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The impact of using artificial intelligence to enhance linguistic awareness among Arabic language students at university: A Case Study Using ChatGPT

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ABSTRACT:

This study examines the impact of using ChatGPT on enhancing linguistic awareness among university students of Arabic through written production. To achieve this objective, a quasi-experimental design was adopted, involving a control group and an experimental group, both consisting of 15 students selected purposefully. The experimental group received organised training on ChatGPT for eight weeks. During this time, they were directed towards specific texts which they enhanced using the tool (e.g. rephrasing, summarising, expanding ideas, analysing structures, modifying style and correcting errors). In contrast, the control group performed the same tasks without the aid of the tool. We also developed a framework for the components of linguistic awareness and verified its validity and reliability. Additionally, we developed a test to measure levels of awareness in both groups before and after using the tool. The results revealed statistically significant differences concerning lexical, grammatical and semantic awareness at the significance level of $\alpha = 0.01$, and regarding orthographic, morphological and stylistic awareness at the significance level of $\alpha = 0.05$, favouring the experimental group. Furthermore, post-test results for the experimental group showed statistically significant values at the 0.01 level, indicating improvement in components of linguistic awareness. However, this improvement did not reach statistical significance for morphological and lexical awareness.

The overall results of the study indicate a positive impact of using ChatGPT on enhancing linguistic awareness among students. This suggests that artificial intelligence tools, such as ChatGPT, should be integrated into the curricula of university Arabic language departments. This integration should combine theoretical and practical elements and include the development of specific writing activities and training to foster linguistic awareness among students.

Keywords: artificial intelligence, ChatGPT, linguistic awareness, Arabic language department, university students, written production.

Introduction:

There is no doubt that generative artificial intelligence (GAI) is one of the most significant technological innovations in the field of information technology in the modern era. It is a vast research domain with an active presence in various fields, enhancing the capacity of machines to

emulate the human brain and higher-order thinking skills. Those interested in the future of machines have high hopes of elevating artificial intelligence to more advanced levels of performance and effectiveness. This would reduce effort and enhance human competencies while opening up new possibilities beyond traditional or existing capabilities.

In this context, ChatGPT emerges as an advanced artificial intelligence model offering tremendous potential for solving difficult problems and overcoming complex challenges in various contexts, particularly in language teaching and learning. It has become an essential tool for teachers, enabling them to execute linguistic tasks and activities efficiently and cost-effectively, and for learners to develop their linguistic skills flexibly. Numerous contemporary studies, both Arab and foreign, have highlighted the role of this system in training learners at different levels to practise language in various contexts (Lara H. S., Endang F., Endang S., 2024) and enhancing their reading comprehension (Xi Cheng et al., 2024), oral (Jalil Fathi et al., 2024) and written (Santosh Mahapatra, 2024) production skills. ChatGPT also fosters critical, reflective and creative thinking (Harry Barton Essel et al., 2024) and enhances learners' sense of cultural diversity. It can also correct errors (Waad Alsaweed et al., 2024) and develop learners' abilities to compose and translate texts.

Investing in ChatGPT in higher education is undoubtedly as important as its application at lower educational levels, particularly in language departments. As well as the aforementioned benefits, it generates advanced linguistic models to encourage students to engage in writing and dialogue about complex and contentious issues. This develops their analytical and critical thinking skills, as well as their editing and authorship capabilities. Using this tool aims to achieve these direct objectives, but also leads to the attainment of other implicit goals. One such goal is the development of linguistic awareness among students, which we will explore in this research paper. Our review of Arab and foreign studies examining the use of the generative system (ChatGPT) in language departments revealed that most focus on its direct application, particularly in writing. Conversely, there are fewer studies that have addressed its impact on building linguistic awareness as a cognitive component that transcends grammar rules and encompasses an understanding of its structure and functions in context. This objective is as important as the others mentioned; in fact, it underpins many of them.

1. Problem of the study:

Using generative models in language teaching allows educational approaches to be enhanced, moving beyond merely presenting linguistic content to interacting with it. This shifts the focus from teaching language as a grammatical system to viewing it as a tool for understanding, thinking and expression. This raises the question of the extent to which such models contribute to shaping students' linguistic awareness.

This question is particularly significant and specific within the university context, especially in Arabic language departments. Students are expected to possess sufficient resources for the conscious use of the language and a high level of communication skills without making errors due to their specialisation and years of studying Arabic. However, the reality is the opposite: most students exhibit significant linguistic weaknesses and deficiencies. A review of the literature reveals a consensus among various studies that there has been a marked decline in linguistic and

communicative competence among students in Algerian Arabic language departments, especially in recent years. The most prominent manifestations include numerous spelling, morphological, grammatical and semantic errors, accompanied by a weak understanding of the language's structure and expressive functions. Notable studies include Nabila Malak (2022), which identified weaknesses in students' competence in morphological and grammatical aspects; Dalila Lakhzari (2019), which revealed issues at the phonetic, morphological, grammatical and semantic levels; Yasmin Bloutar and Kanza Saber (2022), which reported frequent spelling, structural, grammatical and morphological errors in students' writing; and Karim Ben Yekhou (2025), which emphasised a significant lack of lexical awareness.

These results highlight the urgent need to study linguistic awareness among Arabic language students directly. Writing is a key means of reflecting linguistic competence and revealing mastery of language rules, structures, meanings and uses. As ChatGPT is an effective technological model for written textual interaction, as well as being a vital medium for developing writing skills and enhancing opportunities for reflection on, review and revision of students' work, we aim to uncover its impact on their linguistic awareness.

