

Utilization of Artificial Intelligence Tools for Research Writing by Academics in Universities in Katsina State, Nigeria

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Abstract

This paper investigates the utilization of AI Tools for Research writing by Academics of Universities in Katsina State, Nigeria. The objectives of the study are to among others identify the types of artificial intelligence tools for research that are being used by academics in Universities in Katsina State; to find out the various publishing tasks carried out using AI tools for research by academics in Universities in Katsina State etc. The Universities include Umaru Musa Yar'adua University, Katsina, (UMYUK); Federal University Dutsinma, (FUDMA) and Al Qalam University (AUK), Katsina respectively. Quantitative research methodology and survey design were adopted for the research. The questionnaire was used to collect data for the study. The population of the study comprised all the academic staff in the aforementioned universities in Katsina State. The subjects of the study were drawn using a cluster sampling technique. The study found that Rytr AI, Quillbot AI, Elicit AI, Research Rabbit, ChatPDF, ChatGPT Scite, Trinka, Grammarly, and Semantic Scholar respectively were the types of AI tools commonly utilized by academics in universities in Katsina State. It was also discovered that publishing tasks such as information retrieval, bibliography and citation management, and Plagiarism prevention were the tasks carried out using AI tools by academics. It was therefore recommended University librarians should prioritize acquisition and subscription to the variety of AI tools as veritable resources in their respective libraries. It is therefore concluded that AI tools should be seen as a supportive apparatus rather than a replacement for human innovative thinking in the research process cycle.

Keywords: *Utilization; Artificial Intelligence; Artificial Intelligence Tools; Research; Academics*

Introduction

Globally, the rapid progress in Artificial Intelligence (AI) has become a significant factor in transforming educational approaches, especially in research endeavors. Research is one of the primary functions of academics in universities, research centers, colleges, and polytechnics. It is somewhat considered as a very complex and challenging enterprise, (Pitrianti and Gasanti, 2020). The significant advancement of AI in research has initiated a radical paradigm shift and perspectives within the academic community. This shift is characterized by a heightened level of responsiveness and innovation among researchers and educators. It has further led to the optimization of research practices and instructional methods to better align with the specific and nuanced requirements of individual researchers and educators. By and large, this transformative surge has not only revolutionized how research is conducted but also how knowledge is imparted, emphasizing a more tailored and effective approach to meet the diverse needs present in the academic landscape. Fitria, (2021) posits that AI could improve the quality of a written product; and improve writing skills (Mediyawati et al., 2021). This development motivates many scholars to deploy and leverage AI tools in various aspects of research to harvest its benefits and diverse opportunities.

Artificial intelligence can be defined as an intelligence that imitates the human brain and refers to the set of technologies that implement various human competencies, including cognition and thinking, problem-solving, prediction and judgment, and system optimization, using technologies from areas of machine learning, big data, and natural language processing (Poole and Mackworth 2010). In a simpler term, Artificial Intelligence (AI) is used to describe the use of machines to mimic human intelligence to carry out human-typical tasks. For instance, artificial neural networks, of which “deep learning models” are a subset, aim to simulate the structure and behavior of the human brain. (Christou, 2023). AI and more specifically deep learning models (e.g., GPTs) are helpful and commonly used in conducting literature reviews because of their programming to automatically identify key concepts and themes in the literature and to summarize large bodies of information (Watson et al., 2022). In addition to generating research questions and suggesting related research topics, deep learning models can be used to help with literature reviews in other ways (Mathew, 2023).

In Nigerian universities, academics bear a significant responsibility in advancing the quality of research endeavors through the application of a diverse array of sophisticated methodologies, and cultural and foundational principles essential for addressing societal challenges effectively and disseminating research findings. The process of research composition entails meticulous attention to detail, intertwining comprehensive research, methodical argumentation, and coherent articulation to enrich scholarly dialogue. To establish a robust foundation for effective research, academics need to deeply engage with fundamental concepts essential for research endeavors. This involvement encompasses formulating precise problem statements or research origins (Maiorana & Mayer, 2018) and creating engaging abstracts that concisely outline the central ideas, methodologies, and outcomes of the study (Altmäe et al., 2023).

