ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

THE IMPACT OF AI TOOLS ON THE LANGUAGE OF UNIVERSITY STUDENTS IN ISLAMABAD

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Abstract
The prevalence of AI use among university students is growing daily; even graduate and undergraduate students prefer AI tools like ChatGPT for academic purposes. Much research has been conducted on the usage of AI from different perspectives in different countries; however, the impact of AI on students' language in Pakistan is lacking. To address this issue, this research aims to analyze the impact of AI tools on the linguistic choices of university students in Islamabad. A qualitative research method was employed to collect data from 40 graduate and undergraduate students' assignments at five private universities in Islamabad. A software tool, Text Inspector by Stephan Bax, was utilized for textually analyzing the human-generated and AI-assisted assignments. Findings revealed that using AI tools, students can improve their linguistic choices such as lexical diversity, vocabulary sophistication, formatting and tone, hedging and certainty, and cohesive devices. Furthermore, the results show that AI helps in improving writing, saving time, and organizing ideas.

Introduction

Artificial Intelligence (AI) has become a defining component of contemporary information and communication technology, reshaping how knowledge is generated, processed, and disseminated. Broadly defined as the ability of machines to simulate human intelligence, AI enables systems to learn from experience, process language, recognize patterns, and make decisions typically associated with human cognition (Russell & Norvig, 2010; Wang, 2023). Modern AI systems are grounded in machine learning, neural networks, and natural language processing (NLP), which allow machines to generate, analyze, and evaluate human language. The emergence of large language models (LLMs), such as ChatGPT and Google Gemini, has significantly advanced language-based tasks by producing fluent, contextually appropriate, and human-like text (Brown et al., 2020; OpenAI et al., 2024). These innovations have broadened the scope of AI applications across disciplines, particularly within linguistics and language education.

In linguistics, AI has enhanced both theoretical and applied research by enabling large-scale corpus analysis, syntactic parsing, semantic modeling, and speech recognition (Jurafsky & Martin, 2023; Mizumoto et al., 2024). At the same time, linguistic theories contribute to the development of more accurate and context-sensitive AI-driven tools, including chatbots, automated translation systems, and writing assistants (Cambria & White, 2014). This mutual relationship between AI and linguistics has created new opportunities for language analysis, learning, and assessment.

AI has also become increasingly influential in Second Language Acquisition (SLA), particularly in ESL, ELL, ML, and ESOL contexts. AI-powered tools such as intelligent tutoring systems, grammar checkers, and automated writing feedback platforms provide real-time, personalized support in vocabulary use, sentence construction, and discourse organization (Li et al., 2022). Applications like Grammarly and Write & Improve employ NLP-based, corpus-informed feedback to expose learners to linguistically authentic and native-like language input, thereby supporting language development (Choi & Yi, 2021).

Moreover, AI-supported learning environments promote self-directed learning and metalinguistic awareness by adapting feedback to learners' proficiency levels (Kukulska-Hulme, 2020). Research indicates that sustained engagement with AI-assisted writing tools

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

can influence learners' linguistic choices, including increased use of academic vocabulary, complex syntactic structures, cohesive devices, and hedging strategies, resulting in more formal and organized academic writing (Blin, 2021; Liu & Wang, 2021). However, alongside these benefits, concerns persist regarding over-reliance on AI tools, reduced originality, and potential erosion of critical thinking skills.

Therefore, this study investigates the effects of AI-assisted language use on undergraduate and graduate students in Islamabad, focusing on linguistic structure. By examining the interaction between AI-driven learning environments and authenticity in student writing, this research contributes to ongoing discussions on AI, language learning, and academic integrity.

Problem Statement:

In the field of education, AI plays an increasingly vital role, offering students innovative tools to enhance their learning experiences and academic performance. Students frequently utilize AI-driven platforms for instructional purposes. Numerous studies have investigated the perspectives of students and educators toward AI, its benefits, challenges, and ethical considerations. However, there is a lack of research on the impact of AI on the language of university students in Pakistan. In order to close this gap in existing literature, this research aims to analyze the impact of AI on the linguistic choices of university students in Pakistan.

