

Transforming Bangladeshi Academia with AI: Usage Areas, Platforms, and Innovative Solutions

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ABSTRACT

Artificial intelligence (AI) has emerged as a transformative force in higher education, reshaping academic practices globally. In the ever-evolving digital landscape in Bangladesh, AI is one of the driving forces in higher education, which offers many benefits to stakeholders involved in higher education, including personalized learning, providing prompt feedback, and automating administrative tasks. This study aims to explore the use of artificial intelligence (AI) in academia by identifying its key usage areas, evaluating the platforms utilized for its implementation, and examining scientific and technological solutions that facilitate its integration to foster effective and sustainable AI practices in educational institutions. The study applied stratified random sampling techniques to select 605 respondents for the study. Analyses such as missing values, normality, linearity, demographics, and Statistical Package for Social Science (SPSS) were used for descriptive analysis. The findings reveal that AI is predominantly utilized in education (45.8%) and research (34.5%), with limited applications in administration (4.0%), and Google AI and OpenAI are the most frequently used platforms (over 32% each). Google Scholar is the primary resource among AI tools (40%). However, a significant portion (20.8%) of respondents do not use any tools, highlighting opportunities for broader awareness and adoption of AI resources in academic work. The study's findings offer valuable insights into the personalized utilization of AI by stakeholders, providing significant knowledge to facilitate the comprehensive application of AI in higher education in Bangladesh, particularly for the benefit of educators and policymakers.

1. Introduction

Education forms the foundation of a nation's success, and higher education is pivotal in ensuring its enduring growth and advancement. Contemporary higher education is undeniably undergoing profound and dynamic transformations driven by digital technology. This evolution compels institutions to continually develop and generate innovative tools and devices to meet their stakeholders' diverse and evolving needs (Ruiz et al., 2023). In addition, humanity has experienced three industrial revolutions and is now in the midst of the fourth. This latest revolution encompasses significant advancements like artificial intelligence, the Internet of Things, big data analytics, cloud computing, 3D printing, adaptive manufacturing, robotic systems, augmented reality, and blockchain technology (David et al., 2022). Among them, AI has increasingly captured interest and been the subject of research across various fields (Talukder & Sarkar, 2023), including higher education. AI in Education is huge, supporting adaptive learning, automated grading, research, chatbots, virtual assistants, and language learning. Examples of AI tools like ChatGPT help students and teachers with tutoring and administrative support by smoothing the way in many educational processes. Accompanying these developments, the full potential of artificial intelligence (AI) is realized in higher education. AI significantly reduces the time required for administrative and repetitive tasks, allowing educators to concentrate on core responsibilities such as teaching and research. Furthermore, it plays a pivotal role in fostering a sustainable future for education by advancing research and enhancing outreach (Jan et al., 2023; Berchin et al., 2021). In Bangladesh, the integration of AI into higher education is yielding substantial benefits. AI-driven intelligent tutoring systems and adaptive learning environments are markedly enhancing educational

experiences, positioning Bangladesh as a more competitive player globally. In this context, (Latif et al., 2021) and Andaleeb (2022) provide insightful analyses. The usage of AI in Bangladesh's higher education sector demands attention to its unique conditions and challenges. Achieving effective utilization requires strong collaboration among students, educators, and administrators. However, research on AI usage in Bangladeshi higher education is limited, creating a critical gap that this study aims to fill. This study explores the use of artificial intelligence (AI) in academia by identifying its key usage areas, evaluating the platforms utilized for its implementation, and examining scientific and technological solutions. By examining these dynamics, this research offers insights into building an AI-enabled educational environment that supports sustainable development and improves educational outcomes in Bangladesh (Shirin, 2022).

2. Literature Review

Integrating AI into academia enhances teaching, learning, and administration, enabling personalized and efficient educational experiences. (Alam & Mohanty, 2023) Emphasize the significance of intelligent tutoring systems, adaptive learning environments, and predictive analytics in transforming traditional pedagogical methods. These advancements align with global trends and highlight the need to identify and utilize key areas where AI can contribute meaningfully. In Bangladesh, the role of AI in fostering educational sustainability and providing targeted assistance to students is acknowledged, but systematic adoption remains a challenge due to resource and infrastructural limitations (Sultana & Faruk, 2024).