Conducting thorough literature reviews is equally vital as it enables academics to position their work within the current knowledge landscape and pinpoint areas where their research can make meaningful contributions (Singh & Lukkarila, 2017). These and many more essential research activities are now facilitated with the deployment and use of a variety of AI tools. These AI tools are many and varied depending on the research tasks of scholars who will be using them. For instance, Marshall and Wallace (2019) list several notable AI-based tools that are in use for systematic review automation: RobotSearch and RCT Tagger for filtering RCTs; Thalia for the conceptual search and indexing of PubMed articles; RobotAnalyst and SWIFT-Review for obtaining topic-modeled search results; and ExaCT, RobotReviewer, and NaCTeM for data mining. Other important AI tools for research include but are not limited to the following: semantic Scholar, Trinka, Grammarly, Scite ai, wizdom ai, Mendeley, copyLeaks, Ithenticate, etc., (Abdul Razack et al, 2021)

Moreover, by utilizing AI tools, scholars can effectively manage tasks such as creating concise titles, developing engaging abstracts, performing thorough literature reviews, and upholding academic integrity by accurately citing and referencing sources. These AI-driven resources play a pivotal role in various academic research domains, encompassing descriptive, correlational, quasi-experimental, and experimental research, along with their institutional significance as highlighted by Alharbi (2023) and Dale & Viethen (2021). It is against this backdrop that this study investigates the utilization of Artificial Intelligence Tools for Research by Academics in Universities in Katsina State, Nigeria.

Research Problem

Artificial Intelligence (AI) tools have become integral to academic research writing, by revolutionizing the landscape of universities and education. This convergence between AI and academic research is transformative, as both entities mutually enhance and reshape each other. The integration of AI tools in academic research writing offers scholars a transformative capacity that harmoniously combines various aspects such as producing, codifying, transmitting, evaluating, renovating, teaching, and learning knowledge across academic disciplines. These AI tools enable academics to effectively visualize the connections among diverse papers during literature reviews and facilitate the identification of derivative works by other researchers, as indicated by Marzuki et al. (2023). AI and more specifically deep learning models (e.g., GPTs) are helpful and commonly used in conducting literature reviews because of their programming to automatically identify key concepts and themes in the literature and to summarize large bodies of information (Watson et al., 2022). In addition to generating research questions and suggesting related research topics, deep learning models can be used to help with literature reviews in other ways (Mathew, 2023). Regrettably, AI tools are considered critical elements in bolstering research output, so far, no systematic effort has been made to investigate their utilization for research as well as the possible challenges surrounding their utilization by academics in Universities in Katsina State. To bridge these research gaps, this study was designed to investigate the utilization of AI tools for research writing by the Academics of universities in Katsina State, Nigeria.

Research Questions

This study was guided by the following research questions:

1. What types of artificial intelligence tools for research are used by academics in Universities in Katsina State?
2. What scholarly publishing tasks do the academics of universities in Katsina State use AI tools to carry out?
3. What challenges are faced by academics while using artificial intelligence tools for scholarly communication in Universities in Katsina State?

Literature Review

The emergence of technology and its investments in the education sector have increased, with AI tools that are now being widely explored to ease several research writings and their related aspects. AI is being used to improve motivation, engagement, and satisfaction. The evolution of research writing in the current age of technological proliferation cannot be dissociated from the rapid advancement of digital tools. Haleems et al. (2022) posited that this shift is precipitated by an increasing fusion of digital utilities within the educational realm, effectively performing traditional pen-and-paper approaches into far more creative and dynamic pedagogical experiences. Garlinska, et al. (2023) averred that virtual classrooms, online workshops, and cloud-based writing tools, are revolutionizing the domain of writing instruction. These AI tools offer functionalities such as real-time feedback, collaborative editing, and plagiarism checks. Such features not only enhance the writing research acumen of academics but also ‘inspire them to engage in critical thinking and independent reasoning’ (Nykyropets, 2023). By and large, Academics are emboldened to publish their work in public forums, nurturing their confidence and writing abilities, such tools also promote peer review and feedback mechanisms, fostering a sense of community and collaborative learning (Umamah and Cahyono, 2022).