Research Objectives:

The objectives of this research are as follows:

1. To identify the effectiveness of AI tools in the linguistic choices made by university students in Islamabad.
2. To explore the way university students in Islamabad negotiate the balance between AI-Assisted language production and maintaining their own linguistic voice in academic writing.

Research Question:

1. What effect does AI usage have on the linguistic choices of university students studying in Islamabad?
2. How do university students in Islamabad negotiate the balance between AI-Assisted language production and maintaining their own linguistic voice in academic writing?

Literature Review:

OpenAI created ChatGPT, a language model that uses deep learning techniques to generate responses to text input like humans. A large corpus of conversational data has been used to enhance ChatGPT, a language model version of the GPT series, to respond to open-ended recommendations using natural language that resembles human speech (Zhu & Luo, 2021). ChatGPT is a conversation simulation, self-directed learning tool, and source of innovative educational materials used in classrooms. Therefore, it is not unexpected that ChatGPT has gained such widespread recognition in the field of education so quickly.

Little is known about ChatGPT's ability to enhance ESL learning, especially in the writing domain, despite its widespread use in the classroom (Polakova & Ivenz, 2024). The way English as a Foreign Language (EFL) education is taught has radically altered as a result of the introduction of chatbots, particularly AI-powered systems like ChatGPT. By serving as both a teacher and a tool, these state-of-the-art tools have become indispensable components of the teaching collection, especially when it comes to enhancing writing abilities, where they assist students in navigating the complexity of the English language (Dwivedi et al., 2023; Wang, 2023).

Furthermore, the empirical results of Khan et al. (2021), which emphasize the critical role that these technologies play in enhancing grammatical abilities through dynamic, customized feedback systems, further reinforce this. Likewise, Miranty and Widiati (2021) looked at how

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Indonesian students saw the benefits and drawbacks of AWE (i.e., Grammarly). Moreover, students are aware of Grammarly's advantages because they appreciate the value of resources that help them produce writing that is more accurate and of higher quality. AI developments and personalized learning have significantly impacted the field of second language acquisition (Woo & Choi, 2021).

Generative AI models have garnered a lot of public interest and attention, even though they could produce content that closely resembles human-generated content. According to Dwivedi et al. (2023), these models communicate with a variety of complex inputs, including images, sounds, and text. ChatGPT is increasingly being used in classrooms across a wide range of fields, including journalism and media, education, science, chemistry, dentistry, and medicine, among many others. By providing information on various concepts, laying out procedures, answering queries, and producing practice problems and examples, it can aid in teaching and learning. AI is used for both critical and pleasant tasks due to its capabilities, which automate tasks and impact day-to-day living.

Learning, planning, growth, writing, and assessment are some of the advantages and opportunities for the teaching process (van den Berg & du Plessis, 2023). AI learning systems could become even more powerful and valuable tools for learning languages. Provide clear guidelines and expectations to students using chatbots in higher education (Atlas, 2023). These beneficial AI models have demonstrated significant potential as tools for enhancing classroom teaching and learning processes, claim Dwivedi et al. (2023). Recent studies have demonstrated that GPT-3 can generate multiple-choice questions and answers for reading comprehension assessments (Dijkstra et al., 2022); moreover, Atuhaire (2022) proposed a pipeline for developing assessments based on an enhanced GPT -3 model to facilitate self-learning. ChatGPT would assist teachers in their work and enhance students' educational experiences (Kasneci et al., 2023).

ChatGPT offers assessment, feedback, teaching activities, and personalized learning possibilities. However, it also raises issues of plagiarism, responsibility, and privacy, emphasizing the necessity of maintaining academic integrity (Memarian & Doleck, 2023). While ChatGPT's effectiveness in a variety of topic areas indicates potential as a teaching tool, it also raises issues with plagiarism, accuracy, and the need for revised policies, procedures, and training for teachers and students (Lo, 2023). Similarly, earlier studies have also revealed some significant issues with its use. The primary issues have been academic dishonesty and plagiarism (Cotton et al., 2023) and false information (Karakose et al., 2023; Zhuo et al., 2023). However, ChatGPT enhances learning, academic support, and research, but raises concerns about plagiarism, bias, and job displacement (Chang et al., 2023).

