



## LINGUISTIC AND VISUAL PATTERNS OF CHATGPT IN HIGHER EDUCATION

### An Analysis of its Use in Undergraduate and Postgraduate Theses

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#### KEYWORDS

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*Writing style*  
*Higher education*  
*Academic integrity*  
*ChatGPT*  
*Artificial intelligence*  
*Educational technology*

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#### ABSTRACT

*This article examines the influence of artificial intelligence on academic writing, focussing on undergraduate and postgraduate theses. Its objective is to identify linguistic and visual patterns in texts generated or assisted by ChatGPT through an analysis of 50 theses, equally distributed between a public and a private university in Peru. The results indicate that the most representative argumentative structures include terms such as "moreover," "crucial role," and "comprehensive." A 48% argumentative similarity was observed in the public university, in contrast to 72% in the private university. It is recommended to broaden the analysis by incorporating other language models, such as BART.*

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## 1. Introducción

In the current context of higher education, the integration of advanced technologies into teaching and learning processes has sparked both interest and controversy (S. Lee & Song, 2024). One tool that has gained prominence is ChatGPT (Acosta-Enriquez et al., 2024), an artificial intelligence-based language model that has begun to be widely employed in universities, particularly in the development of final degree projects. This popularity has led to excessive use, raising critical questions about its impact on the quality and originality of the academic work submitted by students.

Whilst this tool can serve as a resource for generating ideas and conducting preliminary research (Guentulle et al., 2024), there is a risk that students may rely excessively on its capabilities, potentially resulting in a diminished acquisition of critical research and writing skills. Such overuse could lead to a homogenisation of submitted projects, where originality is lost, and work becomes standardised around the responses and content generated by artificial intelligence (Sun et al., 2024). In the long term, this could undermine the educational purpose of these projects, which is to foster critical and independent thinking in students (Suriano et al., 2025).

In this same vein, we argue that this has implications for graduates' employability. Employers value critical thinking, problem-solving, and creativity—skills that may be compromised if students grow accustomed to receiving pre-formulated solutions. In an increasingly competitive and dynamic labour market, the ability to generate innovative ideas and original solutions is paramount (Kim, 2017). Consequently, educational institutions must carefully assess how and to what extent technologies like ChatGPT should be integrated into academic curricula, striking a balance between technological innovation and the holistic development of professional and personal competences.

Universities bear the responsibility of maintaining their reputation and academic rigour, which are essential for their global recognition and prestige (Kiraka, 2020). Without adequate internal regulation, the uncontrolled use of ChatGPT could adversely affect these core values (Putra et al., 2023). This situation would impact both the perceived quality of the education they provide and the assessment of their faculty's competence and effectiveness. If lecturers are perceived as unable to manage or curb the misuse of artificial intelligence tools by students, their ability to uphold high academic standards and deliver the comprehensive education expected from such institutions could be called into question.

Over the long term, reliance on tools such as ChatGPT, Bard, and Grok AI in the preparation of final degree projects may lead to the acquisition of less competitive skills and insufficient development of critical thinking among students (Shahzad et al., 2024). Should future generations of professionals fail to cultivate these competences, they may face barriers in adapting to dynamic work environments that demand not only innovation but also a keen ability to address contemporary societal challenges. In a rapidly evolving global market, the capacity for independent, analytical, and creative thinking is vital. Thus, universities face the challenge of balancing the use of disruptive technologies with the need to promote deep, reflective learning, ensuring that students are both proficient in digital tools and capable of tackling and leading future challenges. Moreover, it must be emphasised that research integrity hinges on the originality and depth of analysis (V. R. Lee et al., 2024). This trend could not only compromise the quality of research outputs but also negatively influence the advancement of knowledge across various academic disciplines, potentially limiting the development of new theories and discoveries.

Given this reality, there is an urgent need to examine how ChatGPT is being implemented in undergraduate and postgraduate theses. Accordingly, the primary aim of this study is to conduct a visual analysis of the usage patterns of ChatGPT in final undergraduate and postgraduate theses, with the purpose of identifying the most recurrent terms and typical argumentative structures. By identifying and analysing these patterns and their consequences, the study will provide concrete data that academic institutions can use to formulate strategies to maximise the benefits of this technology whilst minimising its potential negative effects.

