senior academics, who may rely more on traditional approaches (Czerniewicz et al., 2020; Veletsianos & Houlden, 2020).

In terms of academic rank, lecturers (143; 40.9%) and assistant professors (103; 29.4%) made up the majority, followed by assistant lecturers (53; 15.1%). Senior academics were fewer, with 39 associate professors (11.1%) and only 12 full professors (3.4%). This distribution suggests that most of the university's academic staff are in the early or mid stages of their careers. Faculty at these stages are often motivated to build research portfolios and experiment with new methods, which may make them more open to adopting artificial intelligence tools in their research (Aithal & Aithal, 2019).

Disciplinary distribution shows balanced representation, with a slight concentration in sciences. The largest group was from Sciences and Engineering (142; 40.6%), followed by Humanities and Social Sciences (109; 31.1%), Health and Medical Sciences (75; 21.4%), and Sharia and Law (24; 6.9%). This diversity is important because attitudes toward artificial intelligence adoption often vary by discipline. Faculty in sciences and engineering tend to be more comfortable with computational tools, while those in the humanities and law may raise stronger concerns about ethics, originality, and contextual appropriateness of artificial intelligence (Tlili et al., 2023).

Regarding academic experience, the largest groups reported 6–10 years (123; 35.1%) and 16–20 years (108; 30.9%) of service, followed by 11–15 years (68; 19.4%). A smaller group (42; 12.0%) had over 21 years of experience, while only 9 (2.6%) had fewer than five years. This indicates that many respondents were mid-career faculty, combining substantial professional experience with active interest in career development. Previous research suggests that such faculty tend to evaluate new tools with both enthusiasm and caution, weighing benefits against concerns about workload, ethics, and institutional readiness (Marinoni et al., 2020).

Overall, these demographic results portray the University of Zawia as an institution with a young, gender-diverse, and cross-disciplinary academic staff. These features are likely to shape patterns of artificial intelligence adoption: younger and mid-career faculty may be more adaptable and motivated to integrate artificial intelligence into their research, while disciplinary traditions and cultural factors may influence both opportunities and concerns. This demographic background provides a foundation for interpreting the subsequent findings on artificial intelligence adoption (Engkizar et al., 2023).

Section B: Access and Digital Readiness

The findings on access to digital devices and readiness for artificial intelligence adoption show both enabling factors and significant gaps in infrastructure and training among faculty at the University of Zawia. When asked about devices used regularly for research (Figure 1), most faculty members reported laptops (328; 93.7%) as their primary tool, followed by tablets (282; 80.6%) and smartphones (142; 40.6%). Desktop computers were the least used (46; 13.1%). This trend reflects the global move away from fixed, institution-based computing toward portable devices that allow more flexibility and accessibility in academic work (Brooks et al., 2015). The strong reliance on laptops and tablets suggests that faculty members are relatively well-prepared to adopt artificial intelligence-driven applications, which are often designed for mobile and web-based platforms.

At the same time, the limited use of desktop computers may signal infrastructural challenges within campus facilities, consistent with broader trends in North African universities where investment in fixed hardware often lags behind mobile adoption (Alturki & Aldraiweesh, 2022). This device preference also aligns with (Cai et al., 2021), which suggests that individuals adopt technologies that according to rational factors (i.e. performance expectancy, effort expectancy, facilitating conditions and attitude) and irrational factor (habit); in this case, mobile devices provide portability and lower entry barriers compared to desktops.