Thus, this study will attempt to answer a fundamental question: Does using ChatGPT increase linguistic awareness and develop writing abilities among students in Arabic language departments? Additionally, it will address several sub-questions, including:

Are there differences in post-test linguistic awareness scores among students who have used ChatGPT?

Are there differences in levels of linguistic awareness among students before and after using ChatGPT? What are the main indicators of awareness affected?

What is the proposed framework for using ChatGPT to enhance linguistic awareness among Arabic language students?

2. Significance of the study:

This study is significant because it intersects with two key areas. The first is the contemporary trend of using generative artificial intelligence in language education. The second is the urgent need to find practical solutions to issues of linguistic weakness among Arabic language students at university, particularly with regard to linguistic awareness.

This study aims to address a research gap in Arab literature, particularly in the Algerian context, by examining the impact of an artificial intelligence tool (ChatGPT) on enhancing linguistic awareness among students. While most research and efforts have focused on studying the effects of ChatGPT on linguistic skills, this study seeks to explore its potential to increase linguistic awareness.

This study opens new horizons for teaching methods in Arabic by integrating generative artificial intelligence tools into the university environment. This integration enhances linguistic competencies and improves performance by fostering awareness of the structure and functions of the language.

Furthermore, this study paves the way for contemporary research by exploring the relationship between university students and the Arabic language through the use of artificial intelligence tools.

3. Objectives of the study:

The objectives of this study are to:

- assess the impact of using ChatGPT on increasing linguistic awareness among students in Arabic language departments, examining changes in their understanding of language structures and usage before and after using the tool to write texts.

- Identify which aspects of linguistic awareness were affected by using ChatGPT and the extent to which this impacted their writing.

- Reveal ChatGPT's role as a supportive tool for students in Arabic language departments, aiding them in thinking about language and developing metalinguistic skills.

Investigate the relationship between using ChatGPT and linguistic competence among Arabic students, determining the extent to which modern technology enhances academic performance.

Develop pedagogical practices for teaching Arabic that integrate artificial intelligence and target linguistic thinking.

4. Limitations of the study

Subjective limitation:

This study is limited to examining the ChatGPT tool and focuses on its interactive linguistic aspect. Written production is used as a means of observing and evaluating the level of linguistic awareness among students before and after using the application tool.

Human Limitation:

The study targets a sample of 30 second-year Master's students in the Department of Arabic Language and Literature, selected purposefully. The students were divided into two equivalent groups:

- Experimental group: 15 students who use ChatGPT to write texts according to specific guidelines.

- Control group:

Comprising 15 students who wrote texts in the conventional manner, without relying on the application tool.

Temporal and spatial limitation:

The study lasted eight weeks, comprising an average of seven sessions, and took place during the first semester of the 2024–25 academic year at Yahia Fares University in Medea, Algeria.

5. Terminology of the study

ChatGPT:

A generative model that uses deep artificial intelligence and natural language processing techniques to produce texts that resemble human conversation. In this study, ChatGPT serves as an intelligent educational tool that supports students in writing texts by rephrasing, enhancing and correcting errors, as well as providing suggestions. This makes it a means to develop linguistic awareness through writing practice.

Linguistic awareness:

It is defined as "a mental trait that develops through directed attention to language and its use, enabling language learners to gain insights into how to use language"[1]. It is also defined as "the ability to focus attention on language, think about it and engage with it as an objective entity"[2]. In the context of this study, it is an indicator of linguistic proficiency, reflecting the interaction between explicit and implicit knowledge, as well as students' understanding of the structure of the Arabic language, and their conscious use of it when writing texts and correcting errors.

Students of the Arabic Language Department:

These are second-year master's students enrolled in the Arabic Language Department at Algerian universities. They receive in-depth training in various branches of the language and engage extensively with it. This makes them the most suitable group for monitoring linguistic awareness and testing the artificial intelligence tool ChatGPT in their writing to evaluate its impact on outcomes.

6. Theoretical framework of the study

I. ChatGPT and Teaching/Learning the Arabic Language

ChatGPT stands for 'Chat Generative Pre-trained Transformer' and was developed by OpenAI. It was first released on 30 November 2022 as GPT-3.5 and was updated to GPT-4[3] on 14 March 2023. It is one of the most powerful modern models designed to interact with human languages, drawing its strength from its ability to respond to user commands by accessing vast language databases. This performance is made possible through the application of artificial intelligence, including natural language processing technology, machine learning and deep learning techniques[4], to produce texts that resemble human writing via transformer neural networks.

While chatbots are not a new concept, ChatGPT stands out due to the range of capabilities it offers users. These include conducting human-like conversations, providing accurate and quick answers, simplifying concepts, generating texts, crafting content, proofreading languages, summarising information, supporting translations, editing articles, creating images, and writing poems, stories, jokes, and songs. Unlike other chatbots, ChatGPT can remember previous questions and provide new and diverse answers, rather than giving the same response to every

[1]- Barjesteh, H., & Vaseghi, R. (2012). Language Awareness within the Context of Changing Perspectives on Grammar Pedagogy. LEKSIKA. Vol. 6, No. 2, p. 01.

[2]- Jessner, U. (2006). Linguistic Awareness in Multilinguals: English as a Third Language. Edinburgh University Press, p. 42.

[3]- Arab Center for Educational Research for Gulf States. (2024). Artificial Intelligence in Education: Promises and Challenges.Educational Futures, Vol. 6, No. 5, Kuwait, March 2024, p. 20.

[4]- Nacerddine, Muhammed Ajifudin Dimyathi, Mirwan Akhmad Taufik, Achmad Yani. (2024). ChatGPT for Learning Arabic: Potentials and Limits. Journal of Arabic Studies, 9(1), p. 992.

question. It can 'write content from scratch without directly quoting from other sources'[5]. These features make it an ideal interactive environment for developing users' linguistic and cognitive skills and enhancing their problem-solving and analytical thinking capabilities.

