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**Investigating Students' Academic Writing Proficiency Using  
ChatGPT. The Case Study of First Year Master's Students.**

Dissertation Submitted in Partial Fulfillment for the Requirement of a Master's  
Degree in Didactics and Applied Linguistics

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## Dedication

First and foremost, I thank Allah “subhanahuwata’ala” for providing me with the will and power to finish this work.

In her name, most loving, most strong, I state my deepest appreciation to my mother, the one and only ultimate pillar of support one could ever ask for in life.

Additionally, I extend my love to my father and family and friends whom I would not have succeeded today without them, for their support during my ups and downs.

Driven by my ailurophile nature, I feel compelled to express love for my cats, simply because why not.

*“Last but not least, I want to thank Me, I want to thank me for believing in me, I want to thank me for doing all this hard work, I want to thank me for having no days off, I want to thank me for never quitting...”* (Snoop Dog, 2019).

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## Abstract

Chat Generative Pre-trained Transformer is an AI-based natural language generative model, able to produce humanized texts with a personalized style/type of writing requested. This study investigates the effect of ChatGPT on students' academic writing proficiency within EFL higher education, where it addresses two significant gaps: a practical gap as no study investigated the effectiveness of ChatGPT as a sentence enhancer, vocabulary generator and ideas expander for academic writing support; the second gap is a contextual gap as no research has been conducted on introducing ChatGPT to academic writing support in the Algerian context. It is hypothesized that students will build upon their objectivity, formality and syntactic complexity, more specifically in terms of objective tone, formal vocabulary, elimination of slangs, idioms, abbreviations, contractions, acronyms, implementing higher noun phrases and longer T-units. A total of 19 Algerian first year master's students majoring in Didactics and Applied Linguistics were part of an experiment about using ChatGPT as an assistant in sentence enhancement, vocabulary generation and ideas expansion for five sessions. ChatGPT was available inside the classroom using mobile phones with Internet access. A pre-questionnaire was administered to the samples in order to identify their writing performance, areas of lacks and strengths as well as their familiarity with AI writing tools. A pre-test was carried out after the pre-questionnaire to examine students' initial academic writing performance. Over a span of five sessions, students were exposed to ChatGPT as an assistant in their process of writing. A follow-up post-test was administered under identical conditions to the pre-test. Later on, the samples responded to a survey to report their perceptions and opinions about the chatbot, their academic writing improvement as well as the quality of teaching they were exposed to. The results showed that the samples generally showed different level of writing proficiency between the pre and post-test scores. They performed significantly better in the post-test in regard to syntactic complexity, formal vocabulary, exclusion of idioms and slangs, suggesting that ChatGPT can be beneficial in improving academic writing skills to a certain degree. Considering objectivity and the absence of abbreviations, contractions and acronyms, ChatGPT did not achieve the desired outcomes.

**Keywords:** Academic writing, Artificial Intelligence, ChatGPT, English Foreign Language (EFL), Second Language (SL) writing.

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## List of Abbreviations

**L1:** First Language

**L2:** Second Language

**FL:** Foreign Language

**EFL:** English Foreign Language

**AI:** Artificial Intelligence

**GPT:** Generative Pre-trained Transformer

**ML:** Machine Learning

**NLP:** Natural Language Processing

**LLM:** Large Language Model

**DAL:** Didactics and Applied Linguistics

**MS:** Mean Score

**SD:** Standard Deviation

**MD:** Mean Difference

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## **General Introduction**

As far as English language teaching is concerned, mastering the four skills (listening, speaking, reading, and writing) is significant since they allow communication and self-expression. Mentioning the context of English as a Foreign Language (EFL), writing holds an immense difficulty because the majority of learners, whether native speakers or foreign language ones, often fail to compose well-structured texts. Therefore, writing is a major struggle in EFL context.

Writing refers to a thinking process that transforms mental language into a written one. However, as students move to higher education, writing becomes significantly academic in that it reflects complexity, formality, objectivity and other features alongside. Due to its difficulty, educators have been incorporating various teaching methods and materials in how to teach writing in general and academic writing in particular. One major strategy that is relevant and has a remarkable impact on modern education is technology.

As the 21<sup>st</sup> century progresses, technology continues to evolve nationwide, leading to a tremendous revolution in Artificial Intelligence (AI). One of these AI innovations is ChatGPT, developed by OpenAI, and introduced to the public in November 2022. This tool has drastically grown in popularity among users as it holds the opportunity to change various industries, and education is no exception. Academically, ChatGPT has drawn attention from individuals in regards to their higher learning because of its capability to engage in authentic and realistic natural conversations with users, as well as generate texts in different genres, be it emails (formal or friendly), stories (creative), or recipes (personal), that are grammatically correct and well structured.

Since ChatGPT has shown a set of opportunities and strengths in relation to education, the significance from this study is, quite simply, to derive a new method for using this new AI educational tool. In the contemporary era, students are deeply invested in technology since it has become an integral aspect of their daily lives; therefore, it is necessary to integrate such a new technological tool into the educational setting. This can help not only sustain student engagement but also facilitate interactive and dynamic learning experiences from one hand. On the other hand, for educators, the incorporation of new technological resources is essential for them to meet the global demand for utilizing technology-driven instructional approaches rather than traditional teaching methodologies. The proposed method

is using ChatGPT in students' academic writing process as an assistant in sentence enhancement, vocabulary generation and ideas expansion, where the aim from this research resides in enhancing students' academic writing performance.

In this technology-driven era, implementing ChatGPT as an instructional tool in teaching academic writing can draw more attention than it has already did in academia. This attention can lead to either a positive adoption of that AI equipment or its complete restriction. To put those claims to the test, the following question is raised and answered throughout this study: To what extent is the potential of ChatGPT in assisting students' writing process as a sentence enhancer, vocabulary generator and ideas expander in order to develop students' academic writing performance?

With continues practice, it is hypothesized that students will build upon their performance in academic writing in terms of objective, formal and complex tone of language. More specifically, ChatGPT will aid the following six aspects: objectivity (excluding personal pronouns), formal vocabulary (Latin/French origin), the inclusion of T-unites (longer sentences: three clauses and more), noun-based phrases, the absence of abbreviations, contractions, and acronyms and lastly the exclusion of slangs and idioms.

Answering the research question required the use of a mix-method approach through using a quasi-experiment data collection tool with a one group pre-test, post-test design in order to obtain data, in addition to two questionnaires administrated for the purpose of gathering students' initial writing process, perceptions and attitudes. Given that EFL University students are more exposed to writing, and are required to produce academic texts; it gave the decision of selecting the sample of first year master's students majoring in Didactics and Applied Linguistics from Abdelhamid Ibn Badis University of Mostaganem.

This dissertation starts with a general introduction, three chapters are underlined furthermore and it ends with a general conclusion. The first chapter, Introducing AI in writing, deals with the basic definitions of the key concepts; it is divided into two sections: Academic Writing and ChatGPT. These sections aim at providing comprehensive explanations of important terms related to academic writing and AI's progress that led to the creation of ChatGPT. Moving on to the second chapter, the research methodology is concerned with the research design, participants and data collection instruments, while the third chapter contains the analysis of that data as well a number of limitations and recommendations for the current study.

# **Chapter One**

## **Introducing AI in Writing**

## Section One: Academic Writing

### 1. Introduction

The advancement of technology has caused a significant transformation in Artificial Intelligence (AI), transforming it from a mere concept in science fiction to a more attainable reality, positioning itself as a trendy discipline in the contemporary era. Its influence on various aspects of life becomes apparent; one area where its influence is noteworthy is the realm of education, particularly in academia. Overall, this section offers a detailed overview of writing with a specific focus on academic writing in addition to presenting a thorough examination of the course of AI that led to the creation of ChatGPT.

### 2. Writing Definition

Based on Oxford English Dictionary, the term “writing” is associated with three parts of speech: writing (n.) as a noun signifies written items, writing (v.) as a verb implies the act of writing, where writing (adj.) as an adjective with a preceding noun (academic writing, free writing) indicates the act of writing in a particular context or producing works in a particular genre. As a verb, writing is defined in multiple manners by scholars since their definitions did not cover all writing aspects, as Weigle (2002) quotes:

*“This is not a simple task since, as researchers in both first and second language writing have pointed out, the uses to which writing is put by different people in different situations are so varied that no single definition can cover all situations”* (p.3).

However, most of the definitions were categorized, into three categories: cognitive, communicative and linguistic. Nunan (1989) addresses writing as cognitive; it is a “*physical and mental fact*”, which necessitates “*discovering ideas, thinking about how to communicate, develop them into statement and paragraphs that will be comprehensible to readers*” (p.36). In a simplest view, writing is the representation of mental language in a written form as agreed upon by Richards &

Renandya (2003) and Levy & Randsell (2013), who insist on the fact that writing is the creation and arrangement of ideas along with maintaining understandability.

Indeed, writing is a productive language skill; therefore it is the product of one's own mental capacity. It involves both physical and mental effort as it requires thinking about ideas and knowledge in an organized pattern then transforming them into comprehensible written structures (Wells, 1986; Graham, 2012). And since writing heavily relies on the individual's cognition, the quality of one's cognitive capacity determines the quality of the written texts. Several studies have explored the correlation between cognition and writing proficiency with authors such as Kellogg (2008), Arar (2011), Carter (2019) and Sachar (2020) reporting positive findings.

For the communicative category, researchers split into two notions. Collins (2003) and Harmer (2006) believe that writing is written communication that allows individuals to express themselves in a comprehensive manner. The second notion sees writing as equal to speaking. Brookes & Grundy (1998) and Robinson (2004) considers writing synonymous with speaking; it is the embodiment of spoken language with only one distinction being one exists orally while the other one exists on papers (Robinson, 2004).

In contrast, Brown (2001) alongside Gonye et al (2012) disagrees with writing being equivalent to speaking, Gonye et al report that "*writing requires greater precision and care than speech as it is more formal activity producing a permanent record*" (2012, p.72). As a matter of fact, the way in which individuals communicate verbally, regardless of their native or non-native status, is significantly different from the written language. When engaging in conversations, speaking takes a contextual nature that facilitates exchanges between the speaker and the audience, preventing further areas of misunderstandings. Conversely, writing creates its own context with no interactions existing; therefore it has to be explicit. This emphasizes the distinction between the two skills, as writing requires precision while speaking tends to be transitory and occasionally lacking in grammatical correctness (Byrne, 1988).

The final group of researchers examined writing from a linguistic side. Widdowson (1978) observes writing as a multifaceted activity that creates links between letters to words to sentences accurately, which are then transcribed onto

paper. He highlights the importance of encoding speech using graphic symbols which indicates the transformation of spoken language into a written one using symbols.

Given the fact that each definition of writing is formulated from a single perspective, it is impossible to conclude which definition is superior. However it can be said that writing is an extension of one's cognition, formed by combining letters to words to sentences accurately in order to achieve communication and self-expression; it certainly differs from speaking where the difference relies in speaking having a disorganized nature where writing follows organized lexical formulas.

### **3. Writing in L1vs. Writing in L2**

The craft of writing is not an innate ability individuals are born with, but rather a competency that is acquired consciously through consistent practice and experience as Myles (2002) emphasizes: "*Writing skills must be practiced and learned through experience*" (p.1). Yet, the acquisition of such ability varies depending on the context; whether the language is a mother tongue (L1), a second language used for public communication (L2), or a foreign language that is not spoken in the country (FL). Nunan (1999) and Myles (2002) agrees upon the fact that the most painstaking skill in language learning and English teaching is writing, which is in particular challenging for L2 and FL learners than learners composing in L1. In order to maintain data clarity, L2 and FL are considered as equivalent.

Silva (1993) elucidates three dimensions that differentiate writing in L1 than writing in L2/FL: language proficiency, cultural transition, and instructional practices (Cited in Myles, 2002). According to Silva & Matsuda (2001), L1 writers in most cases are competent in the lexical, grammatical, and syntactic aspects of their mother tongue, unlike L2/FL writers who lack these aspects, making them prioritize learning these linguistic components over developing their writing aspects (Hyland, 2009). In addition, L1 writers inherently possess cultural patterns that shape the organization of thoughts; L2/FL writers must adapt their approach in order to gain recognition (Silva & Matsuda, 2001; Hyland 2009). In terms of instructional practices, most of writing instructions are based on L1, which proved to be somehow unsuccessful in L2/FL contexts because it different than L1 (Sbaa, 2022).

## **4. Types of Writing**

Writing can be manifested in numerous tones, each with its own distinct features, where the selection of a form depends on the writer's intended purpose. Smith (2003) identifies four types or tones of writing: expository, descriptive, persuasive, and narrative.

### **4.1. Expository Writing**

Expository writing indicates revealing concealed information to readers using explanations and illustrations, thereby making it no longer unfamiliar. It includes transmitting existing facts to individuals who typically possess limited knowledge about a topic (Smith, 2003). This tone is frequently utilized to expose a procedure or a phenomenon, where the author implements transitional words (ibid).

### **4.2. Descriptive Writing**

Descriptive writing surpasses the exposure of information; Smith defines it as “*using words to create a picture*” (2003, p.55). The scholar referred to it as the art of using words to paint a visual representation. It relies on sensory details to effectively convey an atmosphere or perspective, allowing readers to immerse themselves in the text (ibid). Descriptive paragraphs are distinguished by their additional details, many adjectives, and literary devices.

### **4.3. Persuasive Writing**

Persuasive or argumentative writing tends to convince the reader to adopt a particular opinion. Smith (2003) defines it as “*expository because it gives facts, but it also presents an opinion*” (p.55). It comes in two approaches, the first involves presenting strong opinions in contrast to weaker ones, thereby establishing more credible viewpoint, or it involves presenting an opinion alongside other supporting ones to reinforce the writer's stance.

### **4.4. Narrative Writing**

It is often referred to as storytelling, either real or purely fictional (Smith, 2003). Within this tone, the author is trying to constructing and describing a story to the reader in a chronological order. Unlike descriptive writing, narrative writing is

characterized by the existence of characters, setting, plot, and ending, as they are found in short stories and novels (ibid).

## **5. Styles of Writing**

In contrast to writing types that rely on the writer's objectives; the choice of writing styles is influenced by the context. Each style offers its own unique characteristics, enabling writers to tailor their expression to effectively suit the environment they are in.

### **5.1. Personal Writing**

Personal writing is the simplest text an individual can produce. It is characterized by its straightforwardness and simplicity, such as grocery lists, instant messaging and personal diaries. Harmer (2007) states that: *“because writing is used for a wide variety of purposes, it is produced in many different forms. The shopping list and the telephone messages are a type of writing that many people do”* (p.4).

### **5.2. Business Writing**

The primary objective of business context is to communicate business knowledge through writing among coworkers, employees, clients and other business owners. Frenco (2005) addresses that the language used within this community are tailored to the specific objectives of commerce, finance, industry, and the provision of goods and services. Writing takes various forms such as professional emails, letters, memos, report, marketing materials, and reviews (Murphy, 1962; Thomsett, 2018).

### **5.3. Creative Writing**

The nature of this writing, as evident from its name, revolves around creativity and surpassing restrictive patterns of thoughts (Kaufman & Kaufman, 2009; Harper, 2010). It is an artistic writing expression as Harmer (2008) articulates: *“the term creative writing suggests imaginative tasks, such as writing poetry, stories and plays”* (p.328).

### **5.4. Academic Writing**

Academic writing or scientific writing refers to written texts within the academic sphere (Hartley, 2008; Hyland & Salager-Meyer, 2008; Lamanuskas,

2020). In contrast to previous written styles, it seeks to guarantee lucid and cohesive content that result in a well-organized and accurately referenced document. Coffin et al (2003) outlines that it as a genre utilized in higher educational institutions to present research, theories, and arguments. It is distinguished by its formal tone which prohibits the use of idioms, slangs and hesitation fillers that are typical seen in the creative and personal writing genres (Oshima & Hogue, 2007). The essence of academic writing is conceptualized as a: “*style of expression that scholars use to define the boundaries of their disciplines and their areas of expertise*” (Labaree, 2009, p.22).

Another definition provided by Geyte (2013) is that academic writing is an exclusionary scholarly language produces by experts that is incomprehensible to non-experts (Giltrow, 2002, Cited in Baxter, 2011; Lindsay, 2011). In order for it to be successful, it should provide answers to fundamental questions and address issues that arise within the academic realm (Mathews & Mathews, 2008). In terms of structure, it should be clear, concise, and must follow the scientific formats relying on logic, facts and any epistemological field of knowledge. Failure to fulfill such requirements would result in a failure to meet the expectations of the academic community (Whitaker, 2009; Harris, 2006; Hogue, 2007; Clark, 2003).

## **6. Importance of Academic Writing**

Edward Bulwer-Lytton, an English author in 1839, famously stated: “*The pen is mightier than the sword*”. This profound quote highlights the immense potential of writing where it can achieve remarkable success beyond its restricted expectations. According to Whitaker (2009), academic writing has the prospect of developing the skill of researching, evaluating, organizing, arguing, analyzing and critical thinking. It holds immense significance on L2/FL authors, as it enables them to establish continuous communication for scholars among scholars via scholarly written items. Another derived benefit is that it contributes to scholars’ respective fields by sharing new insights and findings, thereby expanding knowledge in various disciplines (Hyland, 2009).

## 7. Principles of Academic Writing

Writing academically extends beyond just arranging thoughts; it demands following prescribed principles where it effectively “*excludes outsiders*” (Hartley, 2008, p.4). The scholars Jordan (1999), Yakhontova (2003), Whitaker (2009), and Wilson (2022) suggest a set of requirements that governs the practice of academic writing.