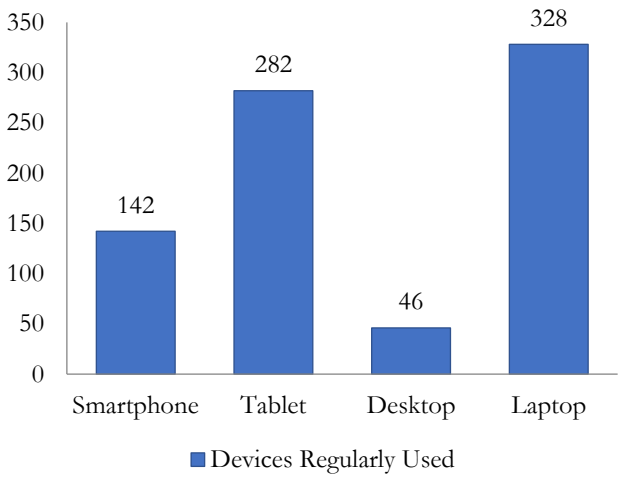

Fig 1. Regularly used devices

Internet connectivity (Figure 2), which is crucial for effective use of artificial intelligence tools, varied in quality. More than half of respondents rated their internet access as good (201; 57.4%), and 58 (16.6%) described it as excellent. However, a notable portion reported their internet as only adequate (68; 19.4%) or poor (23; 6.6%). These findings align with prior studies in the Middle East and North Africa region, where digital readiness is often restricted by unstable or underdeveloped infrastructure, especially outside major cities (Alsayd et al., 2025). Because most artificial intelligence tools rely on cloud-based services and constant updates, inconsistent connectivity can directly limit adoption. Faculty who experience poor internet may not only face technical barriers but may also lose trust in the reliability of artificial intelligence applications, lowering their motivation to integrate them into research (Al-Mughairi & Bhaskar, 2025; Masuwd, 2024). This pattern mirrors global North–South disparities highlighted in the digital divide

literature, where infrastructural instability not only slows adoption but also shapes perceptions of technological credibility (Marks, 2015). In the Libyan case, such instability risks reinforcing a cycle of low confidence and minimal experimentation with advanced artificial intelligence tools.

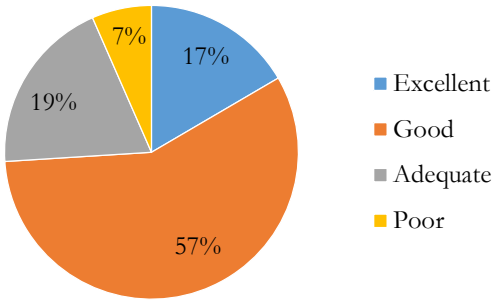

Fig 2. Internet connectivity quality

Training and capacity-building (Figure 3), emerged as the most critical gap. More than half of the respondents reported receiving no formal training in artificial intelligence tools (161; 46.0%) or only a one-time workshop (174; 49.7%). A small number had attended a short course lasting less than a month (12; 3.4%), and only three participants (0.9%) reported holding a professional certificate or diploma in artificial intelligence-related applications. This limited exposure indicates that, while most faculty members have access to digital devices and at least moderate internet connectivity, structured training opportunities remain scarce. Prior studies emphasize that training is a key factor determining whether artificial intelligence tools are used only experimentally or are fully integrated into academic workflows (Tlili et al., 2023; Zawacki-Richter et al., 2019). The lack of training also raises risks of misuse, ethical concerns, and underutilization of artificial intelligence, particularly among early-career scholars who may otherwise be more open to adoption.

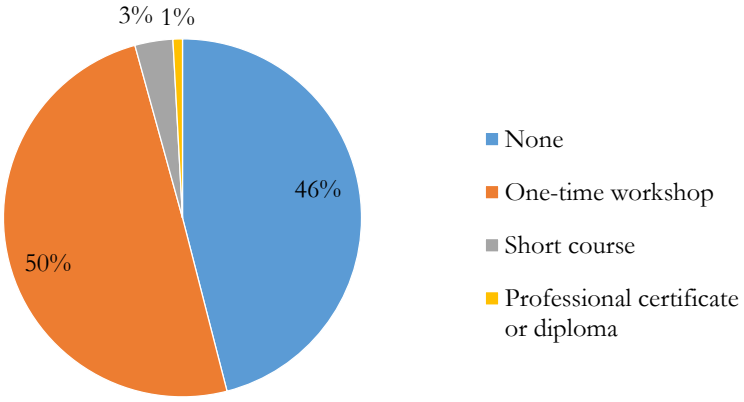

Fig 3. Formal training on artificial intelligence tools

Overall, Section B highlights a paradox: while faculty members at the University of Zawia generally have good access to mobile devices and moderate internet connectivity, they face serious shortages in structured training and institutional support. This creates a situation of partial readiness, one in which technological requirements for artificial intelligence adoption are available but are not matched by sufficient professional development. This reflects what (Teräs,

2022) calls "thin" digital adoption, where technology is present but underexploited due to weak institutional ecosystems. Without targeted policies, workshops, and certificate-based programs, these gaps may limit the full integration of artificial intelligence in research and widen inequalities in digital literacy across ranks and disciplines.