Research Gap:

Much research has been conducted on the development of AI, its models, and human interactions with AI. Most of the research has focused on the use of AI-generated language and its benefits, problems, and impacts on learners in different countries. Furthermore, several studies have been conducted on faculty members' and instructors' perspectives on employing AI in education in different countries. Accordingly, previous research on the impact of AI on students' language and learners' perceptions about AI tools and their usage in Pakistan is lacking. There has been limited research to explore the impact of AI on Pakistani students' writing ability. This study aims to close this gap by analyzing AI's detrimental impacts on learners' linguistic choices in Islamabad.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Methodology:

Epistemology:

The epistemological design of this research will be constructivist. Constructivist epistemology is a theory of learning that emphasizes that knowledge cannot exist outside our minds; truth is not absolute; and knowledge is not discovered but constructed by individuals based on their experiences (Crotty, 1998). The constructivist technique is suitable for this research since the objectives of the study are to closely observe students' assignments to analyze their writing abilities.

Research Design:

A research design is the set of processes and methodologies the researcher has chosen to use. According to Kothari (2004), a research design provides a roadmap or guide for analyzing answers to the research questions. This study employed a qualitative research approach. Qualitative research studies offer a crucial viewpoint that focuses on researchers' own opinions and experiences (Nieswiadomy, 2008).

Sampling section:

This study's population was 40 Graduate and undergraduate students of five private universities in Islamabad. As Stockmaker et al. (2019) state, the population is the entire group of subjects that the researcher is interested in learning more about. A sample is a portion of the total quantity of data collected. It is frequently viewed as a smaller unit of measurement that captures the real data.

Data collection:

This qualitative study employed a documentary research method. As defined by Scott (1990), a document is a piece of written text. The document must be studied as a socially situated product. The documentation technique refers to the process of creating and maintaining records of events, decisions, and actions. To investigate how AI tools affect language structure, student assignments were gathered using the documentary research technique. The data were collected from 40 graduate and undergraduate students studying at 5 private universities in Islamabad. Initially, human-generated assignments were collected, and AI-assisted assignments were gathered after six months of AI tool guidance for comparison. This allowed for an in-depth linguistic analysis of changes in lexical diversity, vocabulary sophistication, word frequency, formatting and tone, hedging and certainty, and cohesive devices.

Theoretical Framework:

This study is grounded in Connectivism Theory proposed by Siemens and Downes (2005), which conceptualizes learning as a dynamic process of creating and navigating knowledge networks rather than merely storing information. Knowledge is distributed across digital, technological, and social systems, and learners engage with these networks in diverse ways, resulting in varied learning outcomes. This framework is particularly relevant in higher education, where digital resources and AI tools function as integral components of students' learning and academic practices. Connectivism theory is based on two elements, which are below:

I. **Connectivism as a Learning Context:**

Connectivism highlights technology as an active force in the learning process rather than a passive support tool. Bell (2011) emphasizes that digital technologies transform how learning occurs by enabling the creation of extensive and complex knowledge networks. Through these networks, technology serves both as a medium for accessing information and as a learning environment itself.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

This perspective aligns with 21st-century educational goals that emphasize creativity, innovation, adaptability, and digital literacy.

II. Noda and Links

A central concept of connectivism is the formation of nodes and networks through which learning occurs. Learners gain knowledge by connecting with information sources and participating in learning communities that encourage interaction and collaboration (Siemens, 2005). These communities act as nodes within larger networks, varying in influence and enabling the continuous flow and development of knowledge (Downes, 2008).