Types of Artificial Intelligence Tools for Research

Nowadays, several AI tools are available online and they can be bought online. The AI tools have as their main function to help individuals improve their research writing ability. Artificial intelligence (AI) tools have become increasingly sophisticated in recent years, providing new ways for academics to improve their research writing ability. The use of artificial intelligence (AI) in academic writing can be divided into two broad categories: those that assist authors in the writing process; and those that are used to evaluate and assess the quality and validity of written work, (Golan et al, 2023). They specifically outlined semantic scholar, penelope.ai, elicit, Writefull, CoSchedule Headline Analyzer, Quillbot; Wordtune; ChatGPT; Cohere, and many others as the types of AI tools used for the varied aspects of research writing, Bhutoria (2022) & (Golan et al, 2023).

According to O'Neill & Russel, (2019), Grammarly is one of the artificial intelligence tools that can be used in an English as a Second Language (ESL) writing lesson. It is a proofreading software that can be used to detect grammatical mistakes in

papers. It corrects spelling, punctuation, and synonyms, and detects plagiarism. Grammarly software and other computer-based programs are increasingly being used to help academics write better, and acquire and develop writing abilities that are difficult to master through traditional instruction.

Other AI tools, Hemingway Editor, and Coschedule headline analyzer are tools that specifically help with manuscript title creation. It can analyze inputted headlines and suggest modifications based on word balance, length, and structure, the former also analyzes written content by identifying complex sentences and offers suggestions for simplification. It also highlights passive voice and adverbs, encouraging writers to use active voice and more descriptive language. Additionally, ProWritingAid, REF-N-WRITE, and Quillbot offer a range of features, including grammar and spell-checking, a contextual thesaurus, and a readability analyzer. It also provides feedback on writing styles, such as sentence variation and use of cliches. These AI tools have the potential to revolutionize the memory jogger for both academics and casual authors. They can assist in identifying errors that would otherwise go unnoticed and provide guidance for improvement. As a result, these tools can lead to more polished and effective scholarly communication.

Furthermore, Williams, (2019) believes that AI personal assistants like Siri, Alexa, Cortana, and Google Assistant have changed how academics expect to get answers to their questions. Scholarly communication was safe and secure with Google Assistant database search more secure with a complex search strategy. Jhaji et al (2024) stated that Writefull offers comprehensive and accurate language feedback that enhances the quality of the research paper. It provides a set of AI widgets, such as a Paraphraser, Abstract Generator, and Academizer, to assist academic writers and researchers.

Utilization of Artificial Intelligence Tools for Research

The utilization of artificial intelligence in research work is gaining traction. Academics have piloted artificial intelligence tools to review literature, check the efficacy of research papers, summarize findings in a few lines, and flag plagiarism (Heaven, 2018). It is worth noting that the role of AI seems wide-ranging specifically in the research writing context, but in the longer term, artificial intelligence could prompt unforeseen outcomes, potentially leading to a reframing of disciplines, modes, and methods of research output. Arguably, every skilled profession is in a state of evolution requiring continual learning, changing academic modes of interaction and writing, and role and career trajectories. However, with a high spirit of enthusiasm, artificial intelligence will not take away the relevance of academics but instead create new roles for them. For instance, a study by Tambunan et al. (2022) showed that using Grammarly improves academic grammar and punctuation. Grammarly AI analyzes the user's text and provides real-time suggestions for enhancing grammar, spelling, punctuation, clarity, engagement, and delivery. Kurniati and Fithriani (2022) found that Quillbot aided academics in developing better paraphrasing skills, which is a critical competency in academic research writing.

A study by Lam and Moorhouse (2022) found that worldTune effectively helped academics identify their research writing weaknesses, thereby promoting self-assessment and learning. This tool goes beyond simple grammar correction and delves into the stylistic elements of writing. In the same vein, ChatGPT is widely used in various fields in academia. The use of AI technologies such as ChatGPT in areas such as academic research, education, and access to knowledge has also been the subject of studies, (Livberber, 2023).