### 7.1. Deep Formality

A valuable resource for the concept of formality can be found in the literature of Heylighen & Dewaele (1999). The authors presented two levels of formality: deep formality and surface formality, which are defined as follows:

*“The first one, which may be called surface formality, is characterized by attention to form for the sake of convention or form itself...That second sense of the word corresponds to what we might call deep formality, that is, attention to form for the sake of unequivocal understanding of the precise meaning of the expression”* (p. 3).

Surface formality signifies the standard formality of language used to adjust the tone to a specific context, like the honorifics system in Japanese and Korean languages. It incorporates the suffix “sama” in Japanese and “nim” in Korean when addressing someone superior (Heylighen & Dewaele, 1999). Deep formality, on the other hand, is used for the purpose of achieving a definitive comprehension of the exact intended meaning of an expression; it would employ the words “Mr. Smith has arrived late to the meeting” instead of “He arrived late”. The use of “Mr. Smith” and “late to the meeting” removes terms that can only be understood by those who were present in the context (Heylighen & Dewaele, 1999). The level of formality used in academic discourse is deep formality; it encompasses the following principles:

#### 7.1.1. Abbreviations, Contractions & Acronyms

In order to maintain a formal writing, words must be presented in their complete form. Contractions are shortened words made by combining two words and replacing the omitted letters with an apostrophe (Jordan, 1999; Wilson, 2022).

Examples include didn't (did + not), couldn't (could + not), and they've (they + have). Abbreviations are shortened forms used to represent words or phrases. It can either involve a removal of entire syllables (app = application, ad = advertisement) or it can be an acronym which is a word formed by the initials of a phrase pronounced together as a single word (NASA = National Aeronautics and Space Administration, PIN = Personal Identification Number). Initialisms, which also use initials, differ from acronyms in that each letter is pronounced individually (Yakhontova, 2003), like US (United States) and EFL (English Foreign Language). Initialisms are considered appropriate in academic writing as they stand for complete existing words, unlike abbreviations and contractions that convey casualness (ibid).

### **7.1.2. Idioms & Slangs**

Formal writing requires avoiding idiomatic expressions, they are phrases that carry figurative meanings; this later exists in creative writing and is prohibited in academic writing. A slang, also called a colloquial expression, refers to the conversational language used in daily conversations within a specific region (Jordan, 1999), such as referring to a "friend" as "mate" in the Australian community or using the adjective "bloody" as a synonym for "very" by the British people. Idioms and colloquial expressions are cultural-specific that may be misinterpreted by those who are unfamiliar with the culture.

### **7.1.3. Linkers & Hesitation Fillers**

Linkers or hesitation fillers are defined by Jordan (1999), Yakhontova (2003), and Wilson (2022) as linguistic tools employed to establish connections, maintain engagement and facilitate smooth transitions between ideas. Primarily intended for oral communication, rather than formal written language, they encompass expressions such as OK, right, well, you know, and umm. These linkers can be substituted by connectors, which are conjunctions employed to link between phrases and sentences such as because, thus, however and many others based on the nature of the sentence (cause effect, contrast, sequence or conclusion).

### **7.1.4. Formal Vocabulary**

Formal terms are single words derived from French or Latin origin as opposed to their informal multi-word equivalents of Anglo-Saxon origin (Jordan,

1999; Jackson, 2014; Wilson, 2022). Anglo-Saxon origin words are short and straightforward, comprising of one or two syllables, and are commonly used in daily conversational intercourse (Jackson, 2014). On the contrary, formal words consist of three or more syllables and are typically derived from foreign languages (French, Latin) even if their foreign origin is no longer evident. The act of borrowing emerged because people believed that the more their language resembled French or Latin, the more knowledgeable they will be (Jackson, 2014). French origin words are often recognizable from their characteristic patterns of spelling:

<b>ity</b>	<b>our</b>	<b>ant</b>
Felicity	Favour	infant
equity	colour	

**Table 1. 1: Typical Endings of French Origin Words**

Formal borrowings of Latin can often be recognized from their typical endings:

<b>us</b>	<b>a</b>	<b>ex / ix</b>
Campus	Diploma	Index
Chorus	Drama	Appendix
Fungus	Formula	Matrix

**Table 1. 2: Typical Endings of Latin Origin Words**

## **7.2. Objectivity**

Harley (2008) defines objectivity as the maintenance of a neutral tone in academic discourse, commonly referred to as impersonalization or depersonalization. The goal of the impersonal approach is to shift the focus of the writing away from the writer's perspective onto the information being delivered, allowing the facts to speak for themselves (Whitaker, 2009), and enabling readers to generate their own opinions based on the data presented (Whitaker, 2009; Wilson, 2022). Objectifying academic texts, according to Jordan (1999) and Yakhontova (2003), restrict the use of personal pronouns (I, you, we), object personal pronouns (me, us) along with comment clauses (I think, I believe) which display informality. Instead, it is advisable to substitute

personal pronouns with introductory pronouns (it, there) combined with a clause or even the impersonal pronoun (one) combined with passive tense verbs.

### 7.3. Cautious Language

An essential characteristic of academic discourse is cautious language, also called “hedging” or “vague language”. It involves the use of vocabulary and phrases that express uncertainty when presenting claims and ideas that would shield authors from potential criticism regarding unfounded claims (Yakhontova, 2003). Hedging avoids overly definitive statements where there may be a small degree of uncertainty, making overgeneralizations where a small number of exceptions might exist and lastly sounding biased, overly confident, or lacking confidence. It is more appropriate to state “the consequences might be harmful” rather than “the consequences will be harmful” because it strikes a balance; absolute certainty implies that there is no need for further research, while excessive uncertainty suggests the unreliability of the presented work. However, there are appropriate instances to express confidence in claims as well as times when it is not. Certainty should be fortified by evidence supporting the claim, and uncertainty should prevail when such evidence is lacking. Jordan (1999) along with Yakhontova (2003) collected cautious sets of vocabulary and phrases that tailored the tentative style of writing:

Cautious Language	Examples
Verbs	Seem, appear to be, estimate, suggest, claim, may, can.
Adjectives	Possible, probable, maybe, perhaps
Adverbs	Perhaps, likely, often, occasionally, sometimes.
Nouns	Assumption, possibility, tendency, trend, claim
“That” clauses	It could be the case that Recent research suggests that
“To” clause + adjective	It may be possible to obtain It is useful to study It is important to consider

**Table 1. 3: Collection of Cautious Language**

#### **7.4. Syntactic Complexity**

Academic writing is linguistically demanding by its lexical density and the presence of clausal and phrasal constructions, which is known as syntactic complexity (Wilson, 2022). In general, written language is intricate than spoken language, however academic writing is more complex with a wider range of T-units. T-unit stands for minimal terminable unit, introduced by Hunt (1965) as a mean to assess the sentence development. One T-unit contains one independent clause and its dependent clause(s). Two T-units means two independent clauses are conjoined.

Syntactic complexity also tends to have noun-based phrases. For instance: “The results of the experiment showed a clear correlation between the degree of long-term memory and language growth”, this style can be modified into a nominalized form as follows: “The demonstration of a clear correlation between the degree of long-term memory and language growth was exhibited in the experiment”. These features contribute to the sophistication of academic writing, reflecting its scholarly nature (Ansarifar et al, 2018).

#### **7.5. Precision and Concision**

Precision and concision are two methods that can ensure the clarity of academic writing. Being precise eliminates any potential ambiguity that can arise from words with multiple meanings, where concision helps in addressing the main point directly (Starkey, 2004). By avoiding unnecessary words and information, writers can keep their message focused and easily understandable, improving the overall readability along with maintaining the reader’s attention and engagement.

#### **7.6. Evidence and Citation**

Academic writing is distinguishable by the evidence and citation it displays. In order to strengthen the claims and arguments presented, writers must provide relevant evidence such as statistics, empirical research findings or expert opinions to make the text well cited that it will showcase the writer’s honesty and accountability. These features enable readers to identify the sources used and verify the established conclusions of other works. Properly acknowledging scholars’ efforts made does not only support the writer’s claims but also minimizes the risk of plagiarism (Yakhontova, 2003).

## **7.7. Cohesion and Coherence**

The concept of interconnectedness in a text encompasses all the explicit and implicit connections that contribute to its overall unity (Lismay, 2020). This connectedness is typically named cohesion and coherence. Cohesion involves explicit linguistic elements that chain sentences together within a text like conjunctions and connectors. Conversely, coherence portrays the relationships established through themes and information structuring (Lismay, 2020). Simply put, academic written work's level of organization is determined by coherence, while the meaning conveyed by clauses is shaped by coherence.

## Section Two: ChatGPT

### 1. Definition of Artificial Intelligence

The term Artificial Intelligence (AI) itself existed in between 1955-1956, in Dartmouth workshop, where the Stanford computer scientist, John McCarthy, introduced it to refer to the replication of human intelligence by machines (Russell & Norvig, 2010; Healey, 2020; Carlos, 2022; Larioui & Himran, 2023).

As a term, AI describes technologies that are capable of performing tasks that exhibits human intelligence (Healey, 2020). As a discipline, it is a branch of computer science that deals with the simulation of intelligent behavior in computers (Merriam-Webster Dictionary). John McCarthy, father of AI, defines it as “*the science and engineering of making intelligent machines, especially intelligent computer programs*” (2007, p. 2). It is “*the ability of certain machines to do things that people are inclined to call intelligent*” (McCarthy, 2007, Cited in Carlos, 2022, p. 21). This involves the creation of computer systems, algorithms, computer-controlled robots, and software that perform intelligent behaviors similar to that of humans; this is by using the insights gained from studying human reasoning, learning, decision-making, problem-solving, as well as visual and auditory perception (Larioui & Himran, 2023). The findings obtained are then used to develop intelligent systems. AI focuses not only on the creation of human-like intelligent entities but also comprehending further the human intelligence and its connection to cognition and manipulation of an extensive and intricate world (Russell & Norvig, 2010).

To sum up, AI is an up-to-date interdisciplinary area of research (Larioui & Himran, 2023), it focuses on developing theories, methodologies, technologies, and application systems that can replicate, extend, and expand human intelligence in machines (McCarthy et al, 2006, Cited in Sheng et al, 2022; Larioui & Himran, 2023).

### 2. History of Artificial Intelligence

The emergence of machines displaying human-like intelligence can be traced back to earlier times, specifically between 1642 and 1644 when Blaise Pascal, a French mathematician, constructed the first mechanical calculating machine known as Pascaline (Healey, 2020), that was able to perform addition and subtraction, with numbers being entered by manipulating its dials. Later in the 19<sup>th</sup> century,

approximately in 1837, two types of engines were designed by Charles Babbage: difference engine and analytical engine (Healey, 2020). Difference engine is based on the finite differences method. It is used to identify patterns within a series of numbers by examining the variations between successive numbers in the sequence. To illustrate, consider the following series of numbers (1, 4, 9, 16). The finite differences method involves analyzing the differences between consecutive numbers, which in this case are (3, 5, 7). After observing, it can be noticed that there is a consistent pattern, which the difference between these numbers are all equal to (2). The method of finite differences can effectively identify other patterns when handed to it. The analytical engine surpasses its role for being a simple calculator as it would have possessed the ability to perform general-purpose computations similar to that of a computer, however it was never constructed. The engine would have been designed to consist of four essential components: the mill which served as the calculating unit, comparable to the central processing unit (CPU) in modern computers; the store as memory; the reader and printer as the input and output devices.

In 1943, the English mathematician Alan Turing invented a code-breaking machine named the Bombe for the British government to decipher the enigma code used by the German army during the Second World War. This innovation can be regarded as the first functioning electro-mechanical computer (Russell & Norvig, 2010; Haenlein & Kaplan, 2019). The successful performance seen in decrypting the enigma code by the Bombe led Alan Turing to wonder about the intellectual potentials of these automated machines. This made the scientist publish the Turing Test in 1950, which served as a comprehensive guide for developing intelligent machines and, in particular, assessing their level of intelligence (Haenlein & Kaplan, 2019; Healey, 2020; Carlos, 2022).

The General Problem Solver (GPS) was developed by Newell and Simon in 1957 with the intention of emulating human intelligence, in particular human thinking and problem-solving techniques, as well as the underlying mechanisms involved (Haenlein & Kaplan, 2019). GPS utilizes a heuristic search algorithm that prioritizes certain actions over others based on their likelihood of leading to a solution. In other words, GPS is able to narrow down all available options by considering their probability of leading to a solution using the heuristic search.

A span of six years later, DENDRAL was created in 1965 as a collaborative effort between Ed Feigenbaum, Bruce Buchanan, and Joshua Lederberg at Stanford University. This program aimed to aid chemists in determining the structure of organic molecules. Approximately between 1964 and 1966, ELIZA, created by Joseph Weizenbaum in 1965, surfaced as a sophisticated natural language processor capable of simulating conversations on a wide range of topics. ELIZA utilizes a pattern matching technique to identify keywords within an input sentence. These keywords are then compared against a predetermined set of rules, enabling ELIZA to generate suitable responses. While GPS can be regarded as the pioneering early AI program that adopted the “thinking humanly” approach (Russell & Norvig, 2010), ELIZA holds the distinction of being the first-ever chatbot and was among the initial programs to successfully pass the above-mentioned Turing test (Russell & Norvig, 2010; Haenlein & Kaplan, 2019; Healey, 2020).

Eight years later, from 1980 to 1988, AI became an industry, experiencing extraordinary growth and expanding from a few million dollars to billions of dollars (Russell & Norvig, 2010). This remarkable surge in value was accompanied by the emergence of numerous companies dedicated to the development of specialized expert systems, robots, software, and hardware, all contributing to the rapid advancement of artificial intelligence. One notable example is R1, the first successful commercial expert system. This groundbreaking program revolutionized the process of configuring orders for new computer systems (Russell & Norvig, 2010).

Soon after, following the emergence of the resurgence of neural networks and expert systems, the field of AI experienced a renaissance, garnering renewed interest and financial support both in terms of content and methodology. It is in the present time, more common to build upon existing theories rather than propose entirely new ones, to substantiate claims with rigorous theorems and/or solid experimental evidence rather than relying solely on intuition, and to demonstrate practical applicability to real-world scenarios rather than mere hypothetical examples (Russell & Norvig, 2010). In regards to methodology, AI has now firmly aligned itself with the scientific method; hypotheses must undergo rigorous empirical experiments, with the results being statistically analyzed to determine their significance. The use of shared repositories, which include test data and code, has made it possible to replicate experiments.

### **3. Disciplinary Contribution to Artificial Intelligence**

AI is a multidisciplinary field of study that draws upon various academic disciplines such as computer science, computer engineering, philosophy, psychology, mathematics, neuroscience, linguistics, and biology. Each discipline contributes unique insights and raises distinct questions within AI. According to Carlos (2022), computer science implements software that performs intelligent processes, while computer engineering focuses on building the physical components that make up a computer system. Philosophy contributes by offering insights into reason, mind, logic, and language, whereas psychology delves into the intricacies of cognition, reasoning, and behavior (ibid). Neuroscience sheds light on the inner mechanisms of the brain, encompassing both conscious and unconscious processes, and biology contributes by exploring living organisms, unraveling the mysteries of reproduction and evolution (ibid). Mathematics, along with statistics, explores the quantitative relationships between objects and theoretical constructs, providing essential tools for representing models (ibid). On the other hand, linguistics investigates language and communication, addressing fundamental questions such as the nature of human communication and the potential links between language and cognition (ibid).

### **4. Field of Artificial Intelligence**

AI has emerged as a transformative force, revolutionizing industries and reshaping the world. Within the expansive domain of AI, several distinct disciplines have risen to prominence, each with its own specific emphasis and practical applications. These include expert systems, computer vision, robotics, Machine Learning (ML) and Natural Language Processing (NLP).

#### **4.1. Expert systems**

Systems like ELIZA, DENDRAL and GPS that replicates human intelligence are expert systems. They are computer systems that duplicate the decision-making skills of a human expert in a specialized domain using series of “if-then” rules. As an illustration, consider an expert system that is built in meteorology domain (weather conditions), this expert system is expected to act the same as a meteorologist expert would in regard to making decisions about the weather. To

exemplify more, consider the following scenario where a meteorologist needs to determine the weather condition:

**The “if-then” rule:** If the temperature is rising, then the weather will be hot.

This straightforward “if-then” rule aids in making a decision regarding the weather. If the temperature is rising, then the appropriate choice would be a sunny or hot weather. It’s a way to simplify the decision-making process based on the weather conditions. This rule can be expanded upon by incorporating additional rules for various weather conditions:

If the wind speed is increasing, then the weather will be windy.

If the humidity is rising, then a fog will form.

If the clouds are thick and dense, then the weather will be snowy.

## 4.2. Computer Vision

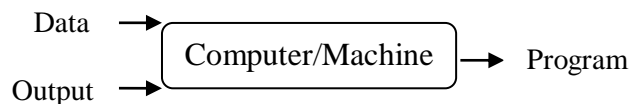
The field of Computer vision centers around machines and/or computers analyzing and interpreting all sorts of images (Carlos, 2022); more precisely, it aims to educate computers how to analyze and understand data that is visual (images, videos), obtained from the external environment. This field is widely recognizable for its significant contributions in facial and fingerprint recognition where its applications extend beyond biometrics, encompassing areas such as object detection, scene understanding and facial and image recognition.

## 4.3. Robotics

Robotics field of study establishes robots that possess semi or full autonomy such as self-driving vehicles (Carlos, 2022). By incorporating the knowledge from other AI sub-disciplines, robots are equipped with the capacities of perceiving their surroundings through visual sensors derived from computer vision field; acquiring new skills through practice, drawn from ML, and engage in interactions with humans, influenced by NLP. Robotics aids humans by liberating them from monotonous tasks and operating in hazardous conditions (VijiPriya et al., 2016); its applications extend to the creation of medical robots, construction robots, and industrial robots utilized in factories.