Data Analysis:

Textual Analysis:

Textual analysis was employed to achieve the study objectives, as it enabled an in-depth examination of participants' writing samples and facilitated the interpretation of both explicit and implicit meanings within the texts. As a systematic research methodology, textual analysis involves organized procedures for data collection and evaluation, allowing researchers to identify underlying themes, patterns, and linguistic features in written discourse (Mackee, 2001). To examine the impact of AI on language structure and linguistic choices, the study utilized **Text Inspector,** developed by **Stephen Bax (2011)**, a web-based text analysis tool. This model enabled detailed analysis of key linguistic dimensions, including lexical diversity, vocabulary sophistication, word frequency, formatting and tone, hedging and certainty, and cohesive devices.

Analysis of the Impact of AI on Linguistic Choices

In this study, a textual analysis was conducted using the Text Inspector, a web-based text analysis model. By processing both AI-assisted and human-generated assignments, the analysis identified patterns and variations in language use across the two types of assignments. This tool provided a detailed examination of various linguistic aspects, including lexical diversity, vocabulary sophistication, word frequency, formatting and tone, hedging and certainty, and cohesive devices.

1. Lexical Diversity.

Lexical diversity refers to the range and variations of terminology that are employed in a written piece. Numerous observations have shown that students tend to use the same terms, which suggests that their writing lacks lexical variety. This slight variation suggests that students typically rely on familiar and often-used phrases rather than experimenting with synonyms or rephrasing. An insufficient vocabulary or a lack of knowledge about more diverse linguistic options is the cause of these repeated tendencies.

Human-generated examples frequently repeat important phrases and have a limited vocabulary. Words like ***pollution, technology,*** and ***climate change*** are used repeatedly without synonyms or other terms. Because of this repetition, the text seems simpler and has less lexical diversity. The AI-assisted text, on the other hand, includes a wider variety of words, including synonyms and more complex language. For instance, the AI uses phrases like ***environmental degradation*** and ***industrial emissions*** in place of ***pollution***. This diversity adds to the text's depth and offers a more complex analysis of the subject.

The basic sentence structures used in the human-generated examples usually follow the subject-verb-object pattern. These phrases lack grammatical variation and are concise and straightforward. The simple, repeated syntax is seen in sentences like ***Pollution harms the environment and We must reduce pollution***. However, the AI-assisted examples show more sophisticated sentence constructions, such as descriptive modifiers and multi-clause sentences. A compound structure is used, for instance***, when altering weather patterns worldwide and requiring immediate intervention.*** This provides more specific information.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

The AI-generated text can convey concepts more fully and effectively due to its enhanced grammatical complexity.

In addition, the human-generated examples present vague and general language, which limits the depth of their arguments. Phrases like **big problem** and **helps in education** lack specificity and fail to convey detailed insights. The AI-assisted examples use precise and technical terminology to articulate ideas with greater accuracy, such as ***Environmental degradation caused by industrial emissions threatens ecosystems***. Instead of saying ***Pollution harms the environment***, the AI states ***Environmental degradation caused by industrial emissions threatens ecosystems***.

AI-assisted writing tends to exhibit higher lexical diversity compared to human-generated writing, characterized by precise terminology, complex syntax, and varied vocabulary. This can lead to more academically appropriate and sophisticated writing, but may also raise concerns about authenticity and over-reliance on technology. AI tools can improve linguistic richness and writing performance, resulting in effective and substantial content. By leveraging AI, students can produce more detailed and sophisticated writing.

2. Vocabulary Sophistication.

The usage of complicated, uncommon, and discipline-specific terms is evaluated by vocabulary sophistication. Instead of using simple, ordinary phrases, it focuses on whether the language incorporates more complex vocabulary. By recommending formal phrases or technical terminology, AI systems often enhance vocabulary sophistication, which can improve the academic tone of assignments. There is a noticeable difference in language complexity between tasks created by humans and those helped by AI. The use of language in AI-assisted assignments is constantly getting more complicated and accurate, utilizing discipline-specific vocabulary as well as formal terms.