Challenges of Artificial Intelligence Tools Utilization

Artificial intelligence has the potential to bring many benefits to society, but it also raises some important issues that make its application and usage difficult among scholars in research writing. Some of the challenges of artificial intelligence tools as reported by different scholars are as follows: Wilson et al, (2017) in their survey of the top 1,000 firms in the US on AI implementation in their firms found that their biggest concern in the implementation of AI was the readiness and ability of staff to understand and work with these new solutions. This implies that the issue of the unavailability of skilled staff to implement these new techniques is quite disturbing. In a similar opinion, Hervieux & Wheatley (2021) argued that the inability rate of AI tools in scholarly communication by researchers is due to a lack of knowledge of these technologies. In the same vein, Kaushal and Yadav (2022) found that, despite the enormous advantages of PDFgear to text editing and enabling users to insert images, their main setback is easy to spot bugs in PDFgear.

Research Methodology

This study adopted a quantitative method with a descriptive survey design. This design was found most appropriate for this study because it intends to explore the opinions and experiences of academics on the utilization of AI tools for research writing in universities in Katsina State, Nigeria. The population of the study comprises all academic staff in the three (3) universities in Katsina State, Nigeria. The universities are Al-Qalam University (AUK), Katsina; Federal University Dutsinma (FUDMA); and Umaru Musa Yar'adua University Katsina (UMYUK), respectively. As obtained from the individual universities' registry by the researchers, there were 1,549 academic staff made up of 213 academic staff from AUK; 813 academic staff from FUDMA, and 523 academic staff from UMYUK respectively.

A cluster sampling technique was used to draw a sample size for this study. This is in recognition of the fact that the population of the study is very large and further divided into mutually exclusive groupings/clusters, and then selected randomly among the clusters to form a sample, (Simkus, 2022). In this case, the clusters are the various exclusive universities in Katsina State. To ensure equal representation from each cluster, proportionate simple random sampling was adopted to select respondents for the study. In all, a total of 311 academic staff were selected as a sample size using the Krejcie & Morgan (1970) table. Consequently, using Israel's (2003) formula, the sample size was distributed as follows: 43 academic staff from AUK; 163 academic staff from FUDMA, and 105 academic staff from UMYUK respectively. A self-developed structured

questionnaire titled “Academic Staff Utilization of Artificial Intelligence Tools for Research Writing” was used as an instrument for collecting data from academics.

Table 1: Population Distribution and Sample Size of the Study

S/N	University	Population	Proportionate sample size
1	A-Qalam University Katsina (AUK)	213	43
2	Federal University Dutsinma (FUDMA)	813	163
3	Umaru Musa Yar’adua University Katsina (UMYUK)	523	105
	Total	1549	311

Data Analysis and Discussion

Out of the 311 copies of the questionnaire distributed to the academic staff drawn from AUK; FUDMA and UMYUK, a total of 270 copies were duly completed, returned, and found usable for this study. At the AUK, 35 copies were retrieved; 145 copies were also retrieved from FUDMA and 90 copies were retrieved from UMYUK respectively. This gave the response rate of (86.8%). The high response rate was made possible due to the research assistants employed by the researchers in each of the universities studied. The data collected for this research were presented and analyzed using frequency distribution tables and simple percentages. The analysis of the responses of the respondents is presented below:

Type of Artificial Intelligence Tools Used by Academic Staff of Universities in Katsina State, Nigeria

To find out the types of AI tools used for scholarly communication by academic staff of universities in Katsina State, Nigeria, a research question was asked concerning this, and subsequently, the respondents were asked to indicate as many types of AI tools they used in their respective universities.

Table 2: Type of Artificial Intelligence Tools Used by Academic Staff of Universities in Katsina State, Nigeria