Section C: artificial intelligence Usage in Research

The results show that artificial intelligence use is already widespread among faculty at the University of Zawia, though its adoption differs depending on research tasks and tool categories. When asked which artificial intelligence tools they had used (Figure 4), all respondents (350; 100%) reported using generative text tools such as ChatGPT. This universal uptake reflects strong awareness of artificial intelligence as a useful academic resource and mirrors global trends in higher education, where large language models are becoming central to academic writing and research workflows (Alrumayh et al., 2025; Tlili et al., 2023). Other frequently used applications included artificial intelligence-assisted translation (265; 75.7%) and summarization/paraphrasing tools (221; 63.1%). These tools are especially important in bilingual contexts such as Libya, where faculty often publish in both Arabic and English.

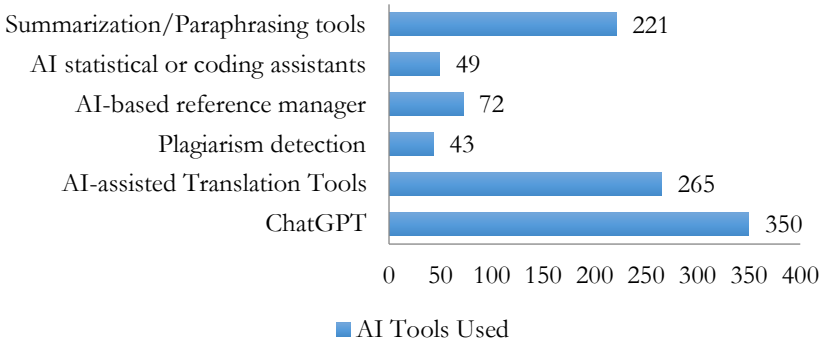

Fig 4. Artificial intelligence tools used

By contrast, more specialized artificial intelligence tools were less common. Plagiarism detection (43; 12.3%), artificial intelligence-based reference managers (72; 20.6%), statistical or coding assistants (49; 14.0%), and artificial intelligence-driven image or table generation (64; 18.3%) were used by only a minority. This suggests that faculty prefer general-purpose artificial intelligence tools that are easy to use, while adoption of discipline-specific or technical software remains limited. This pattern supports earlier findings that educators tend to adopt low-barrier artificial intelligence applications more readily than advanced ones (Zawacki-Richter et al., 2019). At the same time, the limited uptake of specialized research tools diverges from trends in higher-resourced contexts, where advanced artificial intelligence systems are increasingly integrated into data-driven research (Dwivedi et al., 2021). This divergence highlights the structural weaknesses of Libyan higher education, particularly in trartificial intelligencening and infrastructure, and reinforces the notion of a persistent "digital divide" in academic innovation (Marks, 2015).

Adoption across the research process further highlights this preference (Figure 5). Faculty reported high levels of artificial intelligence use in selecting research topics (324; 92.6%), drafting and editing text (316; 90.3%), and conducting literature searches (294; 84.0%). These results indicate that artificial intelligence is

mainly used for idea generation, synthesis, and writing enhancement tasks that take significant time and effort in academic work (Dwivedi et al., 2021). Fewer faculty members used artificial intelligence for data analysis or coding (94; 26.9%) and visualization (81; 23.1%), showing limited adoption of artificial intelligence in more technical or quantitative tasks. Interestingly, 246 faculty members (70.3%) reported using artificial intelligence to respond to peer reviewers and prepare rebuttal letters, revealing a new and underexplored role of artificial intelligence in academic publishing. This finding aligns with emerging evidence that researchers globally use artificial intelligence to improve communication with journals and streamline peer-review responses (Al-kfairy et al., 2024).