The human-generated content utilizes more common language, whereas the AI-assisted material uses more sophisticated and technical jargon. With its use of everyday language and simple expressions, such as ***new technology, making tasks easier,*** and ***cutting down forests***, the human-generated material is easier for a broad audience to grasp. By using more complicated phrases like ***the advent of emerging technologies, anthropogenic activities,*** and ***exacerbated,*** the AI-assisted text, on the other hand, improves vocabulary and complex language. AI-assisted writing emphasizes academic tone and formal language, enhancing precision and complexity, whereas human-generated text prioritizes simplicity and clarity, making it more accessible to a broader audience.

The human-generated content is more casual and simpler to read, whereas the AI-assisted material employs formal language with sophisticated terminology and intricate phrasing. Simple, conversational terms like ***work together, better ideas, and a lot of countries***, for instance, are used in the human-generated content. The AI-assisted text, on the other hand, employs formal terminology like ***collaborative efforts, innovative ideation, and socio-economic challenges,*** which may be more difficult for some readers to understand but seem more professional. The AI-assisted version is more polished and appropriate for academic or professional settings, whereas the human-generated writing is more straightforward and informal. In general, AI-assisted language stresses formality and accuracy, whereas human-generated content prioritizes simplicity and ease of comprehension.

While the human-generated content utilizes straightforward, ordinary language that is simpler to comprehend, the AI-assisted text uses discipline-specific vocabulary that makes it more sophisticated and appropriate for academic writing. In the economics example, the AI-assisted version employs more specific terms like ***inflationary pressures and conservative financial behaviors,*** which are more difficult for a general audience to understand. In contrast, the human-generated text uses well-known phrases like ***prices go up and spend less money.***

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Similarly, in the biology example, the human-generated text explains plant needs in simple terms like sunlight, water, and nutrients. At the same time, the AI-assisted version uses scientific language like ***photosynthetic organisms, solar energy, and metabolic functions.*** Overall, the AI-assisted material employs technical jargon more suited for academic or professional settings, whereas the human-generated content is more understandable and accessible.

The human-generated writing is simpler and easier to read, whereas the AI-assisted text employs a more specific and thorough vocabulary. Common language, like ***improving education and helping solve social problems,*** is used in the first example's human-generated text, but the AI-assisted version utilizes more formal and specialized terminology, like ***enhancing educational frameworks and mitigating social inequities***. In the second example, the AI-assisted writing uses specific terms like ***integration of advanced digital technologies and minimizes the likelihood of errors***, but the human-generated content utilizes simple phrases like ***use new digital tools and reduce mistakes.*** All things considered, AI-assisted language is more precise and polished, making it more appropriate for academic or literary purposes. At the same time, human-generated material is more understandable and accessible to a wider audience.

AI-assisted writing has demonstrated superior language mastery, producing polished and rigorously academic texts with sophisticated vocabulary, formal tone, and technical precision. This advanced language sophistication makes AI-generated texts a valuable tool for various purposes, including academic research and professional communication, enabling clear and authoritative expression of complex concepts.

3. Word Frequency.

The study of word frequency examines whether specific terms occur in a text. While lower-frequency terms, which are frequently more specialized or academic, signal more sophisticated writing, frequent usage of common words may imply basic language. Lower-frequency terms might be added by AI techniques to enhance the writing's intricacy and scholarly tone. There is a noticeable variation in word frequency between assignments created by humans and those helped by AI. The complexity and intellectual tone of AI-assisted assignments are regularly raised by the employment of more sophisticated, lower-frequency terms and formal phrases.

The language used in human-generated assignments frequently relies on high-frequency, widely used vocabulary that the writer is acquainted with and can readily access. This frequently leads to simple statements that value simplicity above intricacy. In human writing, for example, expressions like ***the main reason and many people*** are common and indicate a propensity for straightforward communication. Even if it is straightforward, this type of language does not have the scholarly complexity needed for formal writing. On the other hand, AI-assisted assignments frequently include specialized, lower-frequency terminology that raises the text's level of complexity and intellectual tone. Words like ***primary contributing factor or widespread dissent*** are instances of how AI systems improve language by adding specialized, uncommon terms. In addition to improving the argument's perceived depth, this moves from simple to complex terminology and also better fits the formal, academic register required in higher education. These specialized phrases show that AI technologies are making a conscious effort to improve lexical richness and deliver content more authoritatively and academically, which is less typical in work that is solely human-generated.