S/n	Type of Artificial Intelligence Tools Used	Universities studied					
		AUK		FUDMA		UMYUK	
		F	%	F	%	F	%
1	Rytr	5	14.3	105	72.4	78	86.7
2	Writesonic	7	20.0	4	2.8	12	13.3
3	CopyAI	28	80.0	121	83.4	11	12.2
4	QuillBot AI	28	80.0	132	91.0	79	87.8
5	Gocharlie	5	14.3	8	5.5	67	74.4
6	Write full	3	8.6	18	12.4	76	84.4
7	Consensus AI	2	5.7	124	85.5	11	12.2
8	Elicit AI	23	65.7	119	82.1	88	97.8
9	Research Rabbit	27	77.1	121	83.4	86	95.6
10	SciSpace	2	5.7	15	10.3	3	3.3
11	InstaText	2	5.7	18	12.4	5	5.6
12	ChatPDF	31	88.6	133	91.7	79	87.8
13	ChatGPT	29	82.9	141	97.2	82	91.1
14	Site	27	77.1	122	84.1	79	87.8
15	Trinka	29	82.9	133	91.7	81	90.0
16	Grammarly	32	91.4	139	95.9	78	86.7
17	Semantic Scholar	28	80.0	112	77.2	82	91.1
18	OpenRead	3	8.6	23	15.9	3	3.3
19	Scholarly	2	5.7	32	22.1	2	2.2
20	Paper Digest	7	20.0	16	11.0	7	7.8

Table 2 above outlines the various types of AI tools used by academic staff for research writing in universities in Katsina State. From the table, it was revealed that out

of the 20 AI tools outlined, only 11 of them were found to be commonly used by the academic staff of universities in Katsina State, Nigeria with the highest percentage scores of over 70% respectively. The AI tools include the following: Rytr AI, Quillbot AI, Elicit AI, Research Rabbit, ChatPDF, ChatGPT Scite, Trinka, Grammarly, and Semantic Scholar respectively. According to Watson (2022) AI and more specifically deep learning models are helpful and commonly used in conducting literature reviews because of their programming to automatically identify key concepts and themes in the literature. The findings corroborate those of Monika et al (2023). They found that Most of the researchers accepted that they used AI tools in writing such as ChatGPT, Grammarly, Zotero, etc, and many have also confirmed that they do not completely rely on AI tools for their research.

However, CopyAI was found to be only used by the majority of academic staff at AUK and FUDMA. While surprisingly also, Gorchalie AI was only being used with the highest percentage score of over 70% at UMYUK. This variation indicates the diversity of the intent, functions, and purposes of various types of AI for scholarly engagement in our universities. It further demonstrates the fact that the choice of AI tools is directly dependent on their availability, accessibility, and above all the information needs of the scholar.

Various publishing tasks were carried out using AI tools by academics of Universities in Katsina State, Nigeria.

This is aimed at identifying the various publishing tasks that were carried out using AI tools by academic staff of universities in Katsina State, Nigeria. To achieve this, a list containing various publishing tasks was outlined for the respondents to indicate as many publishing tasks they use AI tools to perform in their respective universities as shown in Table 3 below:

Table 3: Various publishing tasks carried out using AI tools by academics of Universities in Katsina State.

S/n	Various Publishing Tasks carried out using Artificial Intelligence Tools	Universities studied					
		AUK		FUDMA		UMYUK	
		F	%	F	%	F	%
1	Research Problem formulation	25	71.4	97	66.9	67	74.4
2	Literature Searching	10	28.6	120	82.8	87	96.7
3	Information Retrieval	28	80.0	132	91.0	67	74.4
4	Theoretical Framework Modelling	11	31.4	122	84.1	23	25.6
5	Manuscript Preparation	10	28.6	112	77.2	88	97.8
6	Bibliography and Citation	32	91.4	133	91.7	78	86.7

	Management						
7	Target journal selection	13	37.1	25	17.2	79	87.8
8	Plagiarism Prevention	29	82.9	120	82.8	68	75.6
9	Peer review and quality assessment	25	71.4	133	91.7	58	64.4
10	Editorial workflow	27	77.1	99	68.3	67	74.4

Table 3 above outlines some of the publishing tasks carried out using AI tools for research writing by academic staff in the universities studied. A cursory glance at the table showed that out of the 10 outlined publishing tasks that can be carried out using the AI tools, only 3 of the various publishing tasks were found to be commonly carried out using the AI tools by the academic staff of universities in Katsina State, Nigeria with the highest percentage scores of over 70% respectively. These publishing tasks carried out include Information retrieval, Bibliography, citation management, and Plagiarism prevention respectively. These findings did not come as a surprise because the whole task of research writing is centered on literature search and sourcing, referencing, and assurance of research integrity.