## 2. Methodology

This section outlines the phases adopted to address the research problem. It specifies the scope of the study, the sample selection, and the types of degree projects considered. Additionally, it details the process for identifying the patterns and argumentative structures characteristic of ChatGPT, as well as the method for evaluating undergraduate and postgraduate theses.

### 2.1. Scope of Study

The research focusses on Peruvian universities with the aim of analysing differences and similarities in their educational approaches and academic structures. Through this analysis, the study seeks to identify in which institutions students make greater use of ChatGPT, thereby assessing its impact on learning processes and academic dynamics.

### 2.2. Sample

Two Peruvian universities—one public and one private—from the city of Piura (Peru) were selected, as they are the most representative in terms of student numbers. Their large student populations facilitate the collection of a significant sample of undergraduate and postgraduate theses, in contrast to other institutions where the number of final degree and postgraduate projects is more limited. Both universities offer programmes in Systems Engineering or Computer Engineering and Education in a balanced manner, enabling a more objective comparison across disciplines. This selection also allows for an examination of how differences in technological, financial, human, and academic resources, as well as institutional policies and cultures, influence the use and integration of technologies like ChatGPT in educational processes. Public universities often have larger student bodies and more limited resources (Hayhoe & Zha, 2005), whereas private universities typically possess greater financial and technological resources. This disparity may affect how students access and utilise technological tools in their academic training.

### 2.3. Degree Projects

A set of fifty theses, evenly distributed between undergraduate and postgraduate (master's) levels, was analysed. The selection of these studies was based on criteria of relevance and recency, ensuring alignment with the 2023–2024 period and their availability in publicly accessible institutional repositories. Of the total studies examined, twenty-five correspond to private universities and twenty-five to public universities, ensuring an equitable distribution in terms of access and institutional resources. The analysis of these theses focussed on the fields of systems engineering, computer science, and education—disciplines in which the use of artificial intelligence-based tools, such as ChatGPT, has been frequently noted by lecturers and programme coordinators. For reasons of confidentiality, privacy, and the absence of authorisation from the institutions, the names of the universities analysed are not disclosed. Nevertheless, Table 1 provides a detailed breakdown of the theses according to university type and academic level.

**Table 1.** Distribution for the analysis of the undergraduate and graduate

Type University	Undergraduate	Postgraduate Master	Total
Public	15	10	25
Private	15	10	25
Total	30	20	50

Source: Own elaboration, 2024.

With the aim of providing a clear understanding of the academic levels included in this study, Table 2 presents a brief interpretation of the main characteristics that distinguish undergraduate and postgraduate research.

Table 2. Differences between undergraduate and postgraduate

	Conceptualisation	Author
Undergraduate	It focuses on university instruction with the aim of providing a solid basis for the individual to develop specific competences in different fields of knowledge. This process culminates in the award of a degree that qualifies the graduate to work as a professional in his or her area of specialisation.	(Vieno et al., 2022). (Vialart et al., 2016).
Postgraduate	It focuses on the continuing education of university graduates, providing opportunities to update, broaden and deepen their knowledge in line with scientific and technological advances, as well as the demands of the labour market.	(Guo et al., 2021). (Vialart et al., 2016).

Source: Own elaboration, 2024.

2.4. Elements of Study

The introduction and conclusion chapters of the degree projects were selected as the basis for analysing ChatGPT patterns. The introduction enables the identification of how students frame and contextualise their research (Soria, 2023), whilst the conclusions reveal their ability to synthesise findings and propose implications or future research directions (Difabio de Anglat & Álvarez, 2022). Additionally, the Methodology, Results, Discussion, and Recommendations chapters were explored whenever the document was not embargoed and allowed full access to its content. A project is considered embargoed when its author or authors have developed a scientific article based on the thesis, and this article has been published or is under review.