#### 4.4. Machine Learning

As previously stated, the objective of AI is to replicate human behavior, and machine learning (ML) serves as the mathematical framework enabling AI to achieve that goal. A superficial simple definition of ML is making machines learn; however, diving deeply, it “*deals with creating programs that consume raw data, build models from that data, and make predictions given new data*” (Carlos, 2022, p. 25). It involves programming machines to learn from data and utilize that knowledge to create patterns then adjust program actions consequently based on experiences (VijiPriya et al., 2016). ML entails supplying the computer with data and the desired output, and it is the computer’s responsibility to determine the program required to achieve the desired outcome. This distinction is illustrated in figure 1.1.



**Figure 1.1: How Machines Learn**

ML has proven to be highly valuable in real-life practical situations. For instance, the personalized video recommendations on YouTube’s platforms, which utilize ML algorithms to tailor content based on users’ viewing preferences, speech and face recognition (VijiPriya et al., 2016), or as in web search engines like Google.

#### 4.5. Natural Language Processing

“*Natural-language-processing software packages use AI to let a user communicate with a computer in the user’s natural language*” where computers are being helped to understand the human language (VijiPriya et al., 2016, p. 547). This subfield of AI focuses on the interaction between computers and humans while using natural human language, aiming to develop computer systems capable of understanding, interpreting, and generating natural human languages (VijiPriya et al., 2016; Carlos, 2022). Natural Language Processing (NLP) finds applications in machine translation, sentiment analysis, and question-answering systems as these systems can easily grasp the syntax of a sentence, semantic meaning and analyzing it within the context of other texts present significant challenges (VijiPriya et al., 2016; Carlos, 2022).

NLP systems consist of two crucial components: (1) understanding which entails the process of mapping input to a valuable representation and analyzing various linguistic aspects to effectively analyze and grasp the significance of textual information, encompassing the identification of entities and relationships within sentences (Gokul et al., 2023); and (2) generation, which focuses on producing meaningful phrases and sentences in a natural language format based on an internal representation, allowing for text generation output that is both creative and informative (Gokul et al., 2023). Noteworthy instances of NLP systems in the realm of technology include Microsoft's Cortana, Apple's Siri, Amazon's Alexa (Carlos, 2022), and OpenAI's ChatGPT.

## 5. ChatGPT

Chat Generative Pre-trained Transformer (ChatGPT) is an advanced web-browser AI platform developed by OpenAI and that released to the public between November 27<sup>th</sup>-30<sup>th</sup>, 2022 (Mollick & Mollick, 2022; OpenAI, 202; Tang, 2023). Surprisingly, it gathered a base of one million users within five days according to information released by the OpenAI services. This remarkable achievement outshined the time taken by other relevant online platforms such as Facebook (300 days to reach one million users), Instagram (75 days), and Twitter (720 days) (Firat, 2023), the reason why ChatGPT is the fastest-growing consumer AI model in the contemporary era (Baierl, 2023). OpenAI has provided access to two distinct versions of ChatGPT for public use: the free-of-charge ChatGPT-3.5 turbo based architecture and the subscription-based ChatGPT-4.

ChatGPT is able to engage in authentic and realistic natural conversations with users (Panagopoulou et al., 2023), due to GPT architecture core. In essence, ChatGPT serves as the platform, with GPT acting as the force behind its operation. To elaborate more, illustrate ChatGPT as a vehicle and GPT as its engine; the engine can be removed and replaced with a more powerful one, while keeping the same vehicle. With its Large Language Model (LLM) nature, ChatGPT can leverage its vast data samples from billions of web pages across multiple languages (Tang, 2023). Instances of these web pages include such as Common Crawl (a nonprofit organization that crawls the web and provides its archives and datasets to the public), OpenWebText2 (a company specializing in web page text provision), books (Books1 and Books2 are

two internet-based book corpora), Wikipedia (Rudolph et al., 2023), and other literary sources. The model interact with users by analyzing their input first, then it generates an output by predicting words in a sequential manner based on the data it trained on, ensuring that the context remains the same without explicitly referencing the datasets it uses (Eugène, et al., 2023; Hariri, 2023; Shabbir & Javed, 2023; OpenAI, 2023; Panagopoulou et al., 2023).

## **6. GPT Models**

Throughout the years, OpenAI, a research laboratory in the United States committed to the progress of AI with a primary focus of nurturing and cultivating AI systems that beneficial to humanity (OpenAI, 2015). This AI research organization made significant strides, notably with the introduction of ChatGPT and the GPT serie, which is a concrete evidence of the profound shift happening in AI (Tlili et al., 2023). The models have been continuously upgraded, starting with GPT-1, GPT-2, GPT-3, GPT-3.5 Turbo and GPT-4. All of these models have the ability to comprehend and produce text, but variations exist in their accuracy, speed, and cost effectiveness.

“GPT” indicates a type of artificial neural network technology; the “Generative” in GPT reflects the model’s capacity to produce text resembling human text, while “Pre-trained” signifies that the model has undergone a training phase on vast amount of data to generate humanized texts. “Transformer” is an algorithm that incorporates encoder-decoder architecture with self-attention modules responsible for considering the entire context of a sentence when predicting words, improving the quality of understanding and generating language (Gokul et al., 2023; Koubaa, 2023).

GPT-1, released in 2018, was the first model capable of reading text and answering questions, with 117 million parameters (Gokul et al., 2023).Parameters within GPT models are the components that are adjusted and fine-tuned by the model in order to enhance its ability to comprehend and produce text; the higher the number of parameters, the higher level of accuracy in the generated text.GPT-1 marked a significant advancement in AI development by allowing computers to understand written material in a more natural way (Gokul et al., 2023).It exhibited proficiency at responding to short sentences or small extracts per request.

OpenAI developed a more advanced language model in 2019, GPT-2, by using a larger dataset and more parameters (Gokul et al., 2023; Mhlanga, 2023). The model outperformed GPT-1 due to its large number of learnable parameters, estimated by 1.5 billion, which is ten times the size of GPT-1 (Ghojogh & Ghodsi, 2020; (Gokul et al., 2023). GPT-2 covered various subjects from general to academic since it has been trained on 8 million web pages (Ghojogh & Ghodsi, 2020).

GPT-3, a more powerful version of GPT-2, released in 2020, has been recognized as groundbreaking AI language software by OpenAI that possesses the remarkable ability to create lines of text that resembles human writing, covering a wide range of subjects and topics; as a result, it has acquired knowledge on almost every existing topic (Ghojogh & Ghodsi, 2020). One of its key advantages is its size; it was capable of taking 4096 and 2049 tokens (words) as an input (Gokul et al., 2023), and approximately 175 billion parameters (Ghojogh & Ghodsi, 2020; Gokul et al., 2023), making it 100 times larger than its predecessor, GPT-2.

Two years after, GPT-3.5 Turbo was released in 2022, an enhanced version of GPT-3 and the architecture behind ChatGPT web-browser application. This model has undergone rigorous training using web content, tens of thousands of Wikipedia entries, social media posts, and news articles in order to acquired a profound understanding of the relationships exist between sentences and words (Gokul et al., 2023). GPT-3.5 Turbo had the same number of and parameters as GPT-3; however, what sets them apart is GPT-3.5 Turbo incorporated a technique called Reinforcement Learning with Human Feedback (RLHF) which means humans providing feedback to enhance the learning capabilities of the system.

GPT-4, the latest version of the GPT model, was recently announced on March 14, 2023 (Gokul et al., 2023), and is currently accessible to the general public through ChatGPT Plus, a business API that necessitates joining a waiting list in order to explore its usefulness. GPT-4 and GPT-3.5 share many common features, as they both utilize a similar Transformers architectural model, however at different scales (Koubaa, 2023). GPT-4 is significantly larger in size, boasting 100 trillion parameters along with 8192 and 32768 tokens compared to GPT-3.5 (Gokul et al., 2023). This size disparity highlights the enhanced accuracy. It outperforms its predecessor in its capacity to process longer inputs, supporting up to 25,000 words, thereby leading to

more precise responses as well as providing multimodal inputs (texts, images and tables), a feature that is not available in GPT-3 (Gokul et al., 2023; Koubaa, 2023). Lastly, DALL-E, a component of the premium version of GPT-4, is a model that produces visual representations based on textual descriptions provided as an input.

<b>Models</b>	<b>Release Date</b>	<b>Parameters</b>	<b>Capabilities</b>
<b>GPT-1</b>	2018	117 million	Respond to Short Requests
<b>GPT-2</b>	2019	1.5 billion	Text Generation
<b>GPT-3</b>	2020	175 billion	language Translation, Summarization& Generation
<b>GPT-3.5 Turbo</b>	2022	175 billion	Improves user experience
<b>GPT-4</b>	2023	170 trillion	Creative writing tasks

**Table 1. 4: Comparison between GPT's Models**

## **7. ChatGPT in Education**

The introduction of ChatGPT in the educational setting has sparked different opinions regarding its impact; some argue that it has the potential to enhance the teaching and learning experiences (Meniado, 2023; Mikeladze, 2023) while others believe that it could lead to academic dishonesty (Rudolph et al., 2023), decrease of critical thinking and over-reliance because of the readymade answers (Mhlanga, 2023) along other potential risks.

### **7.1.Strengths**

The review of the scientific findings revealed a number of ChatGPT advocators who praised its ability of personalized feedback, improved learning and teaching experience and content generation.

#### **7.1.1. Feedback and Assessment**

ChatGPT is a valuable resource for students as it offers immediate feedback (Japoshvili-Ghvinashvili & Suleman, 2023; Loos et al., 2023). This not only benefits students but also assists teachers by automating grading tasks, allowing them to dedicate more time to other essential responsibilities (Loos et al., 2023). The effectiveness of ChatGPT's personalized feedback can be observed through Prasetya & Syarif's (2023) findings proved that it aids students in refining their language

accuracy, deepening their grammar understanding, and enhancing their proficiency in vocabulary usage and sentence structures.

### **7.1.2. Personalized Tutoring**

Through one-on-one tutoring sessions, ChatGPT supports students on an individual basis, offering attention that enables them to advance at their own pace and comprehend concepts efficiently (Loos et al., 2023; Hariri, 2023). The incorporation of this self-directed learning tool is able to address the distinct needs of each student (Loos et al., 2023; Zhai, 2022). Prasetya & Syarif (2023) particularly stated that the integration of ChatGPT offers a personalized approach that maximizes learners' language acquisition as well as fostering autonomy.

### **7.1.3. Educational Materials**

ChatGPT is capable of knowledge generation (Zhai, 2022), as it can generate different types of content based on input it receives be it teaching materials such as activities, lesson plans, or and learning materials like essays, abstracts, and outlines.

Crafting teaching materials can pose a challenge as it entails the tasks of searching, selecting, adapting and modifying existing materials (Mikeladze, 2023). In this regard, ChatGPT presents a solution by offering cost-effective and easily reproducible personalized learning resources and interactive learning activities (Meniado, 2023), empowering educators to effectively respond to the diverse requirements of their students (Kohnke et al., 2023; Loos et al., 2023; Mhlanga, 2023; Panagopoulou et al., 2023), as well as to *“save time and effort, hence making their (teacher) work less burdensome”* (Meniado, 2023, p.11).

Similarly, ChatGPT can be seamlessly integrated into learning as well, offering students save time and increase comprehension. It can be utilized for content creation purposes (summaries, essays, and study materials such as quizzes), as well as solving complex problems and questions, and explaining a specific topic to accelerate their learning (Qadir, 2022).

## **7.2. Weaknesses**

Scholars raised concerns about the ethical implications of ChatGPT (Mhlanga, 2023), as well as its potential negative impact on assessment methods (Rudolph et al., 2023), scientific integrity (Meniado, 2023), and the cultivation of students' critical thinking skills and problem-solving skills, fostering laziness and blind reliance (Rahman & Watanobe, 2023).

### **7.2.1. Biased Outputs**

Since LLMs are heavily trained on vast data that may contain biases or cultural discrimination, the model could lead to unfair outputs (Meniado, 2023; Rahman & Watanobe, 2023). For example, if the model has trained on a data that is biased toward certain group of people or a culture, that would result in an unfair or discriminatory output by the model.

### **7.2.2. Lack of Deep Contextual Understanding**

ChatGPT's contextual understanding is constrained where it leads to unsuitable and inaccurate responses (Loos et al., 2023). While ChatGPT can produce responses that are grammatically correct and semantically coherent, these responses may not always be entirely accurate (Lingard, 2023; Mhlanga, 2023). This limitation stems from the fact that the strength of AI language models like ChatGPT lies in predicting the most likely next word(s) in a given sequence (Lingard, 2023), without paying attention to the content generated. However it is important for users to provide "*clear and specific prompts ... are critical in guiding the system to generate accurate and relevant outputs*" (Hariri, 2023, p. 21).

### **7.2.3. Academic Dishonesty**

ChatGPT presents the threat of plagiarism by producing written content without attributing the origins of information and fulfilling writing assignments on behalf of its users, students and teachers alike (Meniado, 2023; Rahman & Watanobe, 2023). In higher education, ChatGPT also "*threatens the fairness and validity of online exams and assignments*" (Rahman & Watanobe, 2023, p. 16), as it can generate human-like text for academic topics that would result in cheating.

#### **7.2.4. Skills Deterioration**

Due to ChatGPT's ability to provide instant responses and written outputs within seconds, individuals can become overly dependent on it for carrying out their responsibilities and duties (Rahman & Watanobe, 2023). This excessive reliance on AI can result in the decline of crucial skills required in the modern era, such as creative thinking, critical thinking, and problem-solving abilities (Meniado, 2023).

### **8. ChatGPT in Writing**

ChatGPT has proved its capability in language acquisition, more specifically in writing proficiency (Trust et al., 2023). Faiz et al. (2023) report that the application of ChatGPT “*as a writing aid offers real-time support, aiding learners in grammar correction, vocabulary enrichment, and overall compositional enhancement*” (p.27). A study conducted by Hong (2023) has given insights about the impact ChatGPT can make on grammatical accuracy and lexical expansion, where learners were given the opportunity to engage with the LLM tool that showcased an outstanding improvements in sentence structures and lexical choices. ChatGPT has also demonstrated its effectiveness as a writing aid in EFL learners writing abilities where it effectively improved “*improve grammatical accuracy, vocabulary diversity, and overall compositional quality*” (Faiz et al., 2023, p.33).

### **9. Conclusion**

The progression of AI has transformed the manner in which individuals engage with technology. A particularly fascinating advancement is the emergence of ChatGPT which is a program created to engage with human users. It is essential to view ChatGPT and any other AI systems as supplementary tools that enhance and complement the educational journey, rather than entirely replacing teaching traditional methods.

# **Chapter Two**

## **Research Methodology**

## 1. Introduction

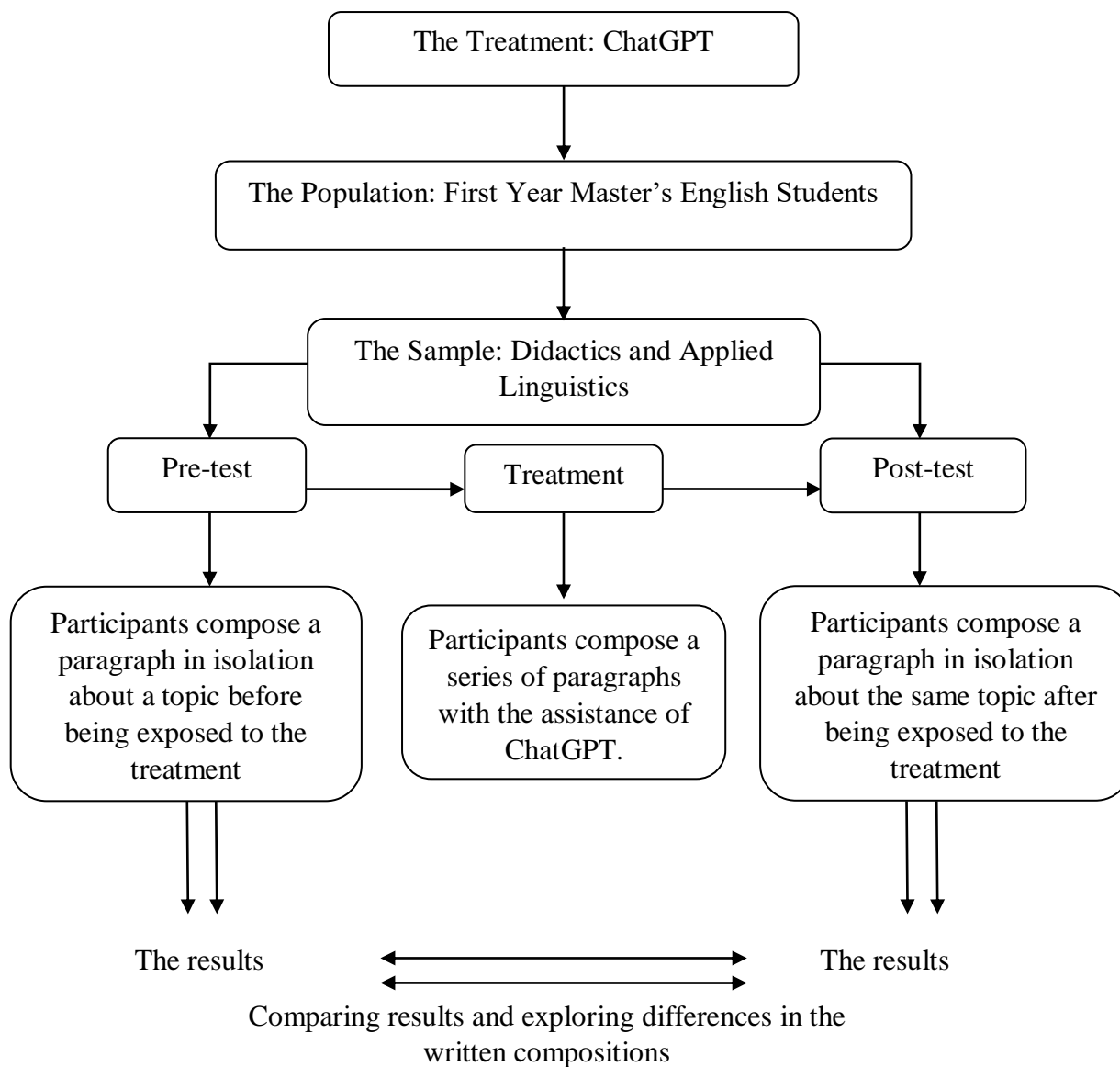
A description of the data collected for this research is presented in the current chapter, with the objective of investigating the influence of ChatGPT on students' academic writing performance. To accomplish such an aim, an experimental methodology is implemented to either validate or refute the research hypothesis, which posits that students will progress in their academic writing proficiency in terms of formality, syntactic complexity and objectivity. The chapter provides a comprehensive overview of the research methodology; more precisely, details on the research design, the variables of the experiment, the sample selection, and the choice of data collection instruments, as well as the methods employed for data analysis.