However, the use of AI tools for Research problem formulation, framework modeling, Peer review, and quality assessment, as well as editorial workflow was found to be the various publishing tasks carried out by the majority of academics staff at AUK and UMYUK respectively. Surprisingly, Target journal selection was found to be the only publication carried out with AI tools with the highest percentage score of over 70% at UMYUK. These findings are in tandem with the study of Rao et al (2019). They found that *Grammarly*, like some other products has extensively been used in academic settings and scholarly research with positive feedback

Challenges faced by academics while using artificial intelligence tools for scholarly communication in Universities in Katsina State, Nigeria

To find out the challenges faced by academics while using AI tools for scholarly communication in universities in Katsina State, Nigeria, a research question was asked in this regard, subsequently, the respondents were instructed to indicate as many challenges they encounter while using AI tools as possible in their respective universities. Table 4 portrays the responses of the academic staff:

Table 4: Challenges faced by academics while using artificial intelligence tools for scholarly communication in Universities in Katsina State, Nigeria

S/n	Challenges faced by academic staff	Universities studied					
		AUK		FUDMA		UMYUK	
		F	%	F	%	F	%
1	It creates possible plagiarism	25	71.4	97	66.9	67	74.4
2	Reduces authenticity and originality of scholarly writing	10	28.6	120	82.8	87	96.7
3	It limits creativity and critical thinking	28	80.0	132	91.0	67	74.4
4	It cannot generate new ideas	11	31.4	122	84.1	23	25.6
5	Lack of information literacy skills	10	28.6	112	77.2	88	97.8
6	Lack of awareness and knowledge of AI	32	91.4	133	91.7	78	86.7
7	Cost of AI tools	13	37.1	25	17.2	79	87.8
8	Ethical issues	29	82.9	120	82.8	68	75.6
9	Lack of university-wide policy on AI	25	71.4	133	91.7	58	64.4
10	Poor computer literacy skills	27	77.1	99	68.3	67	74.4
11	Poor campus-wide internet connectivity	32	91.4	143	98.6	87	96.7

From Table 4 above, it is clear that out of the 11 challenges of using the AI tools listed, 4 of them were found to be the common challenges faced by the academic staff of the universities in Katsina State, Nigeria with the highest percentage scores of over 70% response scores respectively. These challenges include limited creativity and critical thinking, lack of awareness of knowledge of AI, ethical issues, and poor campus-wide internet connectivity respectively. However, reducing the authenticity and originality of scholarly writing, and lack of information literacy skills were found to be a challenge faced by the majority of academic staff at FUDMA and UMYUK with the highest percentage score of over 70% respectively, also poor computer literacy skills were found to be a challenge faced by majority academic staff at AUK and UMYUK with the highest percentage of over 70% response scores respectively. This variation may be attributed to the inability of the universities studied to invest in the digital workforce or

the inability to equip their academic staff with the necessary facilities. It might also be attributed to a negative attitude towards digital literacy by academics.

Conclusion

The use of AI tools in an academic environment has undoubtedly proved to be an invaluable experience in promoting and facilitating the research process. Based on this development, it can be concluded that the utilization of AI tools has now become the new normal in our scholarly endeavor. Therefore, it should be seen as a supportive apparatus rather than a replacement for human innovative thinking in the research process cycle. It is therefore our hope and expectation that academics will adhere to the rules of engagement in the use of AI tools in the conduct of their research activities to maximally harness and exploit the opportunities offered by this inevitable technology. The Internet services should be strengthened within the university campuses to enhance as well as maximize the use of AI tools for research writing in the universities in Katsina State.

Recommendations

Arising from the findings of the study, it is therefore recommended that:

1. There is a need an extensive training and education on the types of AI tools and their functionalities in research writing to be organized for the academics in universities in Katsina State. This will assist in introducing the scholars to various types of AI tools that will complement their primary function.
2. Universities should as a matter of policy embrace the use of AI tools for teaching, learning, and research by ensuring that these tools are adequately made available within the university
3. University librarians should prioritize acquisition and subscription to the variety of AI tools as veritable resources in their respective libraries.

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