Scientific and technological advancements underpin the successful integration of AI in higher education. Developing digital efficacy among students and educators is crucial for fostering autonomous learning and seamless AI adoption (Wang & Li, 2024). Infrastructure and professional development investment is necessary to overcome technical and operational challenges (Karimi & Khawaja, 2023). Despite resource constraints, Bangladeshi educators demonstrate strong enthusiasm for AI-driven solutions, highlighting the need for localized interventions to address unique challenges and leverage AI's potential to bridge resource gaps (Shirin, 2022)

Ethical considerations are fundamental to responsible AI adoption in academia. Data privacy, algorithmic biases, and the lack of comprehensive ethical guidelines present significant challenges (Al-Zahrani & Alasmari, 2024; Cui & Alias, 2024). Establishing robust ethical frameworks is essential for building trust and ensuring responsible AI usage. Additionally, AI's impact on student attitudes and perceptions necessitates inclusive practices and targeted professional development programs to prepare stakeholders for effective integration (Kumar et al., 2023; Slimi, 2023). The benefits of AI in higher education are well-documented, including enhanced teaching quality, personalized learning, and streamlined administrative processes. AI aligns educational outcomes with industry needs, thereby improving career opportunities for graduates (Chatterjee & Bhattacharjee, 2020; Slimi & Carballido, 2023).

Localized strategies are vital for maximizing AI's potential in Bangladeshi higher education. Policymakers must prioritize ethical considerations, invest in infrastructure, and support capacity-building initiatives to ensure sustainable AI practices (Karimi & Khawaja, 2023). Educator readiness, bolstered by targeted professional development, is critical for successful implementation. Inclusive policies that address cultural and linguistic diversity are necessary to provide equitable access to AI technologies. These measures will bridge regional disparities and foster AI's effective and sustainable integration in educational institutions.

3. Research Methodology

This study employs a quantitative research method to explore the utilization of artificial intelligence (AI) in higher education in Bangladesh, focusing on usage areas, platforms, and scientific and technological solutions. Conducted from June to August 2024, the research will be carried out in five major metropolitan cities: Dhaka, Rajshahi, Khulna, Chittagong, and Rangpur, representing diverse academic regions. The study targets students and teachers from public and private universities, with a stratified random sampling method used to select 605 participants across geographic regions, institution types, and academic roles. Data are collected using a pre-tested survey questionnaire distributed physically and digitally, and analyzed with SPSS version 25 through descriptive and inferential statistics. Ethical considerations include informed consent, confidentiality, and institutional review board approval.

4. Results and discussion

4.1. Socio-demographic profile of the respondents

This survey, conducted with 605 respondents nationwide, evaluated the Socio-demographic characteristics of participants, including age, gender, education, profession, field of study, and institutional affiliation.

Table 1 presents the demographic analysis of the sample, comprising 605 respondents, which reveals several key characteristics. A significant majority (61.0%) are aged 18 to 25, indicating a youthful demographic primarily consisting of undergraduate students. Gender distribution shows a slight male majority, with 56.4% males and 43.6% females, suggesting a balanced representation of perspectives. In terms of educational qualifications, most respondents hold a Bachelor's degree (59.7%), while a smaller percentage possess a Master's (35.7%) or doctoral degree (3.6%). The academic discipline breakdown highlights a predominance of students in Business Studies (49.8%), followed by Engineering and Technology (17.9%) and Sciences (11.2%), reflecting a strong focus on business-related fields. Additionally, 55.5% of the respondents are from public universities, indicating a slightly higher representation than private universities (44.5%). This demographic profile provides essential context for understanding the study's focus on technology adoption in higher education, as it captures the characteristics and experiences of a diverse group of students.

Table 1. Socio-demographic profile of the respondents

Variable	Category	Frequency	Percentage
Age Group	18-25	369	61.0
	26-35	179	29.6
	36-45	42	6.9
	46-49	8	1.3
	50-59	5	0.8
	8.00	2	0.3
Gender	Male	341	56.4
	Female	264	43.6
	Total	605	100.0
Educational Qualification	Bachelor	361	59.7
	Master's	216	35.7
	PhD/Doctoral Degree	22	3.6
	Others	6	1.0
Academic Discipline	Arts	26	4.3
	Social Science	50	8.3
	Business Studies	301	49.8
	Engineering and Technology	108	17.9
	Sciences	68	11.2
	Computer Science and Information Technology	35	5.8
	Law and Legal Studies	13	2.1
	Agriculture	4	0.7
Types of Institutes	Public University	336	55.5
	Private University	269	44.5
	Total	605	100.0

Sources: Authors own creation

4.2. What areas and activities do you use in artificial intelligence (AI) in your academic work?

Table 2 and figure 1 illustrate AI's various usage areas and activities in academic work, highlighting its significant role across different domains. Most respondents (45.8%) indicated that AI is primarily utilized in education, enhancing personalized learning experiences, automating grading, and supporting intelligent tutoring systems. Research follows closely, accounting for 34.5%, as AI tools facilitate data analysis, literature reviews, and hypothesis generation, thereby improving research efficiency. In contrast, only 4.0% of respondents noted its application in administration, which may involve streamlining processes such as scheduling and admissions. A combined 11.4% of participants recognized AI's impact in research and education, reflecting the interconnectedness of these areas. Furthermore, a small segment (3.1%) stated that AI is utilized across all domains mentioned. Overall, the data underscores the transformative potential of AI in enhancing educational practices and research productivity, while indicating areas for further growth, particularly in administrative applications.