2.5. ChatGPT Patterns

To analyse patterns, a series of prompts were designed to instruct ChatGPT to generate content related to formulating introductions for theses in the fields of systems engineering and computer science. This approach aims to identify the most recurrent argumentative structures and distinguish text autogenerated by ChatGPT. Table 3 details the instruction provided (formulation of a problem statement) to ChatGPT and its corresponding response. In this analysis, frequently recurring terms such as “moreover,” “is essential,” “in addressing,” “the role,” “ethics,” and “is a crucial step” are observed, which appear forced and repetitive in the generated content.

Table 3. Problematic reality with ChatGPT

Request to ChatGPT	Result
I am currently working on my final year research project in Systems Engineering. My research title is "ChatGPT in the generation of explanations in Intelligent Systems". I need you to write the "Problem Reality". Your result will be part of my introduction.	In the current landscape of systems engineering, advances in artificial intelligence (AI) have brought about a paradigmatic shift in the way we interact with technology (...) intelligent systems.  {Moreover}, the lack of explainability can have significant {ethical} implications. In fields such as healthcare or banking, where decisions can have profound consequences for people's lives, it {is essential} that intelligent systems can justify their recommendations or decisions. Without a clear understanding of how a particular conclusion was reached, it is challenging to assess whether that conclusion was fair, impartial, and {ethical}.  {In addressing} this challenge, it {is essential} to ensure that AI is developed and implemented responsibly and {ethically}, for the benefit of society as a whole. Research into {the role} of natural language generation systems, such as ChatGPT, in enhancing explainability in intelligent systems {is a crucial step} in this direction.

Source: Own elaboration, 2024.

In Table 4, ChatGPT is requested to formulate the motivation to be included in the introduction. Upon reviewing these data, the repetition of certain terms, such as “in addressing,” “is essential,” and “role,” is evident, which had already been highlighted in Table 2.

**Table 4.** Motivation with ChatGPT

Request to ChatGPT	Result
I am currently working on my final year research project in Systems Engineering. My research title is "ChatGPT in the generation of explanations in Intelligent Systems". I need you to write the "Motivation" of the study. Your result will be part of my introduction.	<p>The ability to understand and explain the reasoning behind the decisions made by intelligent systems <b>{is fundamental}</b> in a variety of domains, from computer science to <b>{ethics}</b> and <b>{transparency}</b> in automated decision-making. In this context, artificial intelligence systems, such as ChatGPT, have demonstrated their ability to generate coherent and contextually relevant text in a variety of applications.</p> <p><b>{In addressing}</b> this question, we not only contribute to the field of systems engineering, but also explore the <b>{crucial role}</b> of explainability in the development and adoption of smart technologies in today's society. This work seeks to foster the development of intelligent systems that are not only efficient and accurate, <b>{but also}</b> <b>{transparent}</b> and understandable to their human users.</p>

Source: Own elaboration, 2024.

Whereas Table 5 requests ChatGPT to formulate the rationale for the introduction. Upon reviewing these data, it is evident that certain terms recur, such as “moreover,” “is essential,” “crucial,” and “but also,” which were identified in Tables 3 and 4.

**Table 5.** Justification with ChatGPT

Request to ChatGPT	Result
I am currently working on my final year research project in Systems Engineering. My research title is "ChatGPT in the generation of explanations in Intelligent Systems". I need you to write a "Justification". Your result will be part of my introduction.	<p>Today, intelligent systems based on artificial intelligence (AI) (...) in the generation of explanations in intelligent systems.</p> <p><b>{Moreover}</b>, the justification <b>{ethical}</b> for this research is undeniable. In many critical contexts, such as healthcare or justice, decisions made by intelligent systems can have consequences <b>{significant}</b> for people's lives. Therefore, <b>It is {critical}</b> that these decisions are justifiable and understandable, not only from a technical, <b>{but also}</b> <b>{ethical}</b> and moral.</p> <p><b>{In addition}</b> ChatGPT's ability to generate coherent, natural-language explanations can help democratise the use of artificial intelligence, making it accessible to a wider audience that does not necessarily have technical expertise. <b>{This is crucial}</b> for fostering an informed and aware society that can actively participate in shaping how artificial intelligence technologies are implemented and regulated.</p>

Source: Own elaboration, 2024.