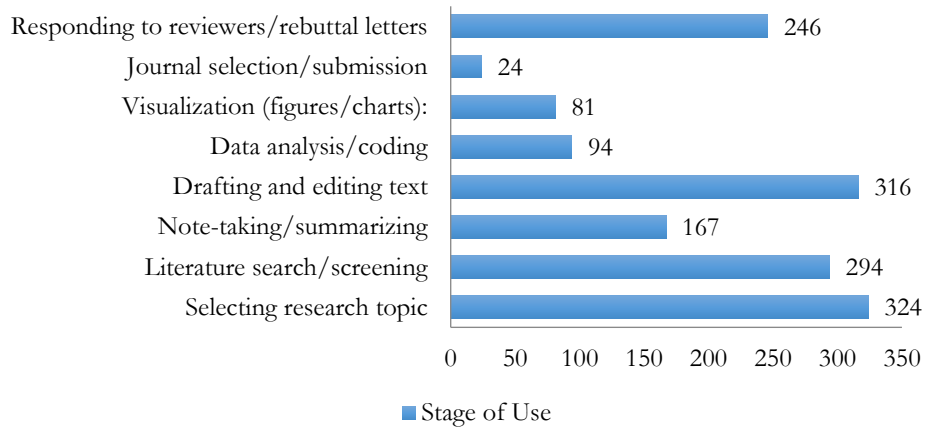

Fig 5. Stages of artificial intelligence use

When asked about the number of tools used regularly, most faculty reported relying on just one tool (201; 57.4%), while 126 (36.0%) used two. Only a few used three (20; 5.7%) or four (3; 0.9%). This concentration suggests that adoption is often shallow, limited to a small set of tools, commonly ChatGPT for text generation and a translation or paraphrasing tool. This reflects what the literature calls the "minimum sufficient adoption" phenomenon, in which faculty use artificial intelligence only to complete immediate tasks rather than exploring its broader research potential (Adhikari & Pandey, 2025). This shallow adoption echoes Tondeur et al (2020) findings that meaningful integration of digital tools requires pedagogical as well as technical knowledge, without structured training, faculty use artificial intelligence only at a functional level, not as a transformative research resource.

Time investment data highlights the centrality of artificial intelligence in daily research practices. A majority of respondents reported using artificial intelligence for 6–10 hours per week (141; 40.3%) or more than 10 hours (167; 47.7%). Only 42 (12.0%) reported limited use of 1–5 hours per week. These figures suggest that artificial intelligence has become a regular and integrated part of research routines rather than a tool used occasionally. Such extensive reliance underscores both the usefulness of artificial intelligence and the potential risks of over-dependence, particularly regarding ethics and academic integrity (Baroud, 2024). This is consistent with the global debate on "automation bias," where scholars may defer excessively to machine outputs without applying critical judgment (Teräs, 2022).

The purposes of artificial intelligence use also reflect the challenges faced by Libyan academics in publishing across languages and navigating limited resources

(Figure 6). The most common applications were paraphrasing and grammar improvement (304; 86.9%), translation between Arabic and English (249; 71.1%), and drafting survey or questionnaire items (276; 78.9%). Faculty also reported using artificial intelligence for citation and reference formatting (219; 62.6%), with fewer using it for suggesting research methods (123; 35.1%) or performing statistical analysis and code writing (94; 26.9%). These patterns suggest that artificial intelligence is primarily valued for reducing linguistic and technical burdens rather than supporting advanced computational research. Similar findings have been reported in other developing-country contexts, where adoption is driven by immediate functional needs rather than experimental or innovative uses (Ameen et al., 2021; Paisun et al., 2024). This reflects a pragmatic adoption model, where artificial intelligence is perceived less as a tool for innovation and more as a means of overcoming existing academic constraints, particularly in resource-limited environments.