Table 2. Usages, areas, and activities of AI in academic work

Usage Areas	Frequency	Percent
Research	209	34.5
Education	277	45.8
Administration	24	4.0
Others	7	1.2
Research and Education	69	11.4
All of them	19	3.1
Total	605	100.0

Source(s): Authors own creation

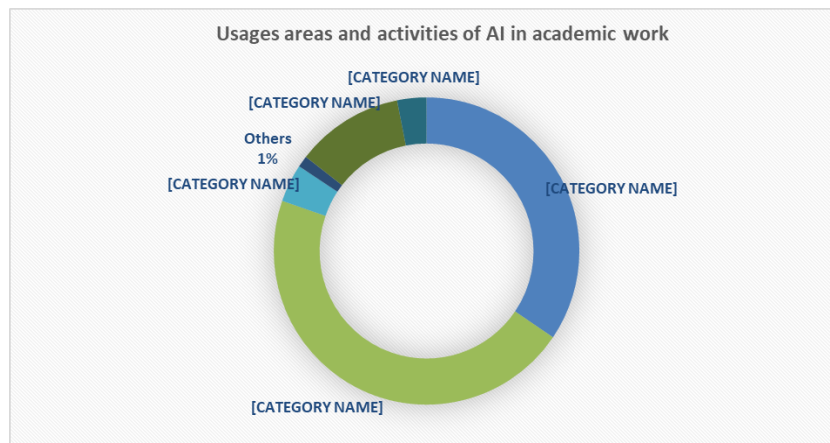


Figure 1. Usages areas and activities of AI in academic work

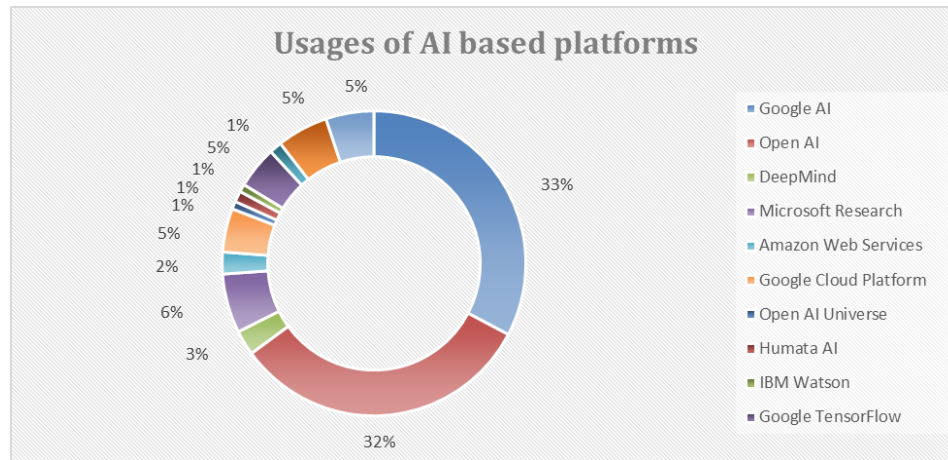
4.3. What Artificial Intelligence (AI) based platforms are you familiar with?

Table 3 and Figure 2 present data on the usage of various AI tools and platforms among respondents, highlighting the popularity of Google AI and Open AI, which account for 32.7% and 32.2% of responses, respectively. These two platforms are nearly tied as the most frequently used resources for AI applications in academic work. Microsoft Research follows with 6.3%, while other platforms like Google Cloud Platform (4.6%) and Google TensorFlow (4.5%) are also utilized, though to a lesser extent. DeepMind and IBM Watson have relatively low usage rates of 2.6% and 0.8%, respectively. Additionally, 5.5% of respondents use other unspecified tools, and 5.1% do not use any AI tools. This distribution indicates a strong preference for widely recognized platforms such as Google and OpenAI in the academic community, while also suggesting opportunities for increased adoption and awareness of other available AI tools.

Table 3. Usages of AI-based platforms

AI Tool/Platform	Frequency	Percent
Google AI	198	32.7
Open AI	195	32.2
DeepMind	16	2.6
Microsoft Research	38	6.3
Amazon Web Services	14	2.3
Google Cloud Platform	28	4.6
Open AI Universe	5	0.8
Humata AI	7	1.2
IBM Watson	5	0.8
Google TensorFlow	27	4.5
Open AI Gym	8	1.3
Others	33	5.5
I do not use any of them	31	5.1
Total	605	100.0

Source(s): Authors own creation

**Figure 2.** Usages of AI based platforms

4.4 What technological solutions do you use to assist you in your scientific work?

Table 4 and Figure 3 showcase the usage of various AI tools in scientific and technological solutions, revealing a clear preference for Google Scholar, which is utilized by 40.0% of respondents. This indicates its prominence as a primary resource for academic research and information retrieval. ResearchGate follows with 12.2%, suggesting its value as a networking and publication platform among researchers. Other tools, such as Scopus (5.8%), Zotero (5.5%), and EndNote (4.0%), are also used, albeit to a lesser extent, highlighting the diverse range of tools available for academic work. Conversely, 20.8% of respondents reported not using any of these platforms, indicating potential areas for outreach and education about available resources. Overall, the data underscores the dominant role of Google Scholar in the academic landscape while pointing to various supplementary tools that researchers may leverage for their scientific and technological inquiries.