To complement the points outlined above, a total of 30 queries were made to ChatGPT, each corresponding to a different research project with varied titles. Table 6 presents a selection of the research titles used. This strategy aims not only to identify the most frequent linguistic crutches but also to analyse its behaviour across different contexts and uncover new recurring patterns and argumentative structures.

Table 6. Sample example of undergraduate thesis titles published in 2023

Discipline	Titles
Systems Engineering	Calculation of staff remuneration using a computerised administrative system.
	Expert system based on neural networks for the qualification of delivery personnel in Delivery.
	Chatbot for X-ray guidance in an X-ray company.
	Ethical hacking to reduce the degree of vulnerability in SMEs.
	Virtual assistant to improve satisfaction and loyalty in small food retail businesses.
Education	Teachers' perceptions of sexuality education at primary level in Peru
	Digital competences of secondary school teachers in Ecuador
	Video games and academic performance in 10th cycle students at a Peruvian university.
	Narrative texts and their relationship with reading comprehension levels in university students.

Source: Own elaboration, 2024.

2.6. Analysis Procedure

A matrix was developed, presented in Table 7, which organises the information in a structured manner, including the research title, author details, supervisor, the supervisor’s academic degree, and the publication date. This table was supplemented with the patterns identified in the previous section. Research projects were continuously downloaded, prioritising the introduction and conclusions; in some cases, the full document was examined when the research was not embargoed and allowed access to the complete study content. The findings were documented, quantified, and characterised. Additionally, the WordCloud tool was employed to create word clouds, with the aim of providing a clearer and more visual interpretation of the results.

Table 7. Data collection matrix

General data					characteristics of the author and advisor				Similarity of ChatGPT Thesis Chapters			
N°	University	Thesis Title	Level	Discipline	Number of Authors	Genre Authors	Gender and Academic Grade Advisor	Introduction	Theoretical Framework	Methodology	Results Conclusions	Recommendations
1	Private	Web system for the management of medical records in the administration area of the veterinary clinic (...)	Undergraduate	Engineering of Systems	2	M	M		M G x		x	
50	...	...	...	...	...	...	...		. . .	...	. ...	...

Source: Own elaboration, 2024.

### 3. Results

This section details the findings based on the description provided in section 2.5. The queries made to ChatGPT revealed 19 argumentative structures. Figure 1 presents a word cloud featuring the terms most frequently generated by ChatGPT, facilitating the identification of the most common words and offering an overview of their relevance in content generation (Peña-Cáceres et al., 2025). The size of each word reflects its frequency of use, with larger words indicating greater regularity. Among the most prominent terms, “Innovative” and “Versatile” stand out, suggesting that these concepts are central to ChatGPT’s discursive output. Other terms such as “Crucial,” “Significant milestone,” and “Crucial role” also feature prominently, indicating a tendency to emphasise the importance of certain concepts in the generated analyses. Likewise, expressions such as “Ultimately,” “In essence,” and “Have emerged” suggest a recurrent use of phrases that add depth and context, demonstrating that ChatGPT not only generates content but also structures its responses in a way that enriches the discourse with interpretive elements.

**Figure 1.** Word cloud of terms recurrently generated by ChatGPT



Fuente: Own elaboration, 2024.

Table 8 presents a total of 19 argumentative patterns, of which 15 are common to both academic levels. At the undergraduate level, it was identified that authors employ 100% of the argumentative structures, whereas at the postgraduate level, this figure is 78.94%. Upon closer analysis, it is observed that terms such as “Significant milestone,” “Innovative,” “In essence,” and “Crucial” are used at both levels, demonstrating that ChatGPT maintains a set of key expressions that underscore the relevance of certain concepts.