## 2. Research Design

*“Research is a systematic investigation to find answers to a problem”* (Blaxter et al., 2006, p. 62); therefore, the current study addresses the problem of the extent of ChatGPT in aiding academic writing skills of L2 English students, as well as their perceptions and attitudes toward using that AI writing tool. It is hypothesized that ChatGPT possesses the potential to develop writing capacities in students in terms of developing a formal, objective and syntactically complex tone of writing. In order to carry out this study and prove such a hypothesis, a combined mixed approach is selected, consisting of an experimental study and questionnaires. The selection of these methods is necessitated by the nature of the subjects under investigation.

Experimental research involves *“studying the effects of specified and controlled treatments given to the subjects”* (Seliger & Shohamy, 1989; cited in Djoub, 2017, p. 217). The treatment of this study refers to ChatGPT (the independent variable), where the researcher tries to capture its effect on students' academic writing performance (the dependent variable) through a quasi-experimental research method, with a single group pre-test post-test design. This design effectively demonstrates the cause-and-effect relationship between the variables, specifically showcasing the impact of ChatGPT's implementation on students' academic writing. Therefore, any alterations observed in the dependent variable can be attributed to the influence of the independent variable. The decision of opting for single group pre-test post-test design is based on the desire of the researcher to closely observe students' individual progress before and after the treatment, which is considered more advantageous than

comparing the outcomes of the control and experimental groups. This approach was chosen so that quantitative data could be used to analyze and interpret the effect of ChatGPT on the subjects' academic writing, in particular, students' writing process, perceptions and attitudes regarding ChatGPT.



**Figure 2. 1: Research Design Outline**

As indicated in figure 2.1, the experimental group was instructed to compose a brief paragraph as a pre-test to evaluate their initial academic writing performance. Later on, the samples received two modeling sessions: one about

academic writing principles and the other one about ChatGPT use as an assistant. Moving on, they underwent a series of writing exercises as part of the treatment. Subsequent to the treatment period, the group was post-tested by composing another brief paragraph on the same topic as the pretest, and subsequently, the scores of the group were compared.

### **3. The Treatment**

The variables chosen for the present experiment is the trend toward the structure of the content written: formality, syntactic complexity and objectivity in academic writing (accuracy), and not the quality of the content itself (fluency). Numerous academics have extensively discussed the possible advantages and disadvantages surrounding the incorporation of ChatGPT in education. However, a practical, detailed overview is still missing, specifically within the Algerian context, which could serve as a foundation for empirical investigations seeking to exploit the capabilities of this innovative AI technology.

Findings showed that “*The writing proficiency of AI is way over a general student*” (Zhai, 2022, p.9), as it “*demonstrates four characteristics: Coherent, (partially) accurate, informative, and systematic*” (ibid). As a result, a strategy has been proposed to utilize ChatGPT as an assistant tool in conveying knowledge on a subject that is oblivious (ideas expansion) and offering alternative phrasing and wording without plagiarizing (sentence enhancement and vocabulary generation); therefore, students are expected to write intelligently and not artificially. In other words, ChatGPT can be used as a: (1) sentence enhancer, (2) vocabulary generator and (3) ideas expander.

#### **3.1. ChatGPT as a Sentence Enhancer**

A number of studies have validated the positive case of AI in aiding language development, as Hammad (2023) quotes: “*AI can ... assist with language editing and grammar checking, helping authors improve the clarity and readability of their writing*” (Cited in Mondal, et al., 2023, p.485). ChatGPT is able to improve students’ sentence structures (Faiz et al., 2023; Prasetya & Syarif, 2023). It can pose a great benefit to learners by presenting various alternative phrasings for a user-provided sentence. Lin (2023) conducted a study that delved into the effects of

ChatGPT on language learning outcomes in a self-directed learning environment among university students, findings showed a notable improvement in students' speaking and writing skills (Cited in Prasetya & Syarif, 2023).

Likewise, Cegin et al. (2023) investigated whether ChatGPT can replace human paraphrases known as crowd workers in paraphrase generation workplace. The results showed that ChatGPT-generated texts are more diverse, both in terms of lexical and syntactical diversity, than those texts created by humans. It was evaluated that the lexical diversity of ChatGPT made an increase in vocabulary size; therefore, a conclusion was drawn on the fact that ChatGPT has higher lexical diversity compared to human editors (Cegin et al., 2023).

During the initial analysis carried out by Lingard (2023) in relation to ChatGPT's effect on language development, two distinct elements were brought to the author's attention; these were the tendency of ChatGPT to alter the sentences as instructed, alongside a change in writing style particularly in the employment of passive voice. This indicates that ChatGPT is competent as a sentence enhancer. So, to boost a sentence, learners can input a phrase and request a more formal engaging one from ChatGPT to better illustrate the idea presented as well as improving the text's readability.

### **3.2. ChatGPT as a Vocabulary Generator**

Petrović & Jovanović (2021) conducted a study that emphasized the advantages of chatbots in vocabulary acquisition. Their findings demonstrated that learners' interaction with chatbots showed improved vocabulary retention and usage, underscoring the capacity of chatbots to facilitate vocabulary expansion. Similarly, ChatGPT improves students' proficiency in vocabulary usage (Prasetya & Syarif, 2023; Faiz et al., 2023). Rafique et al. (2024) confirm ChatGPT's profound impact on vocabulary generation along with shaping its evolution.

### **3.3. ChatGPT as an Ideas Expander:**

As previously mentioned, ChatGPT is a LLM that has been trained on vast varied domain data to produce texts. This suggests that ChatGPT has the necessary knowledge and expertise to effectively respond to any input requested by the user. Kohnke et al. (2023) demonstrates in instances when students encounter

incomprehensible words or expressions in a text, ChatGPT can clarify and answer questions and even provide explanations in the learner's native language. Lingard (2023) adds that ChatGPT can facilitate brainstorming by making unfamiliar topics familiar; assisting in generating titles and outlines. As a matter of fact, Fischer et al (2023) highlights "*ChatGPT's capabilities of generating a huge amount of ideas and adjusting them based on given information*" (162 – 163). Firaina & Sulisworo (2023) conducted an interview which revealed that interactions with ChatGPT led to the facilitation of novel ideas and the acquisition of knowledge. Moreover, ChatGPT can support "*vocabulary expansion and comprehension of context-specific terminology by providing definitions and illustrations*" (Tang, 2023, p.703).

### **4. The Population and Research Setting**

The present study was conducted in the second semester of the academic year 2023-2024 at Abdelhamid Ibn Badis University of Mostaganem. The selected population for this study was made up of first year English master students who study writing as a module. Each specialty represents one group; therefore, the population consisted of six groups. First-year English master students are the population of interest due to their extensive exposure to writing as well as their requirement of producing academic written texts; these students are at their initial stage of graduation, which highlights their need to master academic writing style for their upcoming dissertations writing process. Thus, it would be beneficial for them to start training on academic writing style using the writing AI tool, ChatGPT.

The feasibility of randomly selecting one group as a sample from the whole population is not possible in this study, which is why the convenience sampling method is utilized. Among the six specialties, DAL was deliberately chosen as the sample using the convenience sampling method because it was the most accessible.

### **5. Data Collection Tools**

The collection and analysis of data are vital components of any research study. In this particular investigation, the gathering of necessary data was facilitated through the use of a pre-experimental design, which involved the implementation of a pre-test and a post-test data tool. The choice to employ tests as data collection instruments was motivated by their significant ability to provide qualitative insights

into the participants’ performance both prior to and following the implementation of the treatment. The selection of themes and contexts for the pre-test, post-test, and treatment was influenced by a diverse combination of sources, encompassing the works of McCarthy & Odell (2017) *English Collocations in Use*, as well as other online platforms dedicated to exercises that aim to captivate and foster a sense of enjoyment among students during the process of academic writing instruction.

To assess the performance of the participants, the scores from the pretest and posttest were evaluated and calculated using the IBM SPSS Statistics 29.0. The results then were analyzed to demonstrate any differences in performance that may arise between the pre-testing and post-testing stages. And to further process and present the collected data statistically, the software program SPSS was also utilized, enabling the transformation of the data into graphical representations. The table 2.1 provides an overview of the data collection tools used and the corresponding time frame for each. The process of gathering data for each procedure is conceptualized in terms of the number of weeks.

	Time Frame	January	February				March	April
		Week 4	Week 1	2	3	4	Week 1	Week 2
Data Tools	Pre Questionnaire	28 <sup>th</sup>						
	Pre-test		6 <sup>th</sup>					
	Treatment tests		6 <sup>th</sup>	13 <sup>th</sup>	20 <sup>th</sup>	27 <sup>th</sup>	5 <sup>th</sup>	
	Post-test							16 <sup>th</sup>
	Post Questionnaire							16 <sup>th</sup>

**Table 2. 1: Data Collection Tools Time Framework**

As was mentioned before, a pre-experimental design is used which includes 3 phases for the sample a pre-test, a treatment period, and a post-test. But before starting the experiment, two questionnaires were administrated to the sample in order to gather necessary information in what could benefit the process of experimenting.

## **5.1. Questionnaires**

Defined by Brown (2001), questionnaires refer to “*any written instruments that present respondents with a series of questions or statements to which they are to react either by writing out their answers or selecting from among existing answers*” (p. 6). They have the potential to generate three distinct types of data: (a) factual data, which provides information about the respondents’ demographic characteristics such as age and gender; (b) behavioral data, which aims to uncover what the respondents are doing or have done in the past, such as habits, and personal history; and (c) attitudinal data, which encompasses individuals’ attitudes, opinions, beliefs, interests, and values (Dornye, 2003). This study is concerned with all types of data mentioned taken from the participants.

### **5.1.1. Pre Questionnaire**

To provide empirical data on the participants’ initial writing performance and their familiarity with academic writing, a pre-questionnaire was administrated to them who they are first year master’s students studying English at Abdelhamid Ibn Badis University of Mostaganem and are enrolled in the specialty of Didactics and Applied Linguistics. Due to absences, out of 32 students only 22 have answered the pre-questionnaire (see Appendix A). The questionnaire consisted of a total of 11 questions. Out of these, 9 questions were structured and 2 were semi-structured. The questions were categorized into three sections. The first section provides background information about the participants’ age. The second section focused on assessing the participants’ proficiency in writing and identifying their areas of strength. The third section aimed to gather information about the students’ enrollment in the academic writing courses and their perception of its importance by addressing three closed-ended and two semi-structured questions. It was also necessary to account for whether students use any tools that help them in writing. The following table summarizes the details of the questionnaire used.

<b>Pre Questionnaire</b>			
<b>Type of Surveying Method</b>		Interviewer-based (face-to-face)	
<b>Type of Questionnaire</b>		Semi-structured	
<b>Questions</b>	<b>Type of Questions</b>	<b>Semi-structured</b>	Participants give pre-determined answers + justification
		<b>Close-ended</b>	Dichotomous, Multiple choice and Rating scale questions
	<b>Justification of The Questions</b>	<b>Section One</b>	The objective is to identify students' age in order to pick writing tests themes that stimulate their interests.
		<b>Section Two</b>	The objective is to assess the proficiency of students in writing and identify the specific areas in which they have made significant progress.
		<b>Section Three</b>	The objective is to ascertain the engagement of students in academic writing with their teacher and their perception of its significance. An additional question has been included to determine the familiarity of students with using writing tools.
	<b>Format of The Questions' Order</b>		Semantic
<b>Format of Responses</b>		Single and multiple responses	

Table 2. 2: Pre Questionnaire Details

### 5.1.2. Post Questionnaire

In order to perceive the attitudes of the samples on their writing performance after using ChatGPT as well as their perceptions of the tool itself, a post questionnaire was give to them. 22 papers have been collected from the samples. The post-questionnaire (see Appendix E) consisted of a total of 9 questions. Out of these, 6 questions were structured and 3 were semi-structured. The questions were categorized into three sections. The initial section offers a comprehensive assessment on students' academic writing proficiency following the support of ChatGPT

alongside specific areas of enhancement students believe they achieved through the utilization of this tool by addressing one closed-ended and one semi-structured questions. The second section delves into the specific perceptions of the students on the AI tool in regard its use and the quality of assistance it provided by addressing three closed-ended and two semi-structured questions. The third section which consisted of only one question was designed to assess the contribution of aimed to seek the extent of the teaching approach in facilitating the utilization of ChatGPT in academic writing. Table 2.3 summarizes the details of the post-questionnaire.

<b>Post Questionnaire</b>				
<b>Type of Surveying Method</b>		Interviewer-based (face-to-face)		
<b>Type of Questionnaire</b>		Semi-structured		
<b>Questions</b>	<b>Type of Questions</b>	<b>Semi-structured</b>	Participants give pre-determined answers + justification	
		<b>Close-ended</b>	Dichotomous, Multiple choice and Rating scale questions	
	<b>Justification of The Questions</b>	<b>Section One</b>	The objective is to identify the change of writing style of students after using ChatGPT.	
		<b>Section Two</b>	The objective is to gather students' points of views in regard ChatGPT as a writing assistant.	
		<b>Section Three</b>	The objective is to assess the effectiveness of the teaching instructions employed by the researcher in either enhancing or hindering the comprehension of ChatGPT usage.	
	<b>Format of The Questions' Order</b>		Semantic	
	<b>Format of Responses</b>		Single and multiple responses	

**Table 2. 3: Post Questionnaire Details**

## **5.2. Pre-test**

The participants were informed on their involvement in the research experiment, yet they remained completely unaware of its purpose or procedures. The rationale behind informing them is multifaceted. From a psychological perspective, it is crucial for participants to be aware of their involvement in order to be prepared and exhibit a high level of dedication. From an ethical standpoint, it is generally considered essential to inform participants prior to conducting the experiment to ensure informed consent. In addition, the participants' teacher of writing techniques module was provided with detailed, comprehensive information regarding every aspect of the intended study.

In order to evaluate the academic writing skills of the participants, the researcher provided a lead-in about happiness where they share concrete or abstract objects that make them happy. The researcher then switches the focus to money and happiness where she paves the way to a debate with students about whether money can achieve absolute happiness. Then students are instructed to craft a brief, formal, and objective paragraph (less than ten lines) individually, addressing the question, "Can money buy happiness? Justify your answer". The choice of this specific topic was made due to its relevance in the present society, which guarantees that most students have a decent level of familiarity with it. During the pre-test administration, students were given the opportunity to seek clarification on any unclear aspects of the test and were instructed to finish the test within a maximum time limit of 30 minutes. Due to the absence of certain participants, a total of 19 essays were collected, accurately and appropriately corrected.

## **5.3. Treatment Tests**

Prior to the main investigation, a pilot study was carried out in December 2023, for the purposes of: first, identifying any possible obstacles or challenges that may arise during the main investigation; and second, to evaluate the comprehensibility of the instructions provided to the students. A total of 12 second year Master's students specializing in Didactics and Applied Linguistics from Abdelhamid Ibn Badis University of Mostaganem willingly volunteered and participated in a two sessions pilot study, one session acted as the pre-test and the

second one as a treatment. The treatment session comprised of two lectures, one on academic writing and the second one on ChatGPT as a writing assistant.

Following the completion of the pre-test, the treatment phase commenced immediately, with two modeling sessions and four treatment tests. Therefore, the treatment phase lasted for a total of five sessions (see table 2.4). The pre-questionnaire revealed that students are unaware of academic writing and was not exposed to it in their first semester; therefore, the researcher introduced students to the three academic writing principles: formality, objectivity and syntactic complexity. The lecture has been taken from this study's literature review (see p. 10-14) after being summarized (see Appendix B). In order to instruct students to write academically (formal and objective tone along with syntactically complex texts) using ChatGPT as an assistant, there is a need to enlighten them with what is academic writing and how to write accordingly first.

Moving forward to the next session, the experimental group was introduced to a PowerPoint presentation on ChatGPT advantages in academic writing as a second modeling session. The pre-questionnaire revealed that only the minority were not familiar with ChatGPT; therefore, they were given the opportunity to address their queries about it and how to employ it within the classroom setting. During this session, a modeling was done on students where they were enlightened about ChatGPT's benefits in academic writing, as a sentence enhancer, vocabulary generator and ideas expander, through the utilization of PowerPoint slides (see Appendix C). Following the introduction of its advantages, the students were assigned the topic of "visible vs. virtual relationships: which one is more preferable?" and were instructed to compose a paragraph with the assistance of ChatGPT as a sentence enhancer, vocabulary generator and ideas expander. The students organized themselves into pairs, trios, and quartets in order to collaborate and resolve any misconceptions, thereby enhancing their comprehension of utilizing the AI tool. The students were given a paper sheet of frequent asked questions they can pose to ChatGPT to assist them in their writing process (see Appendix D).