Table 4. Usages of AI Tools

AI Tool/Platform	Frequency	Percent
Zotero	33	5.5
Scopus	35	5.8
QuickCales	10	1.7
Zenodo	9	1.5
EndNote	24	4.0

ReadCube	14	2.3
ResearchGate	74	12.2
Google Scholar	242	40.0
F1000Prime	1	0.2
arXiv	10	1.7
SJ Finder	5	0.8
Litmas	7	1.2
Others	15	2.5
I do not use any of them	126	20.8
Total	605	100.0

Source(s): Authors own creation

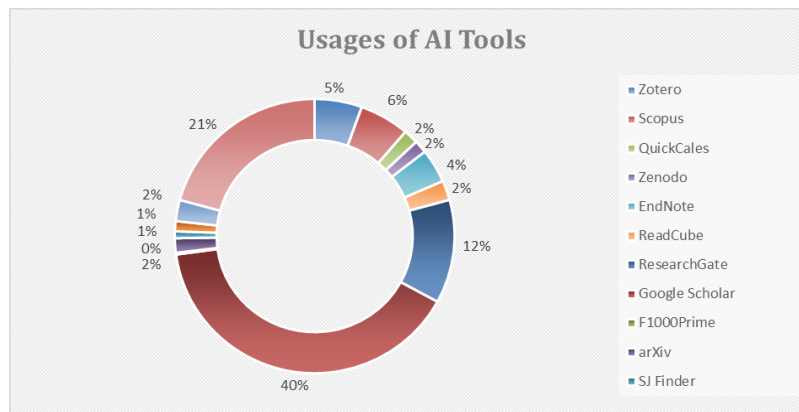


Figure 3. *Usages of AI Tools*

5. Conclusion

The utilization of artificial intelligence (AI) in academia represents a transformative shift, influencing pedagogical strategies, research methodologies, and administrative functions. The findings indicate that artificial intelligence is primarily used in education and research, with minimal integration in administrative tasks. This suggests that the academic community sees AI as a valuable tool for enhancing learning experiences and supporting research activities, such as data analysis, literature reviews, or content generation. However, the underutilization of AI in administrative functions points to a missed opportunity for improving institutional efficiency and decision-making processes. The frequent use of platforms like Google AI and OpenAI demonstrates a growing reliance on mainstream and accessible technologies, reflecting users' trust and familiarity with these tools. Google Scholar, emerging as the leading AI-based resource, highlights the importance of easily accessible academic databases in supporting research productivity. However, a notable portion of individuals not using any AI tools suggests a gap in awareness, accessibility, or digital literacy. This underuse signals the need for targeted training, resource dissemination, and capacity-building efforts to encourage more inclusive and effective integration of AI across all areas of higher education. The findings, therefore, underscore both the current strengths and the areas needing development for responsible and widespread adoption of AI in academia. As AI continues to evolve, its integration in academic environments must be guided by evidence-based policies, interdisciplinary collaboration, and continuous evaluation to maximize its benefits and sustain long-term academic progress.

5.1. Limitations and Future Research Directions

Despite the comprehensive scope of this research, certain limitations must be acknowledged. Firstly, the study relies on existing literature and empirical evidence, which may not fully capture the dynamic and rapidly evolving nature of AI adoption in academia. Secondly, variations in technological infrastructure and institutional readiness across different regions and educational institutions pose challenges in generalizing the findings. Furthermore, the

study does not extensively explore the long-term psychological and pedagogical implications of AI-driven education, which could be a crucial area for further exploration. Future research should focus on empirical investigations assessing AI adoption's real-time impact in diverse academic settings. Longitudinal studies exploring the sustained effects of AI on student learning outcomes, faculty adaptation, and institutional efficiency would offer more profound insights into its transformative potential. Additionally, interdisciplinary research integrating AI with educational psychology, cognitive sciences, and ethics can provide a more holistic understanding of its implications. Policymakers and academic stakeholders should prioritize the development of standardized frameworks to regulate AI implementation, ensuring that ethical considerations, data security, and inclusivity remain at the forefront. Furthermore, exploring AI's role in bridging educational disparities, especially in underrepresented regions, could enhance its equitable integration across global academic institutions.

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