**Table 8.** Recurrent Argumentative Structures

Patterns	Undergraduate	Postgraduate
Significant Milestone	x	x
A Milestone	x	x
Significant	x	x
Versatile	x	x
Innovative	x	x
In addition	x	x
Insights	x	
In a nutshell	x	
In essence	x	x
Ultimately	x	x



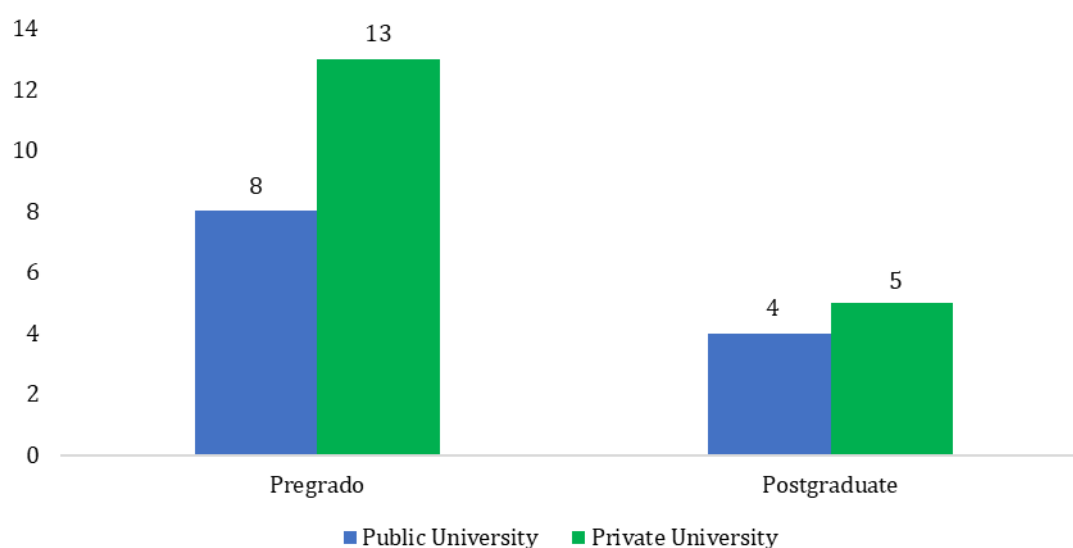
Patterns	Undergraduate	Postgraduate
It is essential to	x	x
Comprehensive	x	
Crucial	x	x
Crucial role	x	x
They have emerged	x	x
They have transformed	x	x
In particular	x	x
But also	x	
On boarding	x	x

Source: Own elaboration, 2024.

On the other hand, undergraduate research revealed a tendency towards simpler and more direct structures, where most authors employ connectors such as “Moreover,” “Comprehensive,” “Crucial,” “Insights,” “In summary,” and phrases that synthesise or conclude ideas more rapidly. This finding aligns with what was outlined in subsection 2.5. We consider that undergraduate authors do not formulate complex prompts, leading ChatGPT to retain the argumentative structures mentioned earlier. In contrast, at the postgraduate level, terms such as “Is essential” and “Significant” emerge, which are not commonly found in undergraduate texts, reinforcing the notion that prompt formulation and analysis at this level lack detail and nuance.

To complement the above, Figure 2 and Table 9 illustrate the distribution of studies with recurring argumentative structures, broken down by university type and educational level. A total of 50 studies were analysed, with 25 studies from public universities and 25 from private universities. At the undergraduate level, it is observed that private universities account for 13 studies reflecting recurrent terms, representing 52% of the studies analysed at this level, whereas public universities present 8 studies, equivalent to 32%. Likewise, the results shown in Figure 2 indicate that, in the case of postgraduate theses, the findings are more limited. This is attributed to the study sample including only 10 projects per university type. Additionally, it is worth noting that institutional repositories of public universities typically contain fewer published theses compared to those of private universities. Whilst it cannot be definitively asserted that a consolidated trend exists in the use of ChatGPT in undergraduate and postgraduate theses, the presence of recurring patterns and terms has been identified, which appear atypical when compared to the usual writing style of undergraduate students.

**Figure 2.** Undergraduate and postgraduate theses with recurrent argumentative structures



Source: Own elaboration, 2024.



At postgraduate level, private universities also outperform public universities, with 5 studies (representing 20% of the total) compared to 4 studies in public universities (equivalent to 16%). Although the gap between the universities is narrower at the postgraduate level, the overall trend suggests that private universities maintain a higher production of studies featuring recurrent argumentative structures. However, it is important to clarify that it cannot be stated with absolute certainty that the analysed texts were generated by tools such as ChatGPT, as the similarity in discursive patterns may also be attributed to factors such as academic training, the influence of institutional writing styles, or access to writing assistance resources.