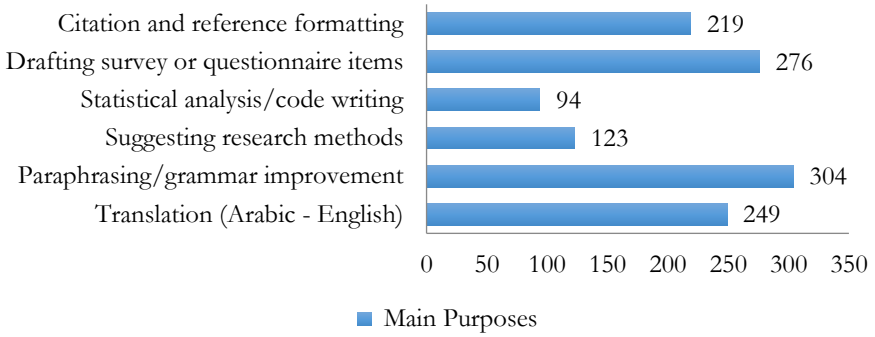

Fig 6. Main purposes of artificial intelligence use

In summary, the findings indicate that faculty at the University of Zawia widely embrace artificial intelligence, mainly for text generation, translation, and editing. Most rely on one or two familiar tools, which they integrate into the early and middle stages of the research process, dedicating substantial weekly time to their use. However, adoption remains limited in more advanced applications such as statistical analysis, visualization, or specialized reference management. This points to both a capacity gap and an opportunity for targeted training. The results echo broader literature showing that meaningful artificial intelligence adoption in academia requires not only access but also domain-specific expertise and clear ethical frameworks, especially considering the importance of aligning practice with Islamic ethical traditions (Masuwd et al., 2025; Ayad et al., 2025).

Section D: Barriers and Institutional Support

The findings highlight several critical barriers to artificial intelligence adoption in research that must be addressed for effective integration at the University of Zawia. The most prominent challenge was lack of training or knowledge, mentioned by 271 respondents (77.4%), underscoring the need for targeted capacity-building initiatives. This result is consistent with prior research that identifies insufficient artificial intelligence literacy among faculty as a primary obstacle to adoption in higher education (Mehdaoui, 2024). Similarly, 314 respondents (89.7%) reported unclear institutional policy or ethical frameworks as a barrier, revealing a structural gap that reflects broader global debates on how universities should regulate artificial intelligence to preserve academic integrity (Dwivedi et al., 2021). This aligns with institutional theory (Kostova et al., 2020),

which emphasizes that unclear rules and norms lead to inconsistent practices and weak organizational legitimacy.

Other barriers were also significant by the faculty members (Figure 7). Concerns about artificial intelligence accuracy were raised by 67 respondents (19.1%), showing caution about the reliability of artificial intelligence-generated outputs. Poor infrastructure was identified by 240 respondents (68.6%), illustrating the persistent technological challenges faced by Libyan universities. Subscription costs and lack of access were noted by 294 respondents (84%), confirming affordability as a pressing concern. Additionally, 82 respondents (23.4%) pointed to inadequate Arabic language support, echoing critiques of artificial intelligence systems' limited inclusivity for non-English academic contexts (Baround et al., 2024; Setiawan et al., 2023). Most strikingly, fear of academic misconduct emerged as the largest barrier: 346 respondents (98.9%) expressed concern over plagiarism, originality, and ethical violations. This finding indicates that anxieties about misconduct overshadow even infrastructural and financial challenges. This reflects Teräs (2022) argument that technology in education often amplifies existing ethical tensions rather than resolving them.