Despite being a relatively new concept, it has been adopted in numerous fields, particularly in education. Here, it plays a unique dual role: it motivates learners to engage with situations that help them to understand difficult concepts, thus developing critical thinking skills and increasing knowledge. It also acts as a smart learning partner, providing support and assistance in collecting and analysing data in intelligent and effective ways, thus facilitating a focus on essential aspects and advanced thinking in the subjects being studied[6]. This role is magnified in language teaching and learning, benefiting all parties involved in the educational process. This system reshapes linguistic content by opening it up to natural contexts that utilise language as activities simulating reality, not merely as fragmented elements or normative rules.

From the teacher's perspective, it contributes by enabling them to plan lessons and design linguistic activities flexibly, taking into account the intended topics and individual learner differences. This includes providing immediate feedback that improves learner outcomes and reduces errors without the need for direct teacher intervention. It also offers teachers more diverse and adaptable content[7], enabling them to align it with their desired objectives and the principles of communicative teaching. This enhances educational quality and saves time and effort.

From the learner's perspective, this system is an invaluable tool for developing their language skills, fostering independence and motivation. It provides an interactive environment that closely simulates human conversations, offering learners a space akin to a natural setting in which to practise the language outside the constraints of traditional classrooms. During this process, it provides immediate responses to help learners understand the precise meanings of words in context and how to use them effectively. Furthermore, it produces multiple textual formats that can be adjusted according to the learner's level (differentiated instruction) and offers direct linguistic feedback related to dictionary definitions and grammatical explanations, as well as error correction based on concrete, supportive examples[8].

This, among other features, undoubtedly provides significant opportunities for learners to develop their understanding of language structures and enhance their linguistic and cognitive competencies in a self-directed and sustainable manner.

The Arabic language—like many other languages—has been able to benefit from the capabilities of ChatGPT in teaching and learning it as a first or foreign language. This is due to its distinctive features that make it amenable to automated processing and generative analysis. "It is largely

[5]- Souzan Salah Muhammad. (2023). Using ChatGPT as an Application of Artificial Intelligence in Supporting the Educational Process. Retrieved from [https://zenodo.org/records/7768868].

[6]- Nacerddine et al. (2024). ChatGPT for Learning Arabic, Reference previously cited, p. 94.

[7]- Al-Kherecheh, M. H. (2024). Bridging Technology and Pedagogy from a Global Lens: Teacher Perspectives on Integrating ChatGPT in English Language Teaching. Computers and Education: Artificial Intelligence, Vol. 6, 2024. Retrieved from [file:///C:/Users/2018/Downloads/1-s2.0-S2666920X24000195-main.pdf].

[8]- Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for Language Teaching and Learning. RELC Journal, 54(2), p. 543 and following pages.

standard, especially in its phonetic structure and morphological rules, while at the same time being an inflected language with a generative derivational system and a unique writing system.[9]" ChatGPT's role in this context is highlighted as a linguistic model that enables learners to interact with the Arabic language in a communicative and generative manner, thanks to its ability to analyze contexts and provide immediate feedback. This opens up broad opportunities to leverage its aforementioned capabilities, particularly in building educational content (creating texts, generating exercises, designing tests, etc.), developing linguistic skills (conversation, reading, writing), and translating texts, as well as enhancing linguistic and critical thinking and supporting independence and self-directed learning.

However, despite these benefits, there are challenges associated with using this model to teach Arabic, such as grammatical and contextual inaccuracies, a lack of awareness of Arab culture, and an inability to interpret idiomatic expressions or religious concepts. Some studies have indicated that ChatGPT can produce seemingly correct linguistic structures that lack semantic and contextual coherence. For example, a study by Sang Y et al. (2023) evaluating ChatGPT's ability to correct grammatical errors found that 'the accuracy rate is approximately 65% on F1 metrics, which is lower than models specifically designed for Arabic'[10]. Similarly, Tarek N. et al. (2023) revealed that large language models, including ChatGPT, may produce outputs that are biased or culturally inappropriate for the Arab context[11]. Therefore, educators teaching Arabic must thoroughly review the model's content and provide conscious guidance to avoid linguistic and cultural errors.

II. ChatGPT and written production among Arabic language students

Writing is one of the higher-order skills that learners acquire during their education. It is not merely a means of expressing thoughts and needs, but also a way of building knowledge and interacting and communicating with others. This skill is particularly important in an academic context, as it demonstrates a learner's understanding of concepts, their ability to articulate ideas, and their capacity to organise them within a coherent structure using correct language. It also serves as a means of evaluating their performance and proficiency in the language.

Contemporary literature generally suggests that ChatGPT can effectively support the writing skills of Arabic language learners, particularly university students, due to its ability to address a wide range of writing aspects. It assists learners by:

- Thinking and planning before starting to write.

- Formulating initial texts by providing suggestions for logical, sequential ideas, which may reduce anxiety associated with starting to write.

[9]- Al-Saeed, Al-Mu'taz Billah. (2024). Arabic Language and Artificial Intelligence. Linguistic Research, King Salman International Center for the Arabic Language, Riyadh, 1445 AH, p. 14.
[10]- Kwon, S. Y., Bhatia, G., Nagoudi, E. M. B., & Abdul-Mageed, M. (2023). ChatGPT for Arabic Grammatical Error Correction. Artificial Intelligence. Retrieved from [https://arxiv.org/pdf/2308.04492].
[11]- Naous, T., Ryan, M. J., Ritter, A., & Xu, W. (2023). Having Beer after Prayer? Measuring Cultural Bias in Large Language Models. Computation and Language. Retrieved from [https://arxiv.org/pdf/2305.14456].