**Table 9.** Quantitative data of the investigations analysed between the year 2023 and 2024

Type of University	Studies analysed	Undergraduate and postgraduate studies with recurrent argumentative structures				Total: undergraduate and postgraduate research with argumentative structures recurring to ChatGPT	
		Undergraduate		Postgraduate			
		n=0	n=%	n=0	n=%	n=0	n=%
Public University	25	8	32%	4	16%	12	48%
Private University	25	13	52%	5	20%	18	72%

Source: Own elaboration, 2024.

In relation to the above, it is evident that, of the 50 studies analysed, public universities recorded a total of 12 investigations with recurrent argumentative structures, representing 48% of the total. In contrast, private universities presented a total of 18 investigations, equivalent to 72%. This indicates that private universities have a higher proportion of studies in this context.

To reinforce the arguments outlined in the preceding paragraphs, Figures 3 and 4 present a representative sample of the cases identified during the analysis process. It is important to note that, due to the confidentiality of the data and to avoid potential conflicts of interest among the authors, specific details that could directly link the research to particular cases have not been disclosed. In Figure 3, it is illustrated how the terms “Moreover” and “but also” are integrated into recurrent linguistic structures within the analysed texts. This pattern is observed consistently across multiple instances. In the case identified as match (a-c), it can be noted how the term “Moreover” continues to appear in a key structural position, evidencing a regular tendency in the construction of arguments.

**Figure 3.** Arguments matching ChatGPT (a)

**Coincidence (a)**

Sales management is defined in operational terms as a series of processes and tasks that a company carries out to plan, execute, and oversee all actions related to the sale and distribution of products or services. **Moreover**, it is characterized by implementing marketing strategies, resources, and technological tools that enable efficient customer acquisition and retention.

**Coincidence (b)**

Finally, by applying Machine Learning (ML) in sales management, economic income increased. Therefore, we can affirm that the applied methodology boosted sales at all stages. **Moreover**, the implementation of ML allows influencing the use of available resources, improving operational efficiency. This not only reduces costs, **but also** increases the accuracy of strategic decision-making.

**Coincidence (c)**

According to Mendoza M., et al. (2023), the term “Machine Learning (ML)” is defined as a technology that finds increasingly diverse applications every day. Machine learning serves as a fundamental tool in prediction and classification methods across a wide range of domains. It operates within the broader scope of artificial intelligence (AI), but it has inherent limitations. Machine learning heavily depends on the available data and may struggle to adapt to new problems or domain changes. **Moreover**, ML is a crucial component of AI, supporting the broader aspiration of AI to include cognitive functions such as perception and decision-making processes previously orchestrated solely by computers.

**Recurring argumentative structure of ChatGPT**

**{Moreover}**, the ethical justification of this research is undeniable. In many critical contexts, such as medical care or justice, decisions made by intelligent systems can have {significant} consequences for people's lives. Therefore, **{it is fundamental}** that these decisions be justifiable and understandable, not only from a technical point of view, **{but also}** from an ethical and moral perspective.

Source: Own elaboration, 2024.

On the other hand, in match (b), the use of the term “Moreover” not only persists but is also complemented by the inclusion of “but also,” reinforcing the same structure identified earlier. This phenomenon resembles the patterns generated by ChatGPT, lending support to the hypothesis of a recurrent structure in the use of these connectors. In Figure 4, another highly recurrent term in the degree projects, “crucial role,” is observed. This expression has progressively established itself across various studies, displaying a marked tendency to be employed in different academic contexts. The frequent repetition of “crucial role” may be linked both to its rhetorical effectiveness and to the influence of ChatGPT, which tends to replicate common patterns from prior academic texts.

**Figure 4.** Arguments matching ChatGPT (b)

#### Coincidence

The relevance of motivation in the educational context cannot be underestimated. It is essential to have an educational system that supports students in carrying out tasks and overcoming challenges in order to achieve high-quality learning. Motivation plays a crucial role in students' engagement and performance, significantly influencing their willingness to face new challenges and persevere in achieving educational goals. An educational environment that promotes and nurtures motivation significantly contributes to students' academic success and personal development. (Sanfeliciano, 2020, para. 1)

#### Recurring argumentative structure of ChatGPT

**{By addressing}** this issue, we not only contribute to the field of systems engineering, but also explore the **{crucial role}** of explainability in the development and adoption of intelligent technologies in today's society. This work seeks to promote the development of intelligent systems that are not only efficient and accurate, **{but also}** transparent and understandable to their human users.