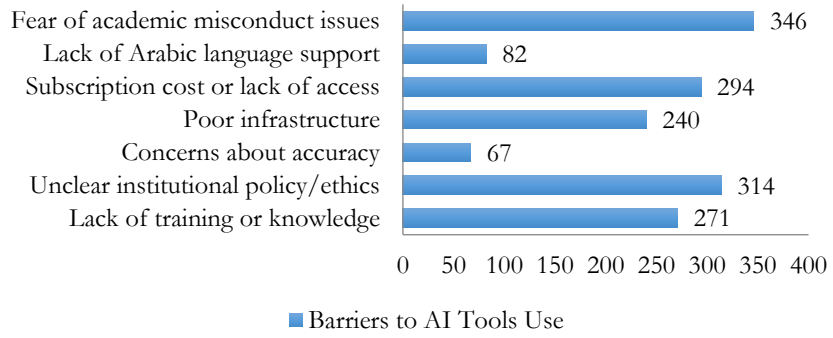

Fig 7. Barriers to artificial intelligence use

Awareness of institutional guidelines was almost nonexistent. Nearly all respondents (348; 99.4%) reported no knowledge of official University of Zawia policies on artificial intelligence use, with only 2 faculty members (0.6%) aware of such guidelines. This imbalance reveals a critical policy vacuum that leaves academics uncertain about acceptable practices. Previous studies have emphasized that such ambiguity fosters hesitancy, misuse, and inconsistent adoption across institutions (Husayn et al., 2025). The near absence of institutional guidelines on artificial intelligence reflects a broader governance gap that undermines responsible integration of emerging technologies. Similar concerns have been raised in legal scholarship, which emphasizes that higher education institutions should establish internal regulations through transparent and participatory processes aligned with national legislation and the Sustainable Development Goals (SDGs), particularly SDG 16 on building resilient institutions (Sulaksono et al., 2025).

Faculty preferences regarding institutional support further reinforce these findings (Figure 8). A strong majority requested training workshops (267; 76%), highlighting demand for structured, practical skill development. By contrast, only 58 respondents (16.6%) preferred online self-paced modules, suggesting a preference for interactive, collaborative learning. A large proportion (314; 89.7%) also requested a helpdesk or technical support system, emphasizing the need for on-demand assistance. Similarly, 257 respondents (73.4%) highlighted the necessity for the university to provide paid licenses for artificial intelligence tools, once again

reflecting affordability as a core institutional responsibility. Finally, 307 respondents (87.7%) requested clear ethical and legal guidelines, confirming that structured frameworks are essential for safe and responsible integration.

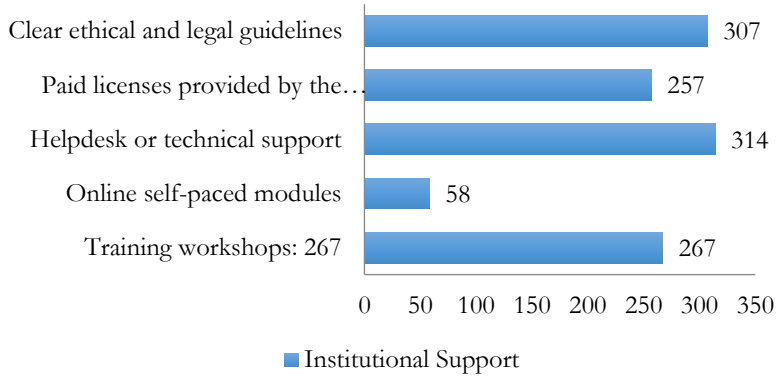

Fig 8. Institutional support

Perceptions of ethical risk varied considerably. A total of 124 respondents (35.4%) viewed artificial intelligence as very risky, while 93 (26.6%) considered it somewhat risky. Neutral attitudes were reported by 83 respondents (23.7%), while smaller groups rated artificial intelligence as low risk (42; 12%) or no risk (8; 2.3%). These findings reflect broader academic debates, where some scholars highlight artificial intelligence's risks of bias, opacity, and misuse (Jobin et al., 2019), while others argue that its potential can be safely realized under strong oversight (Zou & Schiebinger, 2018). Despite these concerns, only 34 respondents (9.7%) reported having faced actual ethical or policy-related issues, while the majority (316; 90.3%) had not encountered such problems. This may indicate what Marks (2015) calls the "hidden digital divide," where faculty adopt cautiously to avoid visible ethical breaches but remain constrained in how fully they can exploit artificial intelligence's potential.

The overall impact of artificial intelligence on research productivity was perceived as highly positive. A majority of respondents (241; 68.9%) reported a strong positive effect, while 58 (16.6%) indicated some improvement. By comparison, 46 respondents (13.1%) reported no significant impact, and only 5 (1.4%) considered artificial intelligence's influence negative. These findings suggest that, despite barriers and risks, artificial intelligence is widely viewed as enhancing research quality, speed, and innovation, echoing recent studies on artificial intelligence's transformative role in academia (Eloundou et al., 2024).