- Re-phrasing written content to improve style while preserving meaning, thus enhancing the accuracy and clarity of expression.

- Cultivating habits of clarity, conciseness and precision to ensure the writing is relevant to the topic.

- Correcting common grammatical and spelling errors to refine the writing and enhance linguistic awareness.

- Enriching and expanding cognitive content by providing additional explanations and insights.

- Enhancing linguistic content by offering appropriate words and expressions to articulate ideas clearly.

- Assisting in structuring paragraphs and linking them coherently to develop skills in text construction and organisation.

- Stimulating creativity and imagination to foster the ability to generate ideas and propose new perspectives and viewpoints.

Encouraging critical thinking by reviewing written work and making necessary revisions.

Composing academic texts in accordance with scientific standards and requirements.

However, alongside these advantages, there are several potential issues with an unstructured reliance on this writing tool, particularly with regard to diminished independence and creativity, and lowered writing skills due to excessive technological dependence. The tool's inherent limitations may negatively impact learners' capabilities and outputs, resulting in issues such as an unscientific writing style, excessive verbosity and redundancy[12], and numerous grammatical and contextual errors due to a lack of consideration for the Arabic cultural background[13].

III. Linguistic Awareness:

Since the 1990s, linguistic awareness has emerged as a fundamental approach in language teaching in response to the need to develop learners' language capabilities. Essentially, this concept forms the basis for understanding how individuals perceive and interact with language as a symbolic system used in different communication contexts. It encompasses not only the effective use of language, but also the reflection on, analysis of, and conscious questioning of language itself and its relationship with knowledge and identity[14].

Vaseghi and Barjesteh (2012) define it as 'a mental trait that develops through directed attention to language and its use, enabling language learners to gain insights into how to use it'[15]. Ulrike (2006) describes it as 'the ability to focus attention on language, think about it, and engage with

[12]- Qirad, S. H., & Jada, O. B. (2024). Using ChatGPT in Academic Writing: Advantages and Disadvantages. National Forum: The Future of Scientific and Academic Production in Light of Using Artificial Intelligence (Opportunities and Technical and Ethical Challenges), December 1, 2024. Retrieved from [file:///C:/Users/2018/Downloads/_chat%20(1).pdf].

[13]- Al-Shathri, N. B. I. (2024). The Effectiveness of ChatGPT as a Feedback Tool for Advanced Arabic Language Learners. Annual Journal of the College of Arabic Language for Boys in Girga. No. 01, December 2024, p. 298.

[14]- Van Lier, L. (1995). Introducing Language Awareness. Penguin English, p. 11.

[15]- Barjesteh, H., & Vaseghi, R. (2012). Language Awareness within the Context of Changing Perspectives on Grammar Pedagogy. LEKSIKA, Vol. 6, No. 2, p. 01.

it as an objective entity'[16]. Svalberg (2007) defines it as 'the learner's ability to notice, analyse and interpret linguistic phenomena, and adopt a critical stance towards them in the context of society, culture and education'[17].

Hawkins (1984) points out that linguistic awareness represents the intersection of language knowledge, social awareness, and educational ability. He states that enhancing it among learners "contributes to building a critical sense towards language and strengthens their communicative competence in various contexts"[18]. The features of linguistic awareness can thus be defined as follows:

The ability to recognise the structure of language (sounds, morphological components and grammatical constructions), and the capacity to distinguish between different types of discourse.

The ability to think about language and treat it as a subject of study by analysing its structures, discovering its systems, and identifying its communicative strategies[19].

- Awareness of the relationship between language, identity, culture and power.

- Awareness of similarities and differences between languages, or variations within the same language.

Researchers generally agree that linguistic awareness is a key component of language teaching and a prerequisite for effective language learning. In his study, Schmidt (1990) emphasised that linguistic awareness is essential for second language acquisition because 'unconscious processes are insufficient for acquiring higher-order skills, especially in the pragmatic and syntactic aspects of language'[20]. Svalberg (2007) further indicated that developing linguistic awareness in learners can lead to 'a qualitative transformation in learners' perceptions and contribute to the development of more effective and efficient learning strategies'[21].

Bourke (2008) identified the key characteristics of linguistic awareness, which can be summarised as follows:[22]

Linguistic awareness involves focusing on meaning and exploring which language forms are suitable for expressing specific meanings and concepts.

The objective is to foster learners' sensitivity to structures rather than simply memorising a lengthy list of grammatical rules.

- Linguistic awareness is developed through formal education and task-based learning.

- Linguistic awareness is multifaceted, encompassing more than just grammatical awareness. It includes various components such as phonetics, vocabulary and morphology.

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[16]- Jessner, U.Linguistic Awareness in Multilinguals.
[17]- Svalberg, A. M.-L. (2007). Language Awareness and Language Learning. Language Teaching, Vol. 40(4), p. 290.
[18]- Hawkins, E. (1984). Awareness of Language: An Introduction. Cambridge: Cambridge University Press, p. 8.
[19]- Schmidt, R. W. (1990). The Role of Consciousness in Second Language Learning. Applied Linguistics, Vol. 11(2), p. 133.
[20]- Ibid, p. 130-132.
[21]- Svalberg, A. M.-L. (2007). Language Awareness and Language Learning, p. 291.
[22]- Quoted in: Soad Jaber Mahmoud Hassan. (2019). The Effectiveness of a Proposed Program of Language Activities in Developing Language Awareness among Female Students of the College of Education in Al-Majma'ah Using Some Web 2.0 Tools. Educational Journal No. 62, College of Education, Aswan University, Egypt, p. 320.