Source: Own elaboration, 2024.

## 4. Discussion

The use of artificial intelligence tools such as ChatGPT in higher education has triggered a paradigmatic shift in how students approach the writing of undergraduate and postgraduate theses (Jo, 2024). This research has identified linguistic and visual patterns emerging in texts generated or assisted by this technology, revealing both opportunities and challenges within the academic domain. This analysis not only demonstrates the influence of artificial intelligence on knowledge production but also raises questions about originality, creativity, and the quality of academic writing. Some of these questions include: How does the use of tools like ChatGPT affect the originality of academic work? To what extent can these tools foster creativity in writing? What ethical implications arise from the use of artificial intelligence in academic writing? Consequently, the linguistic patterns identified in the analysed theses exhibit a tendency towards a writing style that can be regarded as a blend of formality and accessibility. Terms such as “moreover,” “crucial role,” and “but also” suggest a predefined structure in thesis writing. These phrases are commonly employed to introduce additional information or synthesise findings. Whilst these formulae may enhance text clarity, they can also render the writing monotonous or formulaic. According to Dąbrowska (2020), the use of such rigid structures may limit the writer's ability to explore ideas more flexibly and creatively. Students should be encouraged to experiment with their style and develop a unique voice in their writing, rather than relying on conventional linguistic formulae.

Although platforms based on large-scale language models have proven valuable for generating fluent, coherent, and adaptable texts (Williams, 2024), their widespread use has exposed a significant challenge: the emergence of recurrent linguistic patterns that may compromise the originality and diversity of academic language. Among the most prominent argumentative structures, the frequent use of cohesive connectors such as “moreover” and “in summary” is observed, facilitating smooth transitions between ideas. Whilst these elements improve textual coherence, their constant repetition can lead to a lack of stylistic variety, contrasting with human writing, which is generally more diverse. Phrases like “is essential,” “crucial role,” and “comprehensive” recur frequently, evidencing a repeated attempt to reinforce arguments with emphasis. Nevertheless, whilst these patterns may be useful in certain circumstances, their reiterated and mechanical use can betray the AI-generated nature of the text. Another notable feature is the tendency to repeat concepts through synonyms or similar structures, contributing to a sense of redundancy. This is a trait more common in texts produced by language models than in those written by humans, who typically diversify the presentation of their ideas more extensively.

To mitigate the risks associated with the misuse of AI in academic writing, various techniques have been proposed to quickly and effectively identify paragraphs generated by tools like ChatGPT (Mateo, 2022). Among these techniques are consistency and originality analyses. One of the initial indicators of an AI-generated text is an unusual consistency in language quality throughout the document. Whilst human writing exhibits variations in style, level of detail, and complexity across different sections, an AI-generated text tends to maintain uniformity and a homogeneous style (Gunser et al., 2022). Additionally, software tools specifically designed to detect AI-generated text are available. These tools analyse statistical patterns and language features, such as entropy and phrase repetition, which are indicative of automated generation. An example is the GPT-2 Output Detector, which enables the identification of whether a text was produced by a GPT model, based on the prediction patterns employed by the model and their reflection in the final text (Xu et al., 2022). Likewise, lexicometric analysis, which examines the frequency and distribution of words and phrases in a text, can reveal patterns characteristic of AI-generated writing, such as the repeated use of certain terms and lower lexical diversity compared to human writing (Naithani et al., 2022). Another useful technique is cross-verification of content with academic databases and published texts. This process allows the identification of similarities between phrases or sections and pre-existing texts, a common feature in models that generate content from extensive training data.