Finally, when asked about the most important changes needed to improve artificial intelligence use, respondents provided diverse open-ended suggestions. Many emphasized the urgent need for formal institutional guidelines and ethical frameworks to reduce uncertainty and mitigate misconduct risks. Others highlighted infrastructure and funding, calling for stable internet connectivity, upgraded servers, and subsidized access to premium artificial intelligence tools to democratize usage. Another cluster emphasized the development of localized artificial intelligence tools with Arabic language support, reflecting the importance of linguistic and cultural adaptation (Engkizar et al., 2025; Engkizar et al., 2025). A final group stressed the importance of continuous training, both technical and ethical, to ensure that faculty use artificial intelligence not only effectively but also responsibly. These recommendations underscore the need for a holistic strategy

that integrates technical infrastructure, institutional governance, and cultural sensitivity, consistent with calls for sustainable digital transformation in higher education (Williamson & Piattoeva, 2022).

CONCLUSION

The findings from this study provide a comprehensive overview of how faculty at the University of Zawia perceive, use, and navigate barriers to artificial intelligence in research. Overall, the results highlight a strong enthusiasm toward artificial intelligence, with the majority of faculty regarding it as a useful and transformative tool that enhances productivity, efficiency, and innovation. This positive perception has translated into near-universal adoption, particularly of generative text tools such as ChatGPT, which are now embedded into the academic workflows of most respondents. Faculty predominantly employ artificial intelligence for translation, paraphrasing, grammar refinement, and drafting tasks, applications that directly address the linguistic and practical challenges of conducting research in a bilingual academic environment.

However, the pattern of adoption also reveals limitations. Most faculty rely on one or two tools, and their usage is concentrated in ideation, text production, and communication tasks, while advanced applications such as statistical analysis, coding, and visualization remain underexplored. This suggests a relatively shallow integration of artificial intelligence that prioritizes immediate functional needs over deeper, discipline-specific innovation. At the same time, faculty members dedicate significant weekly hours to artificial intelligence use, underscoring its centrality to research routines and raising questions about the risks of over dependence.

Barriers to effective adoption are substantial. Concerns about plagiarism, originality, and ethical violations represent the most widely cited obstacle, reflecting both global debates and the specific cultural and religious sensitivities of Libyan academia. Equally critical are the lack of training opportunities, poor infrastructure, limited Arabic language support, and the absence of official institutional guidelines, which leave researchers without clarity on acceptable practices. Despite these challenges, most faculty members report a strong positive impact of artificial intelligence on their research productivity, reinforcing the technology's potential when paired with the right institutional and ethical frameworks.

Overall, the study indicates that artificial intelligence adoption at the University of Zawia is at a transitional stage: widely embraced, but constrained by systemic gaps and ethical uncertainties. To advance artificial intelligence integration responsibly, universities must prioritize several measures: i) developing clear ethical and legal guidelines; ii) providing structured training and capacity-building programs; iii) investing in infrastructure and subsidized access to premium artificial intelligence tools; and iv) supporting the localization of artificial intelligence applications with Arabic language capabilities. By implementing these strategies, the University of Zawia can strengthen AI's role not only as a functional aid but as a catalyst for high-quality, innovative, and ethically sound research, setting a precedent for higher education institutions across Libya and the broader Middle East and North Africa region.

This study has several limitations. First, it focuses on a single institution, which limits the generalization of the findings across Libya. Second, it relies primarily on self-reported data, which may be influenced by personal perceptions or underreporting of ethical challenges. Future research should expand to multiple

universities, incorporate longitudinal designs to track adoption over time, and complement survey data with observational or experimental approaches. Comparative studies across countries in the region could also provide deeper insights into how cultural, infrastructural, and policy contexts shape artificial intelligence adoption in higher education.

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Author contribution

Majdy Kasheem, Mowafg Masuwd: Writing-Preparation of original manuscript, **Najimudin Shalghoum, Najeeb Yahya:** Conceptualization, Methodology, **Abraheem Alriteemi, Mahmoud Abdullah:** Visualization, Investigation, Improve Content, **Fatima Alsaeh, Safa Alrumayh:** Data accuracy and analysis, Improve Language.

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The data and the grammatical structure in this article have been validated and verified by English language experts and no AI-generated sentences are included in this article.

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