It covers components ranging from phonetics to discourse. The most significant components targeted in this study can be summarised as follows:

A. Morphological awareness:

Morphological awareness is defined as 'the learner's ability to perceive the morphological structures of words and think about these structures explicitly'[23]. Carlisle (2000) defines it as "the ability to recognise the structure of a word, analyse it into its morphological components, and understand the semantic, phonological and syntactic relationships that arise from this structure"[24]. Therefore, morphological awareness encompasses recognising and analysing word structures, as well as understanding the syntactic and semantic relationships among words derived from the same root, and the grammatical and lexical functions performed by morphemes within a word. Given that Arabic is a derivational and inflectional language, morphological awareness assists learners in recognising forms and patterns, distinguishing between phonetically similar yet semantically different words, and enhancing their understanding of various grammatical structures. Studies addressing morphological awareness have consistently highlighted its significant role in language learning, particularly in reading and comprehension, as it enables the decoding of new words and the understanding of their meanings[25].

B. Syntactic awareness:

This relates to a learner's ability to understand sentence structure and the rules governing word relationships within them. It involves knowledge of the syntactic system of a language, including its functions, rules, conditions and relationship to meaning[26]. It also involves identifying and correcting errors in spoken and written language that violate grammatical rules. This type of awareness is fundamental to developing linguistic skills, particularly reading comprehension, as it helps learners to interpret relationships between sentences in a text and understand complex texts. It also assists learners in constructing grammatically correct and coherent sentences for oral communication in various contexts. It also facilitates written expression, enabling learners to construct grammatically accurate and linguistically diverse sentences while ensuring linguistic precision and avoiding errors.

C. Lexical awareness:

Lexical awareness relates to a learner's clear understanding of word meanings and how they are used in different contexts. It involves a deep comprehension of words, as well as the ability to differentiate between synonyms, antonyms, homonyms and derivations, and to select the most appropriate word to express a specific idea in a given context[27]. Lexical awareness is considered

[23]- Khaloufi, F. (2015). The Impact of Morphological Awareness on Reading Learning. Teaching Journal, College of Education Sciences, No. 7 (New Series), p. 40.
[24]- Carlisle, J. F. (2000). Awareness of the Structure and Meaning of Morphologically Complex Words: Impact on Reading. Reading and Writing: An Interdisciplinary Journal, Vol. 12(3), p. 190.
[25]- Kuo, L.-J., & Anderson, R. C. (2006). Morphological Awareness and Learning to Read: A Cross-Language Perspective. Educational Psychologist 41(3), p. 169.
[26]- Souad Jaber Mahmoud Hassan. (2019). The Effectiveness of a Proposed Program of Language Activities in Developing Language Awareness, p. 321.
[27]- Rezgui, M. (2024). Variation and Linguistic Awareness: What Correlation? Review of Human Sciences Vol. 24, No. 01, p. 522.

an essential component of linguistic and communicative competence. All studies addressing this topic have indicated its relationship with the development of morphological and syntactic awareness, and its significant role in enhancing reading comprehension and improving both oral and written production. It also fosters cultural competence and improves learning outcomes.

D. Semantic Awareness:

Semantic awareness is grounded in meaning and requires an understanding of words, phrases, sentences and structures in their various contexts, according to diverse semantic relationships such as polysemy, synonymy, antonymy, implication, connotation and figurative expressions such as metaphors, metonymy, similes and hyperbole[28]. In other words, it involves recognising differences between words and their multiple meanings, as well as lexical relationships. Studies have revealed its crucial role in enhancing reading comprehension and developing writing skills, as well as cultivating rhetorical and stylistic sensitivity and enriching learners' language and literary taste.

E. Stylistic Awareness:

This type of awareness relates to a learner's ability to distinguish between different expressive styles, analyse them and understand the implications of various choices. It involves selecting the most suitable style for a given context or purpose. It also involves recognising different styles and understanding how style selection impacts the communication process[29]. Stylistic awareness is fundamental to enhancing learners' ability to understand and produce texts, as well as developing their creative and critical writing skills and fostering their aesthetic appreciation.

F. Orthographic Awareness:

Orthographic awareness is one of the essential foundations of languages, especially those that rely on phonetic-symbolic writing systems, such as Arabic. It has a phonological basis and refers to the learner's ability to understand the written form of words and process them according to normative rules, distinguishing correct representations from incorrect ones. This component of awareness is closely linked to teaching reading and writing to beginners, and is a strong indicator of the learner's linguistic and cognitive growth, which is reflected in their writing abilities.

IV. Previous studies:

To our knowledge, no research studies have explicitly linked the use of ChatGPT with linguistic awareness among Arabic language learners. However, we found studies that implicitly refer to the relationship between ChatGPT use and metacognitive awareness among learners of other languages, such as English. Notable examples include:

- A study by Mark Feng Teng (2025):[30]

[28]- Soad Jaber Mahmoud Hassan. (2019). The Effectiveness of a Proposed Program of Language Activities in Developing Language Awareness, p. 324.

[29]- Rezgui, M. (2024). Variation and Linguistic Awareness, p. 524.

[30]- Teng, M. F. (2025). Metacognitive Awareness and EFL Learners' Perceptions and Experiences in Utilizing ChatGPT for Writing Feedback. European Journal of Education. Retrieved from [https://hal.science/hal-04828362v1/file/Eurpean%20journal%20of%20educaiton%20.pdf].

This study aimed to explore English as a Foreign Language students' perceptions of using ChatGPT for writing feedback and investigate its impact on metacognitive awareness levels. A mixed-methods research design was employed with a sample of 40 students. The results revealed significant differences in writing experience and perception among the students. Those with high metacognitive awareness utilised ChatGPT more effectively, demonstrating a lower reliance on copying texts and a greater ability to evaluate and modify responses.