Although the use of generative AI can be beneficial, it is essential that students understand the importance of reviewing and modifying AI-assisted content. An effective strategy is to teach students to use AI as a supportive tool rather than a primary writing source (Weng et al., 2024). Rewriting and adapting generated ideas enable authors to maintain a more personal style, distinct from automated linguistic patterns. Furthermore, training students in critical writing and self-revision of their texts can help reduce reliance on AI-generated patterns (Baek et al., 2024). Revision activities, text analysis, and paraphrasing exercises foster greater awareness of linguistic variations and enhance the capacity for original writing.

It is crucial that institutions establish clear policies regarding the use of artificial intelligence tools in academic production, addressing not only plagiarism but also the ethical implications and impact on the originality of work (Gruenhagen et al., 2024). The authors (Al Murshidi et al., 2024) emphasise the importance of students ethically understanding the technology and its implications for knowledge generation. The analysis of ChatGPT's linguistic and visual patterns in undergraduate and postgraduate theses provides valuable insight into its influence on higher education; whilst these tools enhance communication and the presentation of ideas, they also pose challenges that require attention. Critical reflection on the use of AI will be key to maintaining academic integrity and the originality of student work. With the growing integration of artificial intelligence in education, educators and students must collaborate to maximise its benefits and mitigate risks. The advancement of language models, such as ChatGPT, will challenge current detection techniques, necessitating the development of more advanced and adaptive methods.

## 5. Conclusions

The use of generative artificial intelligence tools, such as ChatGPT, has redefined how undergraduate and postgraduate students approach the writing of academic reports and theses. The recurrent linguistic patterns observed in texts generated by these tools—such as the frequent use of certain connectors, emphatic phrases, and a uniform stylistic consistency—can reveal the intervention of AI and potentially compromise perceptions of quality and rigour in academic writing. One of the primary findings of this analysis is the presence of repetitive argumentative structures and linguistic crutches which, whilst facilitating text cohesion and clarity, also tend to limit stylistic variation and the personalisation characteristic of human writing. The ability of students to develop their own style is, in some cases, overshadowed by the convenience of automatically generated language, which may have implications for the development of critical writing and thinking skills.

To address the responsible and ethical use of AI in academic writing, it is essential to foster a culture that integrates these tools with robust revision and editing practices. The role of educational institutions is pivotal in implementing training programmes that teach students to employ AI as a complement rather than a substitute for their own creative and critical capacities.

Given the continuous advancement of generative AI technologies, it is imperative that future studies focus on developing more sophisticated detection techniques capable of adapting to new patterns. An underexplored area is the use of AI models trained to identify text generated by other models, which could complement current techniques based on lexicometric analysis and cross-verification algorithms.

## 6. Limitations and Future Research Directions

Several limitations were identified that may influence the interpretation of the results and the generalisation of the findings. Firstly, the sample was limited to 50 theses, divided between public and private universities, which may not represent the full range of approaches and styles found in the use of ChatGPT in higher education. This sample size restricts the potential for more robust comparative analyses across various institutions and types of academic programmes. Secondly, the research focussed on identifying patterns in the use of ChatGPT as a generative tool, without considering other AI tools that might exhibit different linguistic and visual patterns. Thirdly, due to confidentiality, privacy concerns, and the lack of authorisation from the universities, it is not possible in this study to disclose the names of the institutions analysed. However, future researchers with access and the necessary permissions can follow the detailed instructions provided in the methodology section to conduct further explorations. This would not only enable validation of the obtained results but also ensure the reproducibility of the study and broaden the scope of the analysis. Fourthly, it cannot be definitively asserted that private or public universities exhibit a trend towards the use of tools like ChatGPT, thus necessitating a more in-depth analysis that considers additional factors, such as writing strategies, academic training, and access to assistive writing technologies.

Based on these limitations, future research directions are suggested to expand the scope of the findings. It is recommended to conduct studies with larger and more diversified samples that allow for the comparison of patterns across a greater number of universities and academic disciplines. Such analyses could reveal context-specific variations within educational settings and contribute to a more comprehensive understanding of the use of generative tools across different fields of knowledge. It is proposed to incorporate other AI tools, such as COPILOT and Gemini, to perform a comparative analysis and determine the extent to which the patterns generated by each model influence the style and structure of academic documents. This would enable the identification of whether there are trends or specific characteristics in each tool that undergraduate and postgraduate students adopt in their work.

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