The second session of the treatment period commenced by addressing the common errors made by students in their writing during the previous session. This was done in order to provide further guidance on the proper usage of ChatGPT,

including what to ask/write, how to ask/write, and in what manner. Following this, the students engaged in a discussion about the topic of polygamy. This topic was deliberately selected due to the high level of attendance, with 27 out of 32 students present. The session witnessed a consistent exchange of arguments among students, with each individual actively engaging in the debate. Progressing further, the students were tasked with transforming their verbal arguments into written formats, employing an academic language and addressing the following prompt: “In Islam, polygamy is not prohibited; yet society often disregards the idea of it. Do you align with Islamic laws that encourage polygamy or with societal norms that discourage polygamy? Justify”. Within a 30-minute period, their papers were collected for evaluation.

The theme technology was discussed during the third session where an overview was given on the advancements in technology in the current era, specifically the phenomenon of conversational bots found in social media platforms, emphasizing their ability to simulate real human interactions. Students then shared their own experiences and viewpoints on this matter then students were requested to identify technological devices that could potentially substitute human presence. Furthermore, students engaged in another writing exercise with ChatGPT assisting them, responding to the prompt: “Discuss the potential of technological advancements in replacing jobs (why would a man create a machine that would replace another man’s job?)”. Students were instructed to write a brief paragraph using academic tone in a span of 30 minutes.

At the starting of the fourth treatment session, students were presented with two cards featuring sibling cartoon characters, a male and a female; the male represented procrastination and the female represented immediate action. This visual aid served as a starting point for a discussion on procrastination, during which the students explored reasons for their tendency to procrastinate, the effects of it, and whether procrastination is always negative.

Throughout the session, there was a consistent exchange of experiences among the students, with each individual willingly participating in the discussion or being called upon. Moving forward, the students were given other sets of cards containing eight paragraph prompts that they had to choose a card randomly then respond to within a 30-minute timeframe. The questions on the cards were as follow: “Discuss the

concept of procrastination, what are some common behaviors exhibited by procrastinators?, examine the impact of procrastination on academic performance, how does procrastination relate to concepts of failure, explore the role of technology in contributing to procrastination, discuss the potential for self-discipline in overcoming procrastination, describe the mindset of a procrastinator, Tackle the topic from any angles of your choice”. The cards contained a winning card that allowed students to approach the topic from any angle they prefer. The treatment themes are capture in table 2.4.

Sessions	Topics of the Treatment	
Session 1	Modeling Sessions	Academic Writing Lecture
Session 2		ChatGPT Presentation
	Visible vs. Virtual Relationship	
Session 3	Polygamy	
Session 4	Technological Advancement	
Session 5	Procrastination	

**Table 2. 4: The Treatment's Topics**

#### **5.4. Post-test**

Following the completion of the treatment tests, a post-test was conducted on the group under similar circumstances as the pre-test: similar timing “30 minutes”, same theme question “Can money buy happiness? Justify your answer”, and without the involvement of ChatGPT. A total of 19 paragraphs were collected and accurately corrected and compare to the pre-test ones.

#### **6. Scoring Procedures**

Addressing the writing skill in EFL settings is challenging, since teachers often encounter difficulties not only in instructing the skill but also in evaluating the quality of students’ written output (Yamanishi & Hijikata, 2019). In order to determine students’ actual performance, a reliable scoring rubric is employed. Scoring rubrics are detailed frameworks utilized by educators to direct the assessment of students’ work. Weigle (2002) categorized rating scale categories into two main types: (1) holistic provides a single score based on the overall impression of the

writing sample, and (2) analytic “*offers a clear mission of what and how to score the composition so that each writing element is graded consistently*” (Setyowati et al., 2020, p.172), such as vocabulary, grammar or mechanics with detailed scores.

In order to score students’ pre and post writing-tests; an analytical scoring rubric is used, where the scale depends on rating scripts of six criteria: objectivity (excluding personal pronouns), formal vocabulary (Latin/French origin), the inclusion of T-unites (longer sentences: three clauses and more), noun-based phrases, the absence of abbreviations, contractions, and acronyms and lastly the exclusion of slangs and idioms. The advantages of the analytic scoring profile make it a preferred choice over the holistic rating scale where it provides valuable diagnostic information about the learners’ writing ability; by assessing each aspect of their writing individually, the strengths and weaknesses of learners can be easily identified. Additionally, the analytic assessment is considered easier to use for inexperienced raters compared to the holistic assessment because it allows them to evaluate textual features separately, making the evaluation process manageable.

The paragraphs written in the pre and post-tests were scored out of 12. This 12 is divided into three principles: objectivity (2 points), formality (6 points) and syntactic complexity (4 points). Table 2.5 shows more details.

- 1) **Objectivity:** It is achieved by maintaining a neutral tone through avoiding the use of subject pronouns, object personal, in addition to with comment clauses. A paragraph is awarded 2 points in this category when it lacks any of the aforementioned elements. For each mistake made, the student loses 0.5 point.
- 2) **Formal vocabulary:** A paragraph receives a score of 2 points if it demonstrates a significant usage of words derived from Latin or French, with a maximum limit of 20 terms, assigning a value of 0.1 to each term. This implies that in order to obtain the full 2 points, the student must include a total of 20 terms and more. To ascertain the origin of words, the Online Etymology Dictionary is relied on. This particular resource provides the historical origins of terms, indicating whether it originated from Latin, French or Old English (Anglo-Saxon).
- 3) **Exclusion of Slangs & Idioms:** The paragraph is granted 2 points in this category if it does not contain any idioms, slangs, or informal language; nevertheless, the student’s score will be deducted by 0.5 points if such language is present.

4) **Absence of Abbreviations, Contractions, and Acronyms:** This category awards a maximum of 2 points to a paragraph that does not contain any abbreviations, contractions, or acronyms. Nevertheless, if the student employs such linguistic elements, the score will be diminished by 0.5 points for each error committed, until there are no points left to deduct.

5) **Longer Sentences:** Within this classification, a paragraph receives a rating of 2 points if it demonstrates a substantial incorporation of lengthy sentences up to a maximum of 4 long sentences. Consequently, for each longer sentence employed, containing more than two clauses, the student is awarded 0.5 points; if these sentences are absent, the student will receive a score of 0 points.

6) **Noun-based Phrases:** The same principle of longer sentences applies to noun-based phrases.

Writing Features		Score	Description of Features
<b>Objectivity</b>		2 points	- No use of subject singular personal pronouns (I, you), subject plural personal pronouns (we), and object personal pronouns (me, us). - No comment clauses ( I think, I believe)
<b>Formality</b>	<b>Formal Vocabulary</b>	2 points	Latin/French origin words
	<b>Exclusion of Slangs &amp; Idioms</b>	2 points	No slangs and idioms
	<b>Absence of Abbreviations, Contractions, Acronyms</b>	2 points	No abbreviations, acronyms, contractions.
<b>Syntactic Complexity</b>	<b>Longer Sentences</b>	2 points	Three clauses and more
	<b>Noun-based Phrases</b>	2 points	No verbal phrases
<b>Total</b>		12 points	

**Table 2. 5: Scoring Procedure**

## **7. Conclusion**

The chapter in hand offered a detailed overview of the research design that has been opted for in this study that seeks to reveal the effect of the LLM, ChatGPT, on students' academic performance. Additionally, the chapter comprised a portrayal of the study's participants, research environment along with data collection instruments employed namely pre-questionnaire, pre-test, post-test and a post-questionnaire. The upcoming chapter will delve into the analysis and interpretation of these data tools obtained from the students' answers and writings.

# **Chapter Three**

## **Analysis & Discussion**

## **1. Introduction**

The present investigation aims to explore the correlation of ChatGPT on the academic written output of EFL learners. After providing an overview of the study's fundamental variables as well as a description of the research methodology design, this chapter focuses on interpretation and discussion of data gathered from the instruments employed, throughout the different phases of the research to validate or invalidate the research hypothesis. An additional description is added about recommendations, limitation and future direction for the present research.

## **2. Analysis of Data Collection Instruments**

To examine the data obtained from the pre-experiment and the two questionnaires, the IBM SPSS Statistics 29.0 were utilized. 22 papers were collected from both the pre and post-questionnaires. Additionally, a total of 19 papers were gathered from both the pre and post-tests for the purpose of correction and analysis. This research employed a one group pre-test post-test design, focusing solely on the papers from the experimental group for analysis.

### **2.1. Analysis of Students' Pre Questionnaire**

The participants selected for this research were Master One English students who were specializing in the field of Didactics and Applied Linguistics at Abdelhamid Ibn Badis University of Mostaganem. Due to absences, the total number of 22 respondents completed the pre-questionnaire. Any questions or concerns raised by the participants regarding the questionnaire were promptly addressed. The questionnaire comprised of eleven items, categorized into three distinct sections.

#### **Section one: Background Knowledge**

##### **1) Item One: Age**

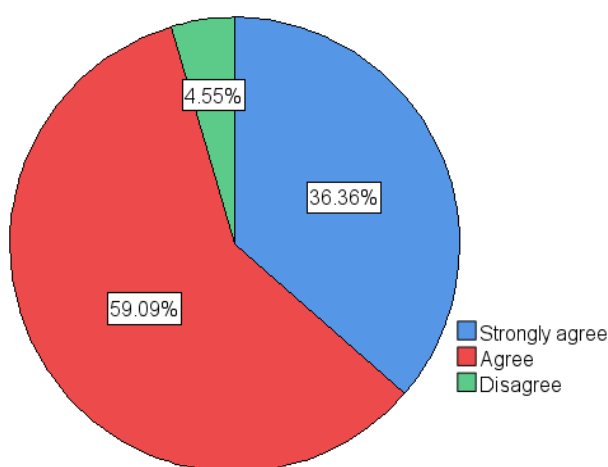
The experimental group knew diversity in age, ranging from 20 year old to 33 years old, where the majority of the participants were similar in age (21 years old). It was necessary to know students' age in order to incorporate suitable future instruction.

Age	N	%
20	1	4.5%
21	12	54.5%
22	3	13.6%
23	3	13.6%
24	1	4.5%
26	1	4.5%
33	1	4.5%
<b>Total</b>	<b>22</b>	<b>100%</b>

**Table 3. 1: Students' Age**

**Section Two: Writing Skill**

1) **Item One:** Development of writing skill throughout university

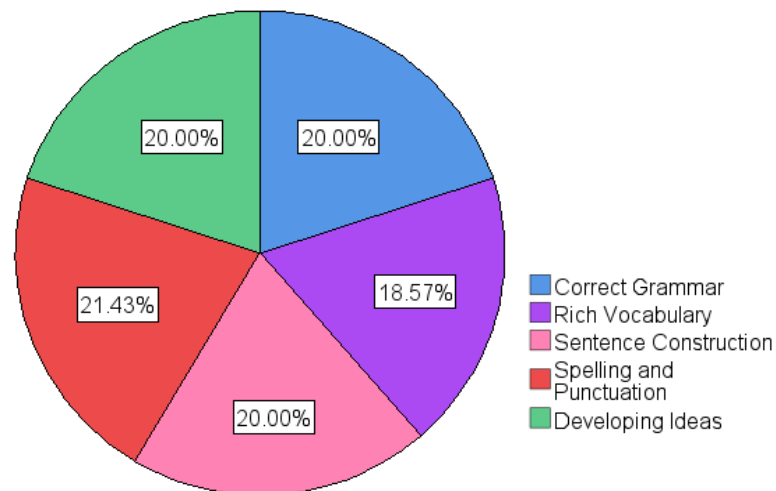


**Figure 3. 1: Development of Writing throughout University**

According to the data presented in the table, it is evident that only a single student (4.5%) expressed disagreement regarding his/her writing skills improvement during the university years. Conversely, the majority of participants (59.1%) agreed that their writing skills had experienced growth throughout their academic journey, with a notable proportion of eight students (36.4%) strongly agreeing that their writing skills had indeed developed.

2) **Item Two:** Aspects of development of writing skill

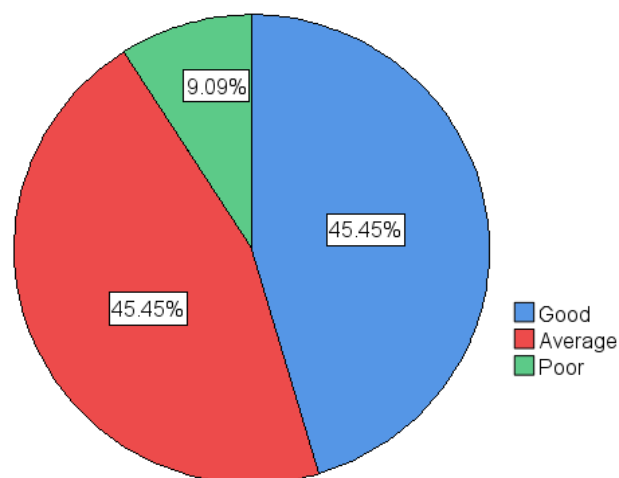
The results obtained from the above chart reveal that students have progressed in all areas. The most area of which is spelling and punctuation with 21.43% of the total respondents, followed by equal percentage (20%) in areas of correct grammar, developing ideas and sentence construction. Rich vocabulary seems to be the least area of progress with 18.57%.



**Figure 3. 2: Aspects of Development of Writing Skill**

3) **Item three:** Evaluation of the writing skill

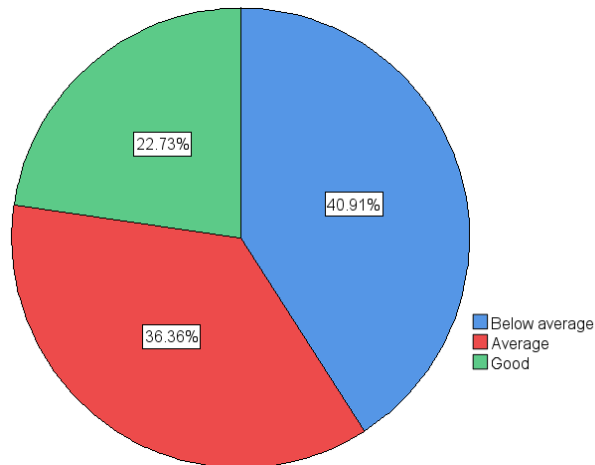
An equal number of students from two categories reported that their writing skills were average and good, with 45.45% each. Conversely, a mere 9.1% acknowledged their writing proficiency as poor.



**Figure 3. 3: Evaluation of the Writing Skill**

4) **Item Four:** The marks of writing exam

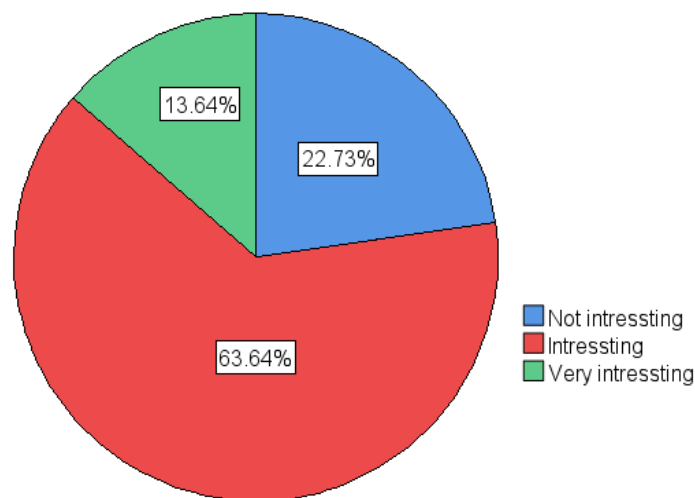
A significant proportion of the participants (40.91%) obtained a mark below the average, ranging from 5 to 9, and 36.36% of them achieved an average mark failing within the range of 10 to 11. The remaining students (22.73%) responded with good, indicating a mark between 12 and 15. Not a single student obtained an excellent mark ranging from 16 to 20.



**Figure 3. 4: The Marks of Writing Exam**

5) **Item Five:** The content of writing techniques module

More than half (63.64%) of the respondents expressed their engagement in the writing techniques module, finding the lessons to be interesting. Conversely, a smaller proportion (22.73%) indicated that the lessons were not interesting, while a minority (13.64%) found the lessons to be highly interesting

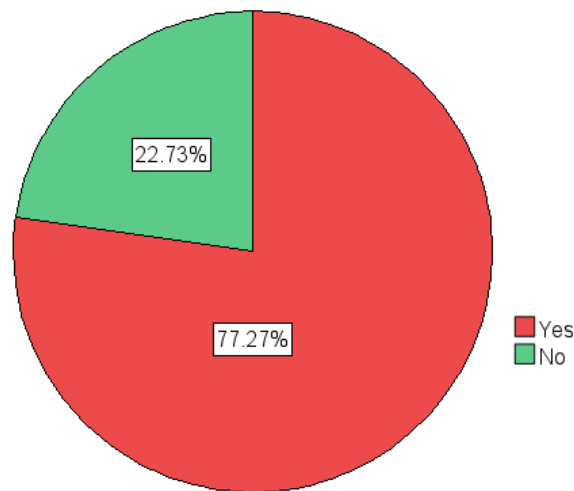


**Figure 3. 5: The Content of Writing Techniques Module**

### Section Three: Academic Writing

#### 1) **Item One:** The study of academic writing in class

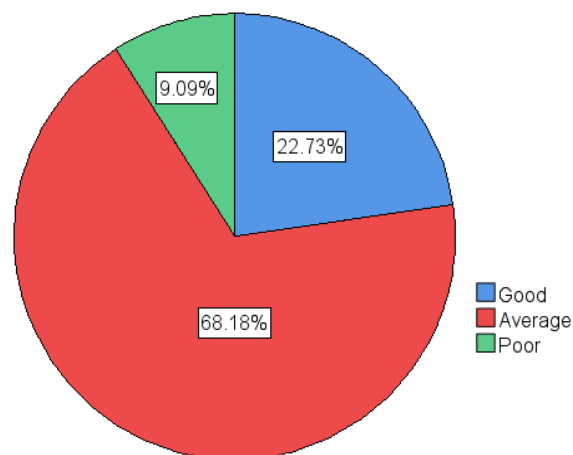
From the table above, majority of respondents (77.27%) said yes to the question of studying academic writing in class, while the remaining (22.73%) said no. A sub-question was about the topics covered in class for those who answered yes. Responses from students highlighted a lack of understanding on academic writing and its characteristics, where the responses provided by included essay writing, paragraph writing, ideas outlining, thesis statement writing, proofreading and editing.