- Study by Simon Suh et al. (2025):[31]

This study aimed to integrate a critical thinking framework with ChatGPT to guide students in writing argumentative essays. Conducted with ten participants from public universities, who were divided into control and experimental groups, the results indicated that the experimental group improved in specific aspects of argumentative writing, such as clarity, logical coherence and the use of evidence. In contrast, the control group performed better in terms of general language usage and the clarification of main arguments.

Several other studies have examined the use of ChatGPT for writing among Arabic language students as a second language or for academic writing among university students.

- Study by Najla bint Ibrahim Al-Shathri (2024):[32]

The study aimed to verify the effectiveness of using ChatGPT as a feedback tool for improving the writing skills of advanced Arabic second language learners. The study was conducted with a sample of twelve female students from a government institution in Riyadh, who were divided into experimental and control groups. The results indicated significant improvements in organising ideas, language and style, and constructing texts such as essays and administrative letters, favouring the experimental group. This confirms the effectiveness of ChatGPT in enhancing writing skills.

- Study by Ahmad Al-Zubaidi et al. (2025):[33]

This study aimed to enhance Arabic writing education and improve text production among students by applying a three-dimensional model combining artificial intelligence (ChatGPT) and human support. Conducted with 40 students at an Indonesian university, the study found that 89.6% of experts rated the model's performance in enriching Arabic writing as excellent, with over 88% of students achieving a level of academic writing that exceeded the minimum requirement, alongside an approximate improvement in writing level estimated at 12.5% compared to pre-intervention performance.

7. Methodology of the study and procedures:

[31]- Suh, S., Bang, J., & Han, J. W. (2025). Developing Critical Thinking in Second Language Learners: Exploring Generative AI like ChatGPT as a Tool for Argumentative Essay Writing. Human-Computer Interaction. Retrieved from [https://arxiv.org/pdf/2503.17013].

[32]- Al-Shathri, N. B. I. (2024). The Effectiveness of ChatGPT as a Feedback Tool for Advanced Arabic Language Learners. Reference previously cited

[33]- Zubaidi, A., Munip, A., Widodo, S. A., & Zerrouki, T. (2025). Enhancing Arabic Writing Skills Using ChatGPT-Based AI Learning Models: A Tridimensional Human-AI Collaboration Framework. Indonesian Journal of Applied Linguistics, Vol. 15, No. 1.

- Study method:

A quasi-experimental approach was adopted, based on the design of control and experimental groups, to measure the effect of the independent variable (ChatGPT) on the dependent variable (linguistic awareness). This method was deemed the most suitable way to assess the level of awareness among the selected sample.

-Steps of the study:

The current study aimed to investigate the effect of using ChatGPT in developing the linguistic awareness of Arabic language students through written texts. To this end, the following steps were taken:

A. Defining the Linguistic Awareness Assessment Framework:

This framework includes components of linguistic awareness and their indicators relating to writing. It focuses on students' ability to manage spelling and punctuation, use an adequate vocabulary, apply grammatical and morphological rules accurately, and maintain awareness of textual coherence, idea sequencing and stylistic appropriateness. The preparation of this framework involved the following stages:

- A review of theoretical literature and Arab and foreign studies addressing the topic of linguistic awareness was conducted to identify its components and specify its indicators, which were then compiled into a single framework. This framework includes six components: Morphological awareness, syntactic awareness, lexical awareness, semantic awareness, stylistic awareness and orthographic awareness. These components were broken down into 29 sub-indicators. These were determined based on the most frequently occurring errors in learners' written work, as indicated by studies and observations made during teaching years.

- The list was presented to several experts in Linguistic Studies and Language Teaching to ensure the indicators were appropriate for their intended purpose, and to make any necessary modifications.

- The assessment framework for the components of linguistic awareness and its indicators was finalised.

A-1 Face validity of the assessment framework:

The validity of the assessment tool is one of the most important conditions for proper evaluation. A tool is considered valid if it achieves its intended purpose, and it is considered more valid if its indicators accurately reflect the components defined for assessment. The results of the face validity test for the linguistic awareness framework showed that the experts agreed with the framework to a rate of 85.71%, with no significant suggestions or additions being made. The framework was adopted in its final form after indicators that did not reach consensus were removed.

INDICATOR NUMBER	NUMBER OF JUDGES(7)		AGREEMENT RATE
	I gree	I don't agree	%85.71

1-2-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-21-23-24-25-26-27-28-29	7	0	100%
22-18	6	1	%85.71
6	5	2	%71.42

Table 1: Agreement Rates Among Experts on the Framework Items

Evaluation tool:

The results of the assessment were evaluated before and after the experiment by determining learners' level of linguistic awareness based on the number of errors they made, as outlined in the following table:

SCORE	NUMBER OF ERRORS	LEVEL OF AWARENESS
4	0	VERY GOOD
3	2-1	GOOD
2	3-2	AVERAGE
1	4-3	WEAK
0	5 and above	VERY WEAK

A-2 Verification of the Assessment Framework's Validity (Psychometric Properties):

Reliability was estimated using Cronbach's alpha coefficient for internal consistency, based on data from 26 learners on the linguistic awareness assessment framework. This is based on calculating the correlation coefficients between each item and the framework as a whole, as shown in the following table:

Axes	**Number of Indicators**	**Sample**	**Cronbach's Alpha Coefficient**
Spelling Awareness	**3**	**26**	**,702**
Morphological Awareness	**3**		**,757**
Syntactic Awareness	**6**		**,847**
Lexical Awareness	**4**		**,798**
Semantic Awareness	**4**		**,781**
Stylistic Awareness	**6**		**,886**
The Network as a Whole	**26**		**,902**

Table 2: Reliability of the Linguistic Awareness Assessment Framework via Cronbach's Alpha

As can be seen from the above table, the values of the consistency coefficient (Cronbach's alpha) for the components of the Linguistic Awareness Assessment Framework ranged from 0.702 to 0.886, indicating high consistency. The framework's overall consistency coefficient was estimated at 0.902, also indicating high consistency. All values are positive, indicating coherence and interconnection among the indicators of this framework, approaching complete correlation. This confirms that the framework possesses a high degree of reliability, giving us confidence in its results.