Human-generated assignments frequently use straightforward descriptive language that communicates concepts without going into great detail. Clear yet comparatively simple descriptions result from writers' propensity to convey ideas using well-known and often-used language. Phrases like ***this idea is important or this helps people understand*** are examples of

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

straightforward methods of communicating meaning. This direct approach could be lacking in subtlety and the capacity to properly convey intricate concepts. AI-assisted assignments, on the other hand, usually employ more accurate and complex descriptions that provide a deeper and more thorough representation of concepts.

Furthermore, words ***like significant, facilitate, and comprehension*** show a conscious effort to improve the text's descriptive depth. AI algorithms are designed to choose academically competent and contextually relevant words, producing more complex and diversified phrases. In addition to making complicated arguments more understandable overall, this sophisticated descriptive language also adds a degree of professionalism and academic rigor that may not always be present in writing produced by humans. The deliberate attempt to communicate subtle differences and complex concepts in a more intellectually sophisticated way is shown by using lower-frequency descriptive phrases in AI-assisted writing.

Human-generated assignments usually use everyday language to convey academic ideas, which leads to simple yet informal wording. Although easily understood, this language lacks the detail and depth required for scholarly debate. However, a more formal and nuanced approach to academic wording is what distinguishes AI-assisted assignments. AI programs frequently use sophisticated linguistic patterns and specialized vocabulary to elevate simple concepts into more formal, scholarly pronouncements. This sophisticated wording makes the argument clearer and more convincing, and shows that the author is cognizant of academic traditions. AI-assisted writing consistently employs specialized academic terminology, indicating that the tools are designed to value formal expression, hence improving the work's perceived quality and intellectual depth.

AI-assisted writing tools enable writers to produce more precise, engaging, and authoritative work, elevating academic discourse and demonstrating mastery of complex ideas. The use of AI tools is also correlated with increased vocabulary diversity and linguistic complexity, potentially leading to more sophisticated and nuanced expressions in academic writing.

4. Tone and Formatting

Tone refers to the attitude of the writer and the degree of formality conveyed in the text. A formal, impartial tone is desired in academic settings. The text's structure, including headers, paragraph organization, citation styles, and logical flow, is related to formatting. AI systems frequently standardize formatting and tone, guaranteeing uniformity and conformity to scholarly norms.

According to the examples provided by the respondents, the tone of human-generated assignments frequently exhibits a subjective and individualized approach. The statement I feel that ***this research is useful in many ways,*** as the first respondent suggests, uses a light-hearted and subjective tone. Although it lacks the objectivity required for academic writing, this language conveys the author's involvement. Similarly, the second respondent's statement, ***This study seems pretty interesting to me,*** emphasizes a conversational tone by utilizing colloquial vocabulary like ***pretty*** and adding a personal viewpoint ***with to me***. AI-assisted assignments, on the other hand, continue to have a more official and impartial tone. According to the AI-assisted respondent, this ***research presents valuable insights across multiple domains,*** which are impartial and expert without expressing personal judgments. By emphasizing the depth of the information rather than the writer's emotions, the second example provides a comprehensive analysis of the subject matter and likewise exhibits a formal tone. This illustrates how AI systems standardize tone and match assignments to scholarly norms.

Human-generated assignments frequently have inconsistent citation styles and structures. ***Some paragraphs were long, while others were short and unorganized,*** as stated by the first

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

respondent, indicating a lack of structural coherence, which might impede the logical flow of ideas. A less structured and more unprepared writing process is reflected in this discrepancy**.** ***I forgot to add references for a few points,*** the second respondent says, bringing attention to a prevalent problem of inadequate citation procedures in human-generated work. The assignment's legitimacy and conformity to academic norms may be impacted by this. AI-assisted assignments, on the other hand, often adhere to set formatting standards. According to the AI-assisted respondent, ***the headings and subheadings were clear and aligned with the content***, suggesting a well-organized presentation that improves reading. ***All arguments were supported with in-text citations following APA style, as stated by the second respondent,*** demonstrating the AI's capacity to uphold citation uniformity and correctness. According to this investigation, academic assignments are more organized and have higher-quality citations thanks to AI techniques, which also lessen human mistakes.