**Figure 3. 6: The Study of Academic Writing in Class**

#### 2) **Item Two:** Evaluation of academic writing skills

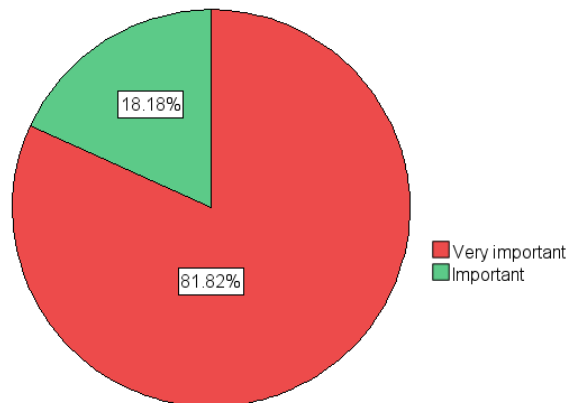
According to the survey, most students (68.2%) indicated that their academic writing abilities were average, while only 22.7% considered them good. In contrast, a small percentage of students (9.1%) admitted to having poor academic writing skills.



**Figure 3. 7: Evaluation of Academic Writing Skills**

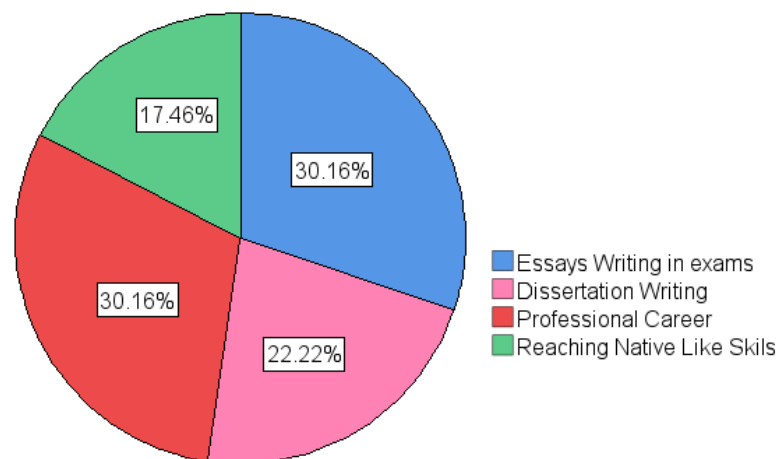
3) **Item Three:** The importance of improving academic writing skills

Based on the information provided, all students acknowledged an importance of enhancing their academic writing abilities. A significant majority of participants (81.8%) reported that improving their academic writing skills is of utmost importance, while a notable proportion of four students (18.2%) mentioned that enhancing their academic writing skills holds importance.



**Figure 3. 8: The Importance of Improving Academic Writing Skills**

4) **Item Four:** Categories students think academic writing can develop

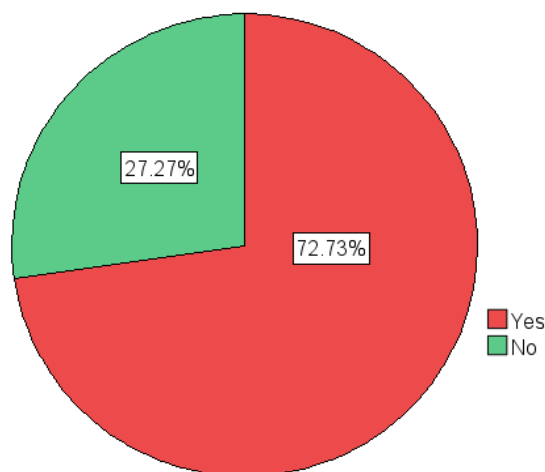


**Figure 3. 9: Aspects of Development Students Think Academic Writing Can Develop**

The findings derived from the above chart indicate that students anticipate improvement in various areas. The two areas that are perceived to progress equally

are essay writing and professional career, accounting for 30.16% of the responses. Following closely is the area of dissertation writing, which is expected to show advancement according to 22.22% of the participants. Conversely, achieving native-like proficiency appears to be the least prioritized area (17.46%).

5) **Item Five:** The use of technological tool to assist when writing



**Figure 3. 10: Use of Technological Tools**

A large percentage of participants (72.7%) indicated their use of assistant technological tools in academic writing, while the remaining respondents (27.3%) do not. Of those who agreed, the majority (56.25%) reported using AI-based tools such as Grammarly, QuillBot, Google Bard, and ChatGPT. In contrast, the rest mentioned using Google and their smart phones for their writing tasks.

## 2.2. Analysis of the Pre-test

Prior to the treatment, 19 students completed a writing test. Subsequently, the corrections were carried out and points were awarded based on six main criteria: formal vocabulary utilization; avoidance of abbreviations, contractions, and acronyms; elimination of slang and idiomatic expressions; utilization of longer sentences; the use of noun-based phrases and finally objective tone. As a result, the grading process was conducted fairly to ensure the validity of the outcomes. SPSS program was used to analyze the data and transform these data into figures.

### 2.2.1. The results of the Pre-test

The data presented in the table illustrates the final mark of the pre-test:

Students' N	Minimum	Maximum	Mean Score (MS)	Standard Deviation (SD)
19	1,6	9,3	4,6474	1,87894

**Table 3. 2: Pre-test Final Mark**

The pre-test had a maximum score of 12, with the mean score (MS) for the entire class being 4,64 and a standard deviation (SD) of 1,878. The SD measures how much students' scores differ from the MS; the lower SD is compared to the MS, the smaller the variation in the scores is, but if the SD is much larger and is somehow equivalent to the MS, it indicates a higher variability in the scores. The lowest score was 1,6 out of 12, while the highest was 9,3 out of 12 as shown in the table below.

Criteria	Students' N	Minimum	Maximum	MS	SD
<b>Objectivity</b>	19	0	2	0,5789	0,83771
<b>Formal Vocabulary</b>	19	0,2	1,8	0,7053	0,39366
<b>Exclusion of Slangs &amp;Idioms</b>	19	0	2	1,5000	0,60093
<b>Absence of Abbreviations, Contractions, Acronyms</b>	19	0	2	1,5000	0,55277
<b>Longer Sentences</b>	19	0	1,5	0,3947	0,54209
<b>Noun-based Phrases</b>	19	0	1	0,0789	0,25073

**Table 3. 3: Pre-testCriteria Marks**

### 2.2.2. Discussion of the Pre-test

From the above table, students' level in academic writing is observed. Beginning with the pre-test mean score (4,64/12) which indicates that the samples are low in writing academically since their mean score was below the average (6/12).

Concerning the five criteria results, the mean scores varied in each criterion. Firstly objectivity, majority of students had below average point (0,57/2) which indicates that they are being subjective when writing. Moving to formal vocabulary with mean score of 0,70/2 with a minimum point of 0,2/20. This implies that students do not use formal terms and are not aware of the formal and non-formal terms implied when writing. Surprisingly, in the criteria of Exclusion of Slangs & Idioms and Absence of Abbreviations, Contractions, Acronyms, majority of students had an above average mark (1,5/2) where it shows great proficiency in the two mentioned criteria. Remaining longer sentences and noun-based phrases categories with below average of 0,39/2 and 0,07/2. This shows a very low performance and high use of verbal phrases and shorter T-units.

Overall, the pre-test results showed that students have poor writing performance unlike the data obtained from the pre-questionnaire which indicated that they had average to good performance. Students' writing performance was poor according to the pre-test results especially in terms of objectivity, longer sentences and noun-based phrases.

### 2.3. Analysis of Post-test

Following the same steps done in the pre-test, SPSS program was used to analyze post-test data and transform it into tables and figures.

#### 2.3.1. The results of the Post-test

The table below demonstrates the ultimate score achieved in the post-test:

N	Minimum	Maximum	MS	SD
19	3	9,3	5,1316	1,63097

**Table 3. 4: Post-test Final Mark**

The post-test had a lowest score was 3 out of 12, while the highest was 9,3 out of 12 as shown in the table below with MS of 5,13 and a SD of 1,63.

Criteria	N	Minimum	Maximum	MS	SD
Objectivity	19	0	2	0,5789	0,83771
Formal Vocabulary	19	0,4	1,8	0,7421	0,35795
Exclusion of Slangs & Idioms	19	0	2	1,5526	0,52427
Absence of Abbreviations, Contractions, Acronyms	19	0	2	1,5000	0,55277
Longer Sentences	19	0,5	1,5	0,6746	0,32540
Noun-based Phrases	19	0	1,5	0,6579	0,41003

Table 3. 5: Post-test Criteria Marks

### 2.3.2. Discussion of the Post-test

The table above highlights students' level in academic writing after being exposed to ChatGPT. Beginning with the post-test MS (5,13/12) which indicates that the samples still have a low performance with a minimum score of 3/12 and a maximum score of 9,3/12.

Concerning the five criteria results, the mean scores varied in each criterion. Firstly objectivity, majority of students had below average point (0,57/2) which indicates that they are being subjective when writing. Moving to formal vocabulary with mean score of 0,74/2 with a minimum point of 0,4. This implies that students still do not use formal terms and are not aware of the formal and non-formal terms implied when writing. In the evaluation of Exclusion of Slangs & Idioms and Absence of Abbreviations, Contractions, Acronyms, a majority of students obtained above average marks (1.55/2; 1.50/2), demonstrating a commendable level of proficiency in these two criteria. Conversely, the categories of longer sentences and noun-based phrases received below average scores of 0.36/2 and 0.65/2, indicating a lower performance and a higher utilization of verbal phrases and shorter T-units.

Overall, the post-test results showed that students have poor writing performance unlike the data obtained from the pre-questionnaire which indicated that they had average to good performance. Students' writing performance was poor

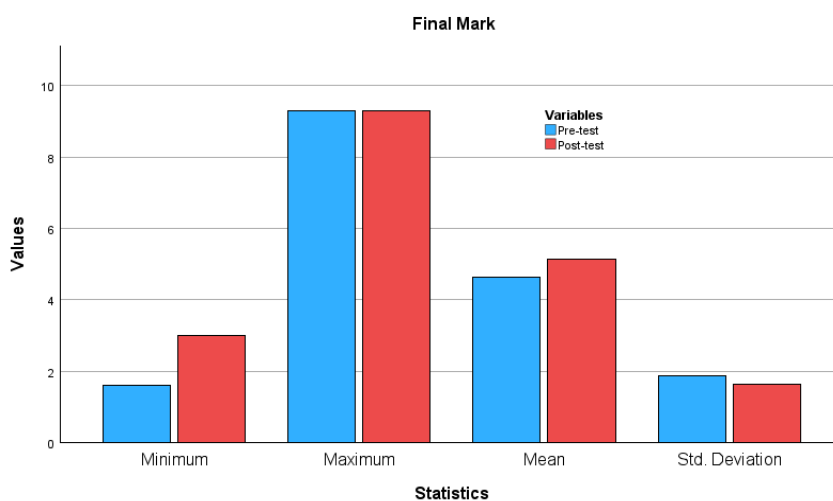
according to the pre-test results especially in terms of objectivity, longer sentences and noun-based phrases.

## 2.4. Paired Sample Tests Comparison

In order to validate or refute the research hypothesis which states that ChatGPT will raise the academic performance of students in terms of formality, objectivity and syntactic complexity, a comparison is needed to be done between the pre-test results and post-test ones.

### 2.4.1. Paired Sample Tests Final Mark

The figure illustrates a comparison between pre, post-test final mark in terms of the minimum and maximum mark obtained as well as MS and SD. It is seen that the least mark obtained is the post-test is 3 out of 12, whereas the one obtained in the pre-test is less by 1,6 out of 12. The maximum mark taken is the same in the pre and post-test with 9,3 out of 12. MS exhibits an increase in value going from 4,64 in the pre-test to reaching 5,13 in the post-test; however, SD shows a decrease from 1,87 to 1,63 between the pre and post-test.

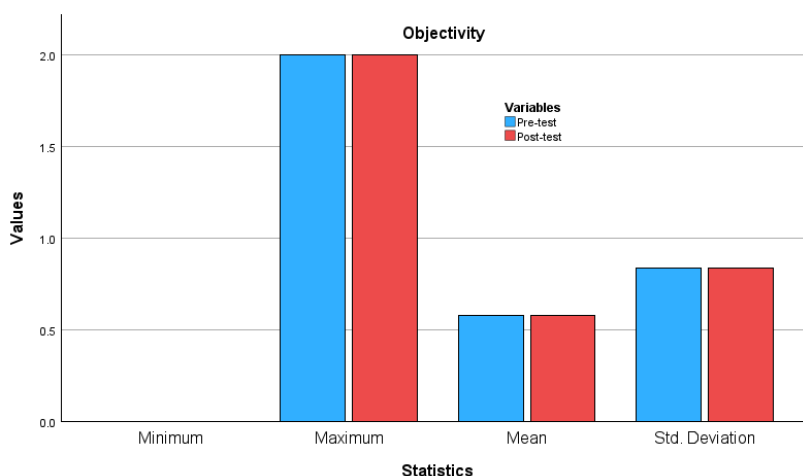


**Figure 3. 11: Paired Sample Tests Final Mark**

### 2.4.2. Paired Sample Tests Objectivity

The chart displays a contrast between pre, post-test objective language exhibited in students' written test. Interestingly, the data shows that there is no change between the values obtained in the pre and post-tests with the lowest score obtained in

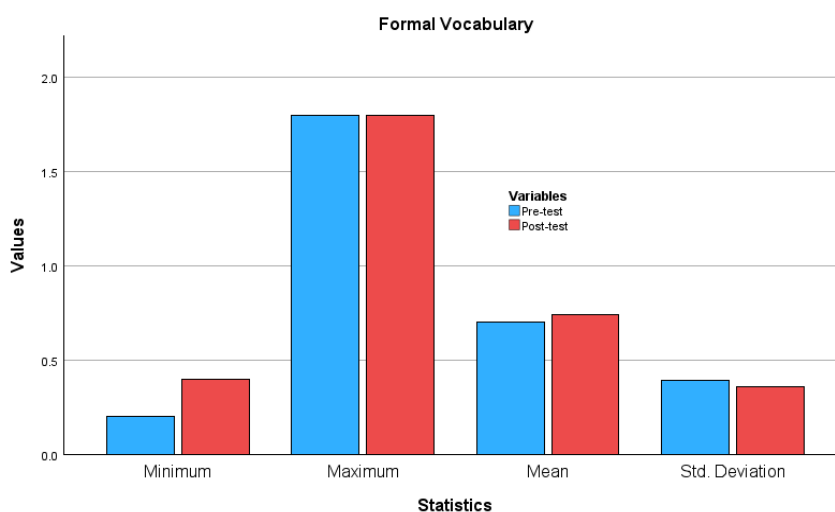
both of the tests being 0 out of 2, maximum score achieved being 2 out of 2, MS being 0,57 and SD being 0,83.



**Figure 3. 12: Paired Sample Tests Objectivity**

### 2.4.3. Paired Sample Tests Formal Vocabulary

The diagram displays a comparison between pre, post-test formal vocabulary usage displayed in students’ papers. The lowest score achieved in the pre-test is 0,2/20, while the score in the post-test increased by 0,2, resulting in a score of 0,4/20. The maximum score remains unchanged between the pre and post-test with value of 1,8/20. MS shows a slight increase, rising from 0,70 in the pre-test to 0,74 in the post one. SD however exhibits a slight decrease dropping from 0,39 in the pre-test to 0,35 in the post-test.



**Figure 3. 13: Paired Sample Tests Formal Vocabulary**

### 2.4.4. Paired Sample Tests Exclusion of Slangs & Idioms

The figure presents a comparison between pre, post-test exclusion of slangs and idioms. It is evident that the minimum and maximum mark obtained is the pre-test remain the same as those from the post-test with the lowest score being 0/2 and the highest score being 2/2. MS exhibits an increase in value going from 1,50 in the pre-test to reaching 1,55 in the post-test; however, SD decreases from 0,60 to 0,52 between the pre and post-tests.