B. Validity via Internal Consistency: Correlation of components with the overall score of the framework

We estimated the validity of the internal consistency of the linguistic awareness assessment framework by calculating the correlation values of the components with the overall score. The following results were obtained:

Variable	Test	Correlation Values	Statistical Significance	Coefficient of Determination Value
Spelling Awareness	Total Score of the Language Awareness Assessment Network	0.782	0.000	0.611
Morphological Awareness		0.730	0.000	0.532
Syntactic Awareness		0.880	0.000	0.774
Lexical Awareness		0.785	0.000	0.616
- Semantic Awareness		0.790	0.000	0.624
Stylistic Awareness		0.810	0.000	0.656

Table 3: Correlation of Framework Components with the Overall Score

As can be seen from the above table, all the correlation coefficients between the components of the linguistic awareness assessment framework and the overall score were high and statistically significant, with values ranging from 0.730 to 0.880. All were statistically significant at the 0.01 level of significance (α=0.01). Referring to the values of the coefficients of determination, which indicate each component's ability to explain variance in the framework's overall score, we found that they ranged from 0.532 to 0.774. This means that each component can explain at least 53% of the variance in the overall score, with the potential to explain over 77%. Therefore, it can be concluded that all components have strong internal cohesion, resulting in the framework as a whole having a high degree of validity.

Experimental study:

To assess the impact of ChatGPT on students' linguistic awareness, we conducted an experimental intervention with a sample of 30 learners. The learners were purposefully selected and divided into two equivalent groups:

Experimental group: Comprising 15 students who used ChatGPT to write texts according to specific guidelines.

Control group: Consisting of 15 students who wrote texts in the traditional manner, without relying on the programme.

The two groups were matched in terms of specialisation, academic level, language proficiency, age group and assigned writing topics.

2.1 Pre-test: Before conducting the test, we met with the participants and explained the concept and objectives of the test. Accordingly, we asked both groups to write an essay on the topic: 'Challenges of the Arabic Language in the Digital Age' and 'Manifestations of Linguistic Weakness in Learners' Writings and Their Main Causes'.

2.2 Experimental intervention:

The experimental group underwent organised training on ChatGPT over seven sessions. According to the study's guidelines, the training was limited, directing the sample to specific texts and showing them how to develop these using the tool (e.g. paraphrasing, summarising, expanding ideas, analysing structures, modifying style and correcting errors). Meanwhile, the control group performed the same tasks without using the tool and received traditional writing guidance.

3.3 Post-test: After the intervention, both groups were asked to rewrite the two essays on the topics proposed in the pre-test in order to assess the impact of using ChatGPT on learners' linguistic awareness. We obtained the following results:

A. Presentation and discussion of results for the first question:

Are there differences in the post-test linguistic awareness scores between the control and experimental groups?

We verified the validity of this question using a T-test for independent samples to assess the significance of the differences in mean scores between the control and experimental groups on the linguistic awareness framework. We obtained the following results:

Variable	Group	Sample Size	Mean	Mean Difference	t-Test Value	Statistical Significance
Spelling Awareness	Control Group	15	8,13	-1,133	-2,01	0,024
	Experimental Group	15	9,26			

Morphological Awareness	Control Group	15	6,46	-1,266	-2,68	0,012
	Experimental Group	15	7,73			
Syntactic Awareness	Control Group	15	16,66	-1,533	-3,08	0,004
	Experimental Group	15	18,20			
Lexical Awareness	Control Group	15	7,66	-3,00	-4,51	0,000
	Experimental Group	15	10,66			
Semantic Awareness	Control Group	15	8,66	-2,00	-3,18	0,004
	Experimental Group	15	10,66			
Stylistic Awareness	Control Group	15	14,06	-1,80	-2,37	0,025
	Experimental Group	15	15,86			

Table 4: Results of the T-test for independent samples indicating the difference in mean scores of the control and experimental groups in the post-test of linguistic awareness.

The results presented in the above table indicate that:

- Orthographic awareness: The statistical analysis showed that the T-test value was estimated at −2.01, which is statistically significant at a significance level of α = 0.05. This means that the observed difference in mean orthographic awareness scores between learners in the control group (8.13) and the experimental group (9.26), estimated at −1.13, favours the experimental group and is not due to chance.

Morphological awareness:

The statistical analysis revealed that the T-test value was estimated at −2.68, which is statistically significant at a significance level of α = 0.05. Therefore, the observed difference in mean morphological awareness scores between the control group (6.46) and the experimental group (7.73), estimated at −1.26, is significant in favour of the experimental group and is not due to chance.

- Syntactic awareness:

The statistical analysis indicated that the T-test value was estimated at −3.08, which is statistically significant at the significance level of α = 0.01. This implies that the observed difference in mean syntactic awareness scores between learners in the control group (16.66) and the experimental group (18.20), estimated at −1.53, is significant in favour of the experimental group and is not due to chance.

Lexical awareness:

The statistical analysis showed that the T-test value was estimated at −4.51, which is statistically significant at a significance level of α = 0.01. This indicates that the observed difference in mean lexical awareness scores between the control group (7.66) and the experimental group (10.66), estimated at −3.00, favours the experimental group and is not due to chance.