AI-assisted assignments maintain a formal and impartial tone, adhering to academic writing norms, whereas human-generated assignments often exhibit an informal and subjective tone. AI technologies improve formatting and tone, ensuring neutrality, uniformity, and conformity to scholarly norms, resulting in more organized and academically rigorous work with precise citations and consistent structure.

5. Hedging and Certainty

The concept of hedging is crucial in academic writing, enabling authors to convey uncertainty or avoid absolute claims, while decisive statements convey confidence and authority. AI systems, however, often struggle to balance hedging and certainty, presenting facts with excessive confidence or misusing hedges to avoid clear stances.

A sensible and unsure tone may be seen in the human-generated hedging example. ***It seems that this theory may explain the observed behaviour.*** Phrases like seems and may imply that the author is reluctant to make firm assertions. Although this wording admits that there may be other answers, it can also make the argument less persuasive and clear. In human writing, this kind of hedging is frequently used when the author is uncertain about the facts or wants to refrain from making big claims without substantial proof. A cautious and well-rounded approach is seen in the AI-assisted hedging example. ***The evidence suggests that this theory could explain the observed behavior.*** While accepting the potential of a legitimate answer, the use of suggests and could suggest " indicates some degree of ambiguity. This wording complies with academic norms as it permits several readings without compromising the validity of the argument. This type of hedging is frequently used in AI-generated content to keep the tone objective and supported by facts, preventing overstatements.

A high degree of confidence is seen in the human-generated certainty example; ***this clearly proves that the theory is correct.*** The words clearly and prove are examples of words that convey an absolute position, leaving minimal opportunity for ambiguity or different interpretations. Although this assertiveness can make the case stronger, if the data is inconclusive, it may also oversimplify difficult concepts or distort results. This illustration shows how human authors may misuse decisive language when they want to project authority or when they firmly believe in their position. ***The findings strongly indicate that the theory is valid,*** and the AI-assisted certainty example conveys a confident yet measured position. Strongly indicating implies a high level of support while allowing for further evaluation. Since it makes no claims about absolute proof, this language is more subtle than the example of human-generated certainty. This kind of wording is frequently used by AI systems to mix academic prudence with confidence, making the text both aggressive and receptive to more research.

In conclusion, human-generated assignments frequently exhibit extremes in confidence and hedging, either expressing undue caution or asserting absolutes. Words like ***it seems or***

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

may are sometimes used by writers to express ambiguity, which can reduce the power of the argument. On the other hand, they could oversimplify complicated concepts by using definite language, like ***clearly proves to express*** confidence. On the other hand, AI-assisted assignments often achieve a compromise between certainty and hedging. Phrases such as " the ***evidence suggests***, which are used in AI-generated hedging, are cautious yet professional. AI also uses more cautious language when expressing certainty, such as ***strongly indicate***, to show confidence without making absolute statements. All things considered, AI technologies generate more accurate and balanced language that complies with academic requirements for careful, fact-based writing. While accuracy necessitates making firm declarations, hedging entails expressing doubt using careful phrasing. AI systems frequently fail to strike a balance between certainty and hedging, either presenting facts with overconfidence or abusing hedges to avoid adopting a firm position.

6. **Cohesive Devices**

Cohesive devices are words or phrases that keep the writing's logical flow and link concepts. Pronouns such as this and these, conjunctions such as however and therefore, and transitional phrases such as in conclusion and on the other hand are a few examples. Coherence and clarity are enhanced by the efficient employment of cohesive devices. Cohesive indicators may be used more frequently by AI technologies to improve text fluency, although this might result in repetition.