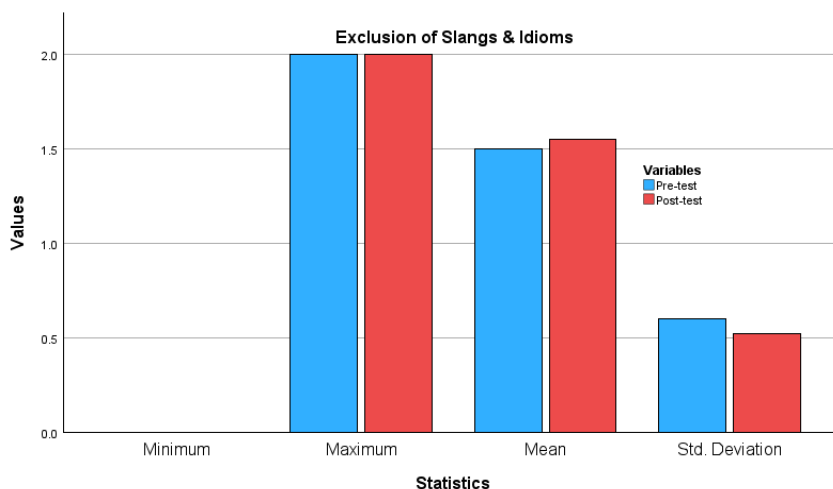


Figure 3. 14: Paired Sample Tests Exclusion of Slangs & Idioms

### 2.4.5. Paired Sample Tests Absence of Abbreviations, Contractions, Acronym

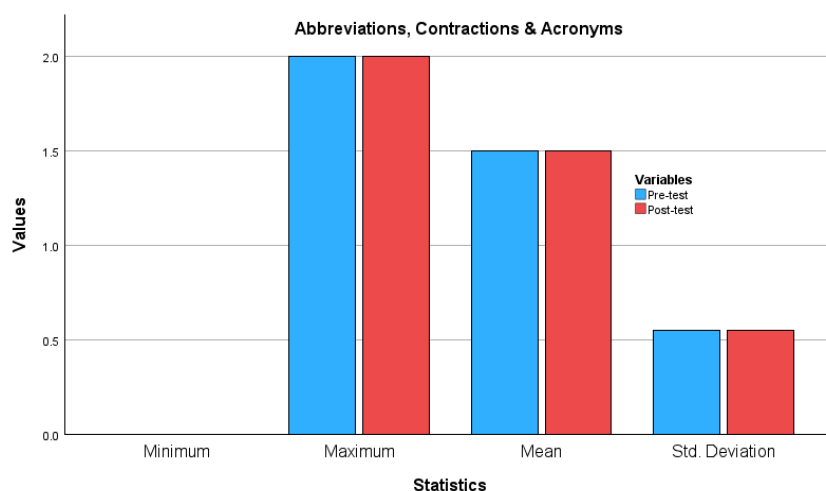


Figure 3. 15: Paired Sample Tests Absence of Abbreviations, Contractions, Acronym

The data presented in the chart shows a contrast of absence of abbreviations, contractions and acronyms between students' tests. The data shows no variation in values, with the lowest score in both tests being 0/2, maximum score being 2/2, MS being 1,50 and SD being 0,55 in both pre and post-test.

### 2.4.6. Paired Sample Tests Longer Sentences

The figure presents a comparison between pre, post-test longer sentences used in students' written compositions. It is evident that the minimum score has increased from the post-test by 0,5/2; the maximum mark obtained is the pre-test remain the same as those from the post-test with the lowest score being 0/2 and the highest score being 1,5/2. MS exhibits an increase in value going from 0,39 in the pre-test to reaching 0,67 in the post-test; however, SD decreases from 0,54 to 0,32 between the pre and post-tests.

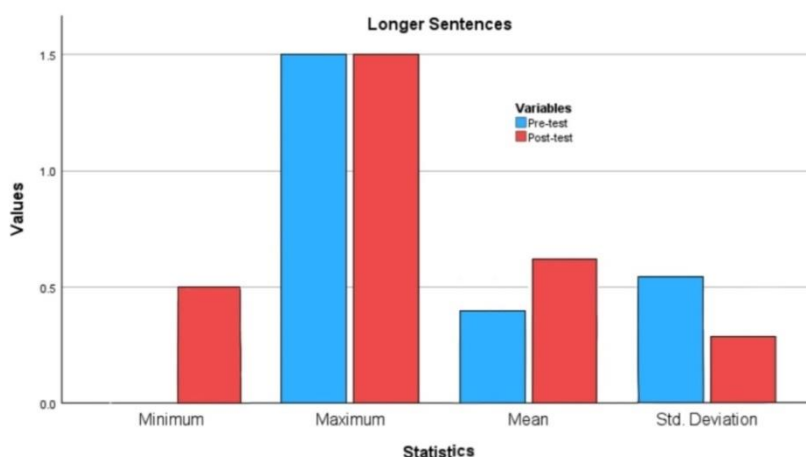
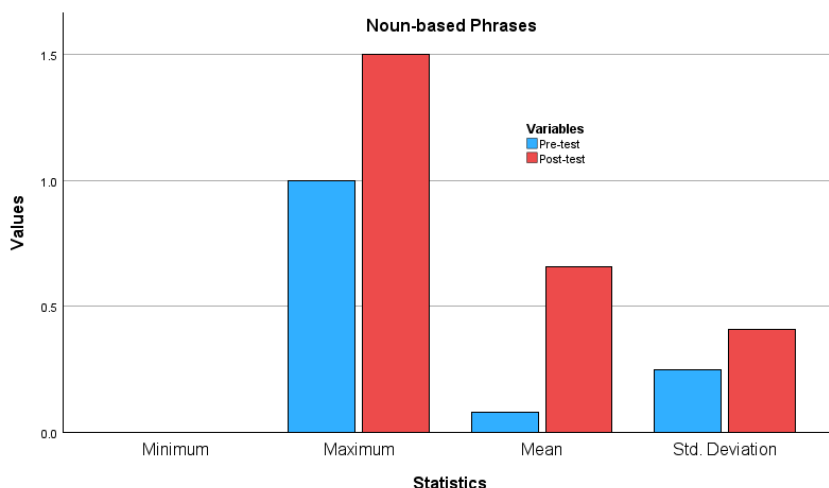


Figure 3. 16: Paired Sample Tests Longer Sentences

### 2.4.7. Paired Sample Tests Noun-based Phrases

The chart illustrates a disparity in the use of noun-based phrass displayed in students' pre, post-tests. The data shows a huge score variations. The lowest score obtained in both tests are 0 out of 2; however, maximum score achieved rising from 1out of 2 to reaching 1,5 out of 2. MS and SD experience a substantial increase, with MS rising from0,07 to 0,65 and SD increasing from 0,25 to 0,41.



**Figure 3. 17: Paired Sample Tests Noun-based Phrases**

### 2.4.8. Paired Sample Tests Results Discussion

Based on the data presented above and the information in the table below, it can be observed that there is clear progress in some criteria between the pre-test and post-test while other criteria remain unchanged. Beginning with the criteria that witnessed no change: objectivity and absence of abbreviations, contractions & acronyms criteria; there was no noticeable improvement with MS and SD being the same for the pre and post tests alike. Therefore, there was no progress seen in the two criteria as a result of using ChatGPT.

Concerning formal vocabulary, there was an increase in the MS between the two tests with a Mean Difference (MD) of 0,036. Mean Difference represents the progress value between the two tests, it is calculated by subtracting pre-test values from post-test values (post-test value minus pre-test values equals MD). Therefore, there is an improvement regarding student performance in applying formal terms. Moving forward to Exclusion of slangs & idioms, there was also an increase in the MS with an MD of 0,052. Therefore, it is to say that there is a progress regarding student performance in language that is free from figurative language and cultural-specific phrases.

Next area is longer sentences where there was an increase in sentence length with an MD of 0,27 between the pre and post-test. This indicates that students have incorporated a range of T-unites in the post-test as opposed to the pre-test. The

last category of noun-based phrases that showed the highest improvement among the other criteria had an MD of 0,579 with an MS of 0,65 in the post-test and 0,07 in the pre-test. This suggests that students have used more nominal phrases in the post-test compared to the pre-test. Table 3.5 provides more details about the tests' variations.

Criteria	Tests	MS	Mean Difference
<b>Objectivity</b>	Pre-test	0,5789	0
	Post-test	0,5789	
<b>Formal Vocabulary</b>	Pre-test	0,7053	0,0368
	Post-test	0,7421	
<b>Exclusion of Slangs &amp; Idioms</b>	Pre-test	1,5000	0,0526
	Post-test	1,5526	
<b>Absence of Abbreviations, Contractions, Acronyms</b>	Pre-test	1,5000	0
	Post-test	1,5000	
<b>Longer Sentences</b>	Pre-test	0,3947	0,2799
	Post-test	0,6746	
<b>Noun-based Phrases</b>	Pre-test	0,0789	0,579
	Post-test	0,6579	

**Table 3. 6: Paired Sample Tests Variations**

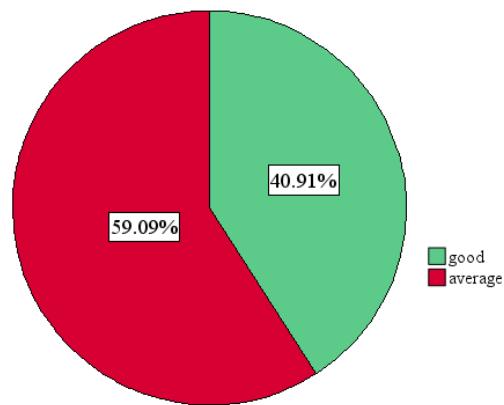
## 2.5. Analysis of the Post Questionnaire

The post-questionnaire was administrated to the same sample selected for this research whom they were Master one English students who were specializing in the field of Didactics and Applied Linguistics at Abdelhamid Ibn Badis University of Mostaganem. A total number of 22 respondents completed the post-questionnaire, and it comprised of nine items, categorized into three sections.

### Section one: Academic Writing

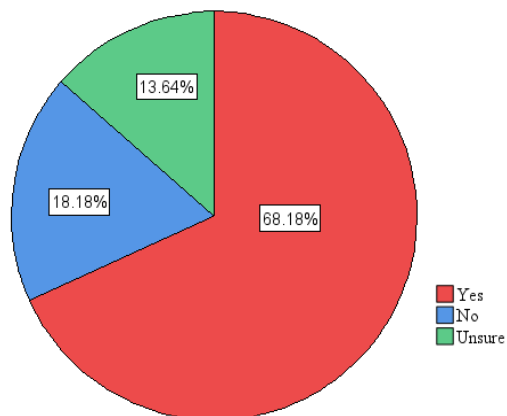
#### 1) Item One: Academic Writing Evaluation After Using ChatGPT

According to the survey data, most students (59.09%) indicated that their academic writing abilities were average, while only 40.91% considered them good. Interestingly, no student reported that his/her academic writing skills are poor.



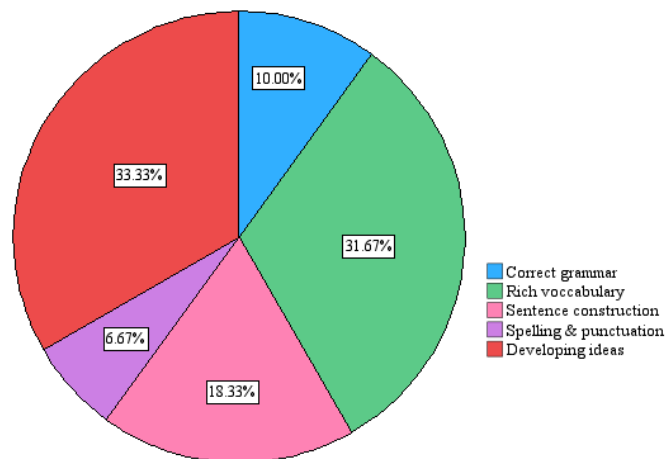
**Figure 3. 18: Academic Writing Evaluation**

**2) Item Two: Writing Style Improvements After Using ChatGPT**



**Figure 3. 19: Writing Style Improvements**

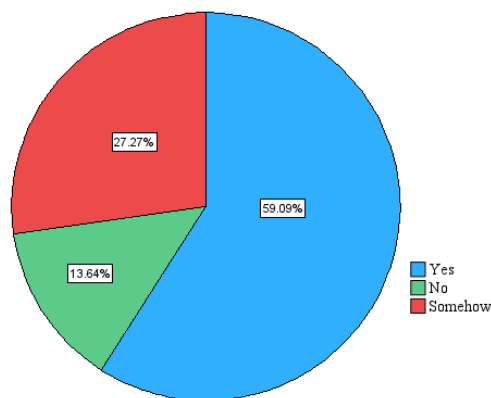
A large percentage of students (68.18%) stated that the use of ChatGPT aid their writing style. Conversely, a small fraction of respondents (18.18%) expressed a negative perception, while the minority (13.6%) remained unsure. The preceding part of this question addressed students' specific areas they feel they improved in as a result of ChatGPT. Majority of them (33.3%) found ChatGPT beneficial in their ideas development, while31.7% acknowledged its rule in enriching their vocabulary. Additionally, 18.3% reported improvement in sentence construction, with10% revealing the tool's contribution in correct grammar. The minority (6.7%) said that ChatGPT helped their spelling and punctuation.



**Figure 3. 20: Areas of Improvement**

### Section Two: Perception on ChatGPT as an Assistant

#### 1) Item One: ChatGPT Easy Use as a Writing Assistant

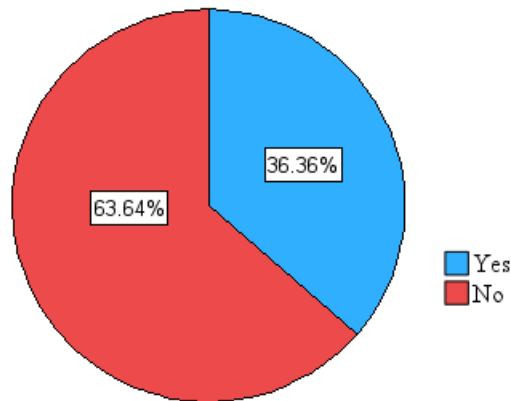


**Figure 3. 21: ChatGPT Easy Use**

Based on the information provided, a significant majority of participants (59.1%) indicated that they found ChatGPT easy to use, while a significant proportion of six students (27.3%) stated that the tool is somehow easy. The minority (13.6%) reported a difficulty when using ChatGPT as a writing assistant.

#### 2) Item Two: Challenges Encountered when using ChatGPT

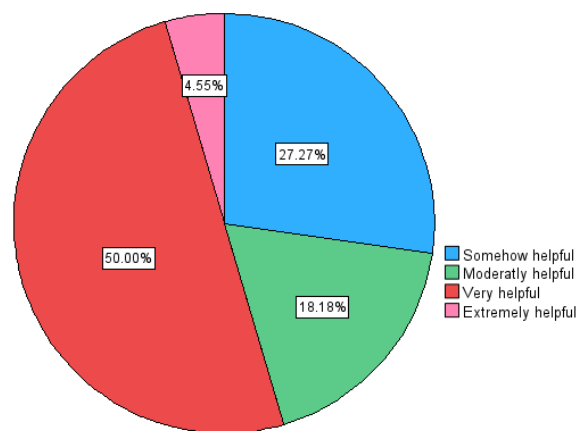
The majority of respondents (63.6%) said no to the question of Challenges faced while using ChatGPT, while the remaining respondents (36.4%) acknowledged facing such challenges. These Challenges include ChatGPT not comprehending what the student want as an answer in addition to answers that are broad or out of context.



**Figure 3. 22: ChatGPT Challenges**

**3) Item Three: The degree of ChatGPT’s help**

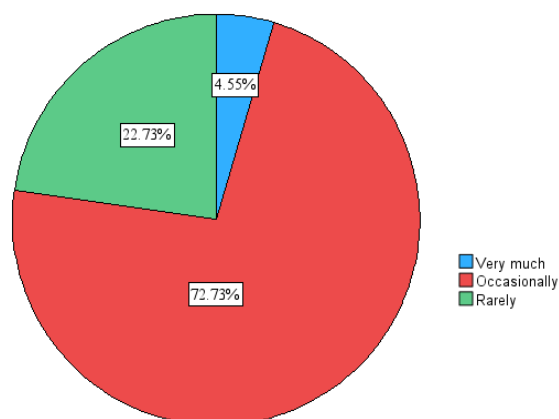
According to the data presented in the table, it is evident that only a single student (4.5%) expressed the extreme helpfulness regarding ChatGPT. Conversely, half the participants (50%) agreed that ChatGPT is very helpful; with a notable proportion of six students (27.3%) agreeing that ChatGPT is somehow helpful and a proportion of four students (18.2%) agreeing that the tool is moderately helpful.



**Figure 3. 23: The Degree of ChatGPT’s Help**

**4) Item Four: The Frequency of Using ChatGPT During Writing Sessions**

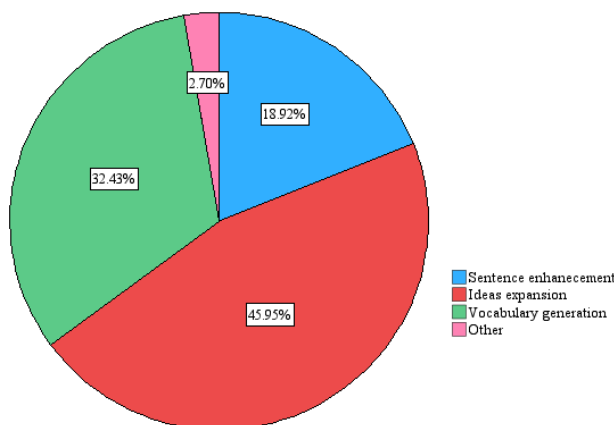
The majority (72.7%) of the respondents expressed an occasional engagement with ChatGPT in the writing practices. Conversely, a smaller proportion (22.7%) indicated a rare use of the tool, with only a single student (4.5%) using it extensively.



**Figure 3. 24: The Frequency of Using ChatGPT**

**5) Item Five: ChatGPT’s Functions found most helpful**

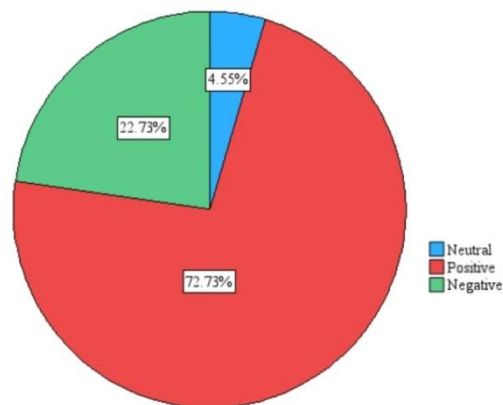
The findings of the chart and the table indicate that students anticipate improvement all mentioned areas. The one area that perceived most progress is ideas expansion with 32.4%. Following closely is the area of vocabulary generation with 32.4%. Sentence enhancement appears to be the least helpful function of ChatGPT (18.9%). Only one sample (2.7%) picked other function which was spelling s/he found beneficial.



**Figure 3. 25: ChatGPT’s Functions Found Most Helpful**

**6) Item Six: The impact of ChatGPT on the overall writing performance**

Interestingly, more than half (72.7%) of the respondents reported positive view towards the tool, whereas 22.7% of them indicated a negative perception of its impact. Only a single sample maintained a neutral stance in regard ChatGPT overall writing performance.

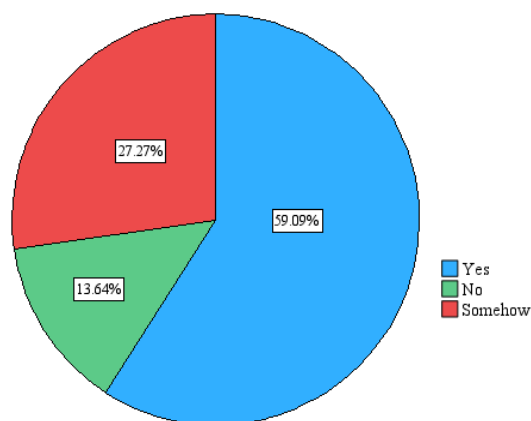


**Figure 3. 26: ChatGPT's Impact on Writing Performance**

### Section Three: Feedback of the teaching Approach

#### 1) Item One: The Influence of The Teaching Approach

Thirteen participants (59.1%) expressed that the teaching method played a crucial role in comprehending ChatGPT, while a significant proportion of six students (27.3%) mentioned that the teaching approach had some level of impact. The minority (13.6%) reported no influence of the teaching approach in regard understanding the use of ChatGPT as a writing assistant.



**Figure 3. 27: The Influence of the Teaching Approach**

### **3. General Discussion**

The current study aims at testing the effectiveness of ChatGPT, an AI tool, on enhancing academic writing quality of first year master's students enrolled in DAL. It was hypothesized that ChatGPT can improve of students' formality, objectivity and syntactic complexity. To break it down more specifically, it was hypothesized that the tool will increase the formal terms used, prohibit slangs, idioms, abbreviations, contractions and acronyms alongside employing more noun phrases with longer T-unites. To investigate these hypotheses, a pre-experimental design was used which indicated one-group pre and post-testing, with two questionnaires were administered, one prior to the experiment and another subsequent to it.

The findings demonstrated that the samples performed well in the post-test as contrast to the pre-test where students scored a MD of 0,48 overall between the pre and post-tests. However, upon closer examination of each criterion individually, it became evident that not all of them showed improvement. Specifically, students did not make progress in the areas of objectivity and the absence if abbreviations, contractions and acronyms with a MD of 0. This confirms that ChatGPT did not aid students in maintain an objective language that is free from abbreviations, contractions and acronyms.

On the other hand, there was a notable enhancement in criteria of formal vocabulary, exclusion of slangs and idioms noun-based phrases as well as longer T-unites. Supported by the data taken from table 3.16, it is confirmed that ChatGPT increases the amount of formal terms, nominal phrases and longer sentences in addition to prohibiting figurative language and cultural expressions found in students' written compositions. Therefore, the hypothesis put forward is partially confirmed, while the other part is invalidated.

### **4. Limitations & Recommendations for the Study**

It is important to acknowledge certain limitations that should be taken into account. First of all, the study's sample size; since the sample chosen for this particular study was the convenience sampling method, this approach does not allow generalizability of the finding. Therefore, to enhance the generalizability of findings, it is recommended for future researchers to opt for a different sampling method in

order to generalize the results of ChatGPT impact on academic writing proficiency. They can also broadening the scope of investigation to encompass vast students.

The experiment was performed on three academic writing principles only, namely formality, objectivity and syntactic complexity. As such, it is unknown what impact and potential ChatGPT model in increasing other principles of academic writing. Therefore, it is recommended not to acknowledge ChatGPT complete impact until the necessary investigation is done on its impact on the remaining academic principles. Along of the reasons why the experiment was not crowned with success was due to: (1) the short period of experimenting which was estimated by five sessions only, in addition to (2) an interruption of studies (holidays) that held back the actual ongoing experiment, thus, disrupting the validation of the hypothesis by not giving them a proper chance to confirm them by experimentation.

Lastly, the investigation in hand used ChatGPT with GPT-3.5 Turbo version due to limited access to the premium version GPT-4. Furthermore, given the fast and continuous development and alterations of the chatbot, the findings might not be applicable to newer versions and the premium version without considering differences to version.

## **5. Conclusion**

This chapter spotlights the practical part of the research. It opens with an analysis of the quantitative and qualitative data collection instruments used: the pre-questionnaire, the pre-experiment and the post-questionnaire. After that, the data obtained was organized, described and interpreted. From the analysis of the results, it becomes apparent that the independent variable (ChatGPT) has a partial positive effect on the dependent variable (academic writing). Therefore, the proposed hypothesis is partially validated, while the other part is refuted.

## General Conclusion

In this chapter, an investigate was done in order to capture the effect of ChatGPT on enhancing first year master's students' academic writing level of competency at Abdelhamid Ibn Badis University of Mostaganem. To meet the research objectives, it was hypothesized above that students will build upon their performance in academic writing in terms of objective, formal, and complex tone of language. More specifically, students will incorporate higher formal terms, more noun phrases and larger T-unites in addition to avoiding slangs, idioms, abbreviations, contractions and acronyms alongside acquiring an objective tone.

Testing the hypothesis required first a theoretical detailed overview about academic writing and ChatGPT. Then, the methodology chapter was incorporated in order to test the hypothesis in terms of concrete data, statistics and numbers. The study necessitated the use of both qualitative and quantitative research tool, which are two questionnaires and an experiment. The obtained results were analyzed using IBM SPSS Statistics 29.0 in order to whether accept or reject the research hypothesis.

The findings of the experimentation revealed that participants in the significantly designated improvement in the post-test after receiving the assistant of ChatGPT as a sentence enhancer, vocabulary generator and an ideas expander; the samples progressed in the criteria of incorporating higher formal terms, more noun phrases and larger T-unites in addition to avoiding slangs, idioms. On the other side, the group subjects registered no improvement after receiving the treatment in the areas of objectivity and absence of abbreviations, contractions and acronyms. These findings provide evidence to support the research hypothesis that ChatGPT has a partial positive impact on the academic written productions of EFL learners.

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# Appendices

**Appendix A:** Students' Pre Questionnaire

**Appendix B:** Lecture of Academic Writing

**Appendix C:** ChatGPT PowerPoint Presentation

**Appendix D:** ChatGPT's Workshop

**Appendix E:** Students' Post Questionnaire

# Appendix A

## Pre Questionnaire

Dear students, you are kindly required to answer the following questions as honestly as possible. You may put a cross (X) in the boxes to indicate your answer. Please note that your answers will be kept anonymous, confidential and used for research purposes only.

Thank you for cooperating

### Section One: Background Information

- Age:

### Section Two: Writing Skill

1) My writing skills have developed throughout my university years (L1, L2, L3).

Strongly Agree  Agree  Neutral  Disagree  Strongly Disagree

2) I have developed in terms of (you can choose multiple answers):

Correct Grammar

Rich Vocabulary

Sentence Construction

Spelling and Punctuation

Developing ideas

3) How do you evaluate your level in writing?

Good  Average  Poor

4) What was your mark of writing exam of the first semester:

Below Average (5-9)  Average (10-11)  Good (12-15)

Excellent (16-20)

5) This first semester's lesson content of writing module was:

Not Interesting  Interesting  Very Interesting

**Section Three: Academic Writing**

1) Did you study academic writing in class?

Yes  No

If yes, please state what have you tackled in class:

.....  
.....  
.....

2) How do you evaluate your level of writing academically (formal use of language, objectivity, complexity, cautious language?)

Good  Average  Poor

3) How important do you think you need to improve you academic writing?

Very important  Important  Not important

4) In what aspects you think academic writing can help you in? (you can choose multiple answers)

Writing essays in exams

Dissertation writing

Professional career

Reaching native-like writing skills

5) Do you use any type of technological tool to assist you when writing?

Yes  No

If yes, please say what is that technological tool: .....

Thank you for your cooperation

# Appendix B

## Academic Writing Principles

Academic writing, or scientific writing, is a genre utilized in prestigious educational institutions such as universities, research organizations and other higher learning institutes to present research, theories, and arguments. It is characterized by:

1) **Formality**: is used to achieve a definitive understanding of the exact intended meaning to readers. It has a set of rules one must adhere to:

- **No Abbreviations, Acronyms or Contractions**: words must be presented in their complete form. **Contractions** are shortened words made by combining two words and replacing the omitted letters with an apostrophe (’). For example: **didn’t** (did + not), **couldn’t** (could + not), and **they’ve** (they + have). **Abbreviations** are shortened forms used to represent words or phrases. It involves removing syllables (app = application, ad = advertisement). **Acronyms** are formation of initials pronounced together as a single word (NASA = National Aeronautics and Space Administration, PIN = Personal Identification Number). Instead one can use **Initialisms**, which refer to using initials but each letter is pronounced individually. For example: **EFL** (English Foreign Language, **CIA** = Central Intelligence Agency).
- **No Idioms & Slangs**: figurative language used within a culture or a community
- **No Linkers & Hesitation Fillers**: umm, OK, well, you know...
- **Formal Vocabulary**: Formal words consist of three or more syllables and are typically has **French/Latin origin**, unlike words of **Anglo-Saxon origin** that are short and straightforward, comprising of one or two syllables. For example:

Anglo-Saxon origin words	French/Latin origin words
Child	Infant
Old	Ancient
Freedom	Liberty
Sun	Solar
Fear	Phobia
Sea	Ocean
Food	Cuisine
Help	Assistance

2) **Objectivity:** Objectifying academic texts restrict the use of **personal pronouns (I, you, we)** which displays informality. Instead, it is advisable to substitute them with **introductory pronouns (it, there)** or **the impersonal pronoun (one)** combined with passive tense verbs.

3) **Syntactic Complexity:** Academic writing takes complexity further with a wider range of longer sentences and noun-based phrases

**Longer Sentence:** Academic writing is linguistically challenging due to its complex sentence structures known as T-units, which consist of an independent clause or more and its dependent clause (s).

- **Noun-based Phrases:** Instead of the use of verbal phrases, academic writing rely on nominal phrases. For instance: “The experiment showed a clear correlation between the degree of long-term memory and language growth”. This style can be modified as follows: “The demonstration of a clear correlation between the degree of long-term memory and language growth was exhibited in the experiment”.

### **Example:**

We don't really know what language come from but many people have talked about it for a long time. Some researchers have tried to find ways for us to make us understand it more but I think that language is something we use for communicating, not an object for us to study and we remember that when we teach and test it.

The question of what constitutes “language” and its nature has been the core of many debated issues. Researchers have proposed and implemented various approaches of making language more comprehensible to individuals but it is believed that language serves as a medium of communication rather than an object of investigation.

# **Appendix C**

## **ChatGPT PowerPoint Presentation**

# ChatGPT

**Chat Generative Pre-trained Transformer**



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# 01. ChatGPT

Chat Generative Pre-trained Transformer



□ **ChatGPT** is an AI conversational interface developed by **OpenAI**, and released on **November, 2022**.

□ This chatbot is able to engage in authentic and realistic conversations with users, by mimicking the human cognitive abilities (thinking, creativity, problem solving, decision making, intelligence).

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**02.**

# **How to use it?**



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New chat



ChatGPT 3.5

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Today

NLP Understanding Difficulty

Previous 7 Days

Academic Writing Overview

Previous 30 Days

Informed Consent in Experiments

Early Tech in Writing

January

Goal-Based Chatbots Explanation

Chatbots: NLP and Beyond

NLP Programs Overview

AI Systems Overview

Feigenbaum's Expert Systems



Upgrade plan

Get GPT-4, DALL-E, and more



Rabab Kaddouri



How can I help you today?

**Come up with concepts**

for a retro-style arcade game

**Compare marketing strategies**

for sunglasses for Gen Z and Millennials

**Design a database schema**

for an online merch store

**Suggest some names**

for my cafe-by-day, bar-by-night business

Message ChatGPT...



ChatGPT can make mistakes. Consider checking important information.





**You**

What is academic writing?



**ChatGPT**

Academic writing refers to a style of writing used in academia, primarily in scholarly or research-oriented contexts. It is characterized by its formal tone, clear and concise language, adherence to specific formatting styles (such as APA, MLA, or Chicago), and reliance on evidence-based arguments supported by credible sources.

**03.**

# **ChatGPT Capabilities in Academic Writing**



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## **Sentence Enhancer**

- Alternative Phrasing
- Noun-based phrases
- Improving Clarity



## **Vocabulary Generator**

- Formal terms and synonyms
- Transitional words



## **Ideas Expander**

- Brainstorming assistance
- Innovative solutions

# Sentence Enhancer



**You**

What is academic writing?



**ChatGPT**

Academic writing refers to a style of writing used in academia, primarily in scholarly or research-oriented contexts. [REDACTED]

language, adherence to specific formatting styles (such as APA, MLA, or Chicago), and reliance on evidence-based arguments supported by credible sources.

# Vocabulary Generator



**You**

Give me alternative phrasing for the following sentence: Academic writing refers to a style of writing used in academia, primarily in scholarly or research-oriented contexts.



**ChatGPT**

Academic writing **pertains** to a form of expression commonly employed within academic circles, predominantly in scholarly or research-driven environments.





**You**

give me formal synonyms for the verb "pertains."



**ChatGPT**

Formal synonyms for the verb "pertains" include:

1. Relates
2. Concerns
3. Applies
4. Corresponds
5. Refers to
6. Relates to
7. Appertains to



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# Ideas Expander



**You**

can you expand the idea of money can't buy happiness



**ChatGPT**

Having lots of money might buy fancy things and make life easier, but it doesn't guarantee happiness. Real happiness comes from spending time with loved ones, doing things we enjoy, and feeling fulfilled inside. Sometimes, chasing after more and more money can make us forget about the things that truly matter, like kindness, laughter, and good memories. While money can buy things, it can't buy the warm feeling of friendship or the joy of helping others. So, while it's nice to have enough money to live comfortably, it's important to remember that true happiness comes from the heart, not the wallet.



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# 04.

## Conclusion



□ **ChatGPT** can provide numerous advantages in **Academic Writing Style** if used properly.

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# Thank You

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# Appendix D

## ChatGPT's Workshop

### 1. ChatGPT as a Sentence Enhancer

- Can you rewrite the following phrase .....
- Change the structure of the following phrase.....
- Give me a sentence that starts with a noun phrase about.....
- Change the following sentence while maintaining the meaning.....
- Rephrase this sentence to make it sound more formal.....

### 2. ChatGPT as a Vocabulary Generator

- Provide me with the synonym of the word.....
- Provide me with formal verbs that belong to the context of .....
- Give me a more formal term for word.....

### 3. ChatGPT as an Ideas Expander

- Can you help me expand on the implications of the idea of.....
- Can you provide more information or insights related to this idea.....
- Can you elaborate on the main points of this topic.....

# Appendix E

## Post Questionnaire

Dear students, you are kindly required to answer the following questions as honestly as possible. You may put a cross (X) in the boxes to indicate your answer. Please note that your answers will be kept anonymous, confidential and used for research purposes only.

Thank you for cooperating

### Section One: Academic Writing

1) How would you evaluate your performance in academic writing after using ChatGPT?

Good  Average  Poor

2) Have you noticed any improvements in your writing style since using ChatGPT?

Yes  No  Unsure

If yes, please select the areas of improvements you've observed:

Correct Grammar  Spelling and Punctuation

Rich Vocabulary  Developing ideas

Sentence Construction

### Section Two: Perceptions of ChatGPT as an Assistant

1) Did you find ChatGPT easy to use as a writing assistant?

Yes  No  Somehow

2) Did you encounter any challenges while using ChatGPT?

Yes  No

If yes, please describe the challenges you faced: .....  
.....  
.....

3) How helpful did you find ChatGPT in assisting with your writing during the sessions?

Not helpful at all  Somehow helpful  Moderately helpful   
Very helpful  Extremely helpful

4) How frequently did you utilize ChatGPT during the writing session?

Very much  Occasionally  Rarely

5) Which functions of ChatGPT did you find most helpful? (Select all that apply)

Sentence enhancement  Vocabulary generation   
Idea expansion  Other

If you have used ChatGPT in any other way, please describe it:

.....  
.....

6) How do you perceive the impact of ChatGPT on your overall academic writing performance?

Positive  Neutral  Negative

**Section Three: Feedback on Teaching Approach**

1) Did the teaching approach influence your understanding on how to utilize ChatGPT effectively for academic writing?

Yes  No  Somehow

**Thank you for your cooperation**