Conjunctions are rarely employed in human-generated assignments and usually show up more naturally. Instead of overpowering the reader, the sentence ***"however, it also led to significant environmental degradation*** illustrates a smooth transition between concepts. On the other hand, AI-assisted assignments frequently use conjunctions like ***however and*** which provide a more organised and fluid flow. Although it strengthens the logical link between phrases, overuse of this might result in duplication. This tendency is reflected in the AI-generated example, which uses a lot of conjunctions, which can make the writing seem repetitive and prescribed, even if they improve coherence.

The use of simple pronouns like ***"it"*** in human-generated assignments helps to keep sentences coherent without making the content too complicated. For example, the example ***it affects ecosystems and human life*** makes a clear reference to the line that comes before it. However, more precise referential pronouns, such as ***this phenomenon***, which make direct reference to the prior idea, are frequently used in AI-assisted assignments. Because AI constantly introduces these markers throughout the text, this exact usage of pronouns can make the writing more obvious, but it may also lead to repetitive wording. In human-generated assignments, transitional words are typically used sparingly to contrast or summarize ideas so that the writing flows organically. For instance, without interfering with the story, the phrase ***"on the other hand"*** successfully indicates a change of viewpoint. In contrast, AI-assisted assignments frequently use transitional words more methodically to improve structure and intelligibility. The usage of both in conclusion and ***on the other hand in the AI-generated sample demonstrates this.*** Although this technique enhances the logical flow of ideas, it runs the danger of making the text too formulaic and predictable, which lessens the writing's organic rhythm. In conclusion, there are significant variations in the ways that cohesive devices are used in assignments that are created by humans and those that are supported by AI.

Conjunctions, pronouns, and transitional phrases are typically used more sparingly and naturally in human-generated assignments, which produces a natural flow of thoughts. AI-assisted assignments, on the other hand, show a greater frequency of these devices, which improves coherence and clarity but may result in a formulaic tone and duplication. Although AI technologies successfully increase writing's logical organization and fluency, their

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

propensity to overuse coherent indicators may lessen the authenticity and diversity of human writing. This contrast demonstrates how AI affects language decisions, especially when it comes to preserving coherence and facilitating the seamless flow of ideas.

Cohesive devices, such as conjunctions, pronouns, and transitional phrases, keep a piece of writing coherent and connect ideas. Coherence and clarity are improved by the efficient employment of cohesive devices. In order to improve text fluency, AI systems frequently increase the usage of cohesive devices, although this might result in repetition. The level of cohesive devices utilized by the students in their work is displayed below. Moreover, the analysis reveals that AI-assisted writing tends to overuse certain cohesive devices, such as transitional phrases, which can lead to a more formulaic writing style. However, the strategic use of cohesive devices can also enhance the overall readability and flow of the text, making it more engaging for the reader. The findings suggest that a balanced use of cohesive devices is crucial to achieving effective writing.

Discussion:

This qualitative study analyzed the writing of 40 students from five private universities in Islamabad to explore the impact of AI tools on their language use. Using the Text Inspector tool, students' AI-assisted and human-generated texts were compared across linguistic features such as vocabulary sophistication, lexical diversity, tone, hedging, and cohesion. The findings show that AI technologies have significantly influenced the linguistic choices of university students in Islamabad by improving vocabulary use, lexical diversity, and overall writing quality. AI-assisted texts often include advanced and subject-specific vocabulary, giving academic writing a more formal and polished tone. By suggesting sophisticated word choices and synonyms, AI helps students expand their lexical range; however, this may sometimes lead to the unnatural use of complex terms that do not reflect students' usual writing styles.

Moreover, AI-generated writing also improves high-frequency academic vocabulary and structured patterns, enhancing coherence and clarity but occasionally resulting in formulaic and less original texts. In addition, AI supports the effective use of cohesive devices through clearer transitions and logical connections. AI-generated content often presents ideas with greater confidence, reducing the use of hedging that is important in advanced academic writing. While AI enhances linguistic sophistication, over-reliance may weaken originality, independent language development, and students' individual academic voice.

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