- Semantic awareness:

The statistical analysis revealed that the T-test value was estimated at −3.18, which is statistically significant at the significance level of α = 0.01. Therefore, the observed difference in mean semantic awareness scores between learners in the control group (8.66) and the experimental group (10.66), estimated at −2.00, is significant in favour of the experimental group and is not due to chance.

- Stylistic awareness:

The statistical analysis indicated that the T-test value was estimated at −2.37, which is statistically significant at the significance level of α = 0.05. This means that the observed difference in stylistic awareness between learners in the control group (mean score 14.06) and the experimental group (mean score 15.86), estimated at −1.80, is significant in favour of the experimental group and is not due to chance.

Based on the partial results of the statistical analysis, it can be concluded that ChatGPT has improved the linguistic awareness of the experimental group members compared to those in the control group. This can be explained by several factors:

- ChatGPT interaction: Interacting with the correct and diverse linguistic patterns provided by ChatGPT increased the students' attention to writing errors and their correction. It enhanced their understanding of grammatical and stylistic structures, as well as the semantic relationships between vocabulary and sentences in texts. This confirms that the system provides an effective learning environment, stimulating students to engage in writing, reviewing and correcting — something that is difficult to achieve through traditional methods.

- Nature of the sample:

The students' stage of development meant they were better able to use and benefit from digital systems. Their specialisation also provided them with a broad knowledge base, enabling them to use written conversations to improve their work and identify and correct errors. Their prior awareness of morphological, lexical, syntactic, semantic and stylistic phenomena meant they were better prepared to use automated suggestions to improve their work. While ChatGPT was not a substitute for their knowledge, it was an effective intermediary in the writing process.

- Nature of the Test:

The written nature of the test enhanced the differences between the two groups and was better able to reveal levels of linguistic awareness among learners (given its focus on writing). Consequently, by providing written linguistic models, ChatGPT helped students produce texts that were more linguistically accurate, as well as semantically and stylistically coherent.

B. Presentation and discussion of results for the second question: Were there differences in linguistic awareness scores between learners in the experimental group before and after the test?

The validity of this question was verified using a paired samples t-test to assess the significance of the difference in mean scores between the pre-test and post-test for the experimental group on the linguistic awareness framework. The following table illustrates the obtained results:

Variable	mensuration	Sample Size	Mean	Mean Difference	t-Test Value	Statistical Significance
Spelling Awareness	Pre-Test	15	**7,26**	**-2,00**	**-2,92**	**0,011**
	Post-Test		**9,26**			
Morphological Awareness	Pre-Test	15	**8,20**	**0,46**	**0,92**	**0,372**
	Post-Test		**7,73**			
Syntactic Awareness	Pre-Test	15	**14,53**	**-3,66**	**-6,38**	**0,000**
	Post-Test		**18,20**			
Lexical Awareness	Pre-Test	15	**10,93**	**0,26**	**-0,38**	**0,703**
	Post-Test		**10,66**			
Semantic Awareness	Pre-Test	15	**8,53**	**-2,13**	**-3,33**	**0,005**
	Post-Test		**10,66**			
Stylistic Awareness	Pre-Test	15	**13,06**	**-2,80**	**-4,97**	**0,000**
	Post-Test		**15,86**			

Table 5: Results of the T-test for paired samples indicating the difference in mean pre-test and post-test linguistic awareness scores for the experimental group.

The data presented in the above table indicate that:

- Orthographic awareness: The statistical analysis showed that the T-test value was estimated at −2.92, which is statistically significant at a significance level of α = 0.05. This means that the observed difference in mean scores for orthographic awareness between the pre-test (7.26) and post-test (9.26), estimated at −2.00, is significant in favour of the post-test and is not due to chance.

- Morphological awareness: The statistical analysis revealed that the T-test value was estimated at 0.92, which is not statistically significant. This suggests that the observed difference in mean morphological awareness scores between the pre-test (8.20) and post-test (7.73) is not significant and may be due to chance.

- Syntactic awareness: The statistical analysis indicated that the T-test value was estimated at −6.38, which is statistically significant at a significance level of α = 0.01. Therefore, the difference in mean scores for syntactic awareness between the pre-test (14.53) and post-test (18.20) is significant in favour of the post-test and is not due to chance.

- Lexical awareness: The statistical analysis showed that the T-test value was estimated at −0.38, which is not statistically significant. This implies that the slight difference observed in the mean lexical awareness scores between the pre-test (10.93) and post-test (10.66), estimated at −0.26, is non-significant and may be due to chance.

- Semantic Awareness: The statistical analysis revealed that the T-test value was estimated at −3.33, which is statistically significant at a significance level of α = 0.01. This suggests that the difference in mean scores for semantic awareness between the pre-test (8.53) and post-test (10.66), estimated at −2.13, is significant in favour of the post-test and is not due to chance.

- Stylistic Awareness: The statistical analysis indicated that the T-test value was estimated at −4.97, which is statistically significant at the significance level of α = 0.01. This means that the observed difference in stylistic awareness between the pre-test (mean score 13.06) and the post-test (mean score 15.86), estimated at −2.80, is significant and not due to chance.

The post-test results for the experimental group showed a slight improvement in linguistic awareness, but this did not reach statistically significant levels for morphological and lexical awareness. This can be explained by several factors:

1. Nature of the components:

Spelling errors are immediately apparent when writing, which is why ChatGPT clearly impacted spelling awareness and correction. Writing also highlights grammatical sentence structure and style, making ChatGPT an effective tool for improving awareness in these areas. In contrast, morphological awareness requires in-depth training in inferring roots, patterns and forms — elements that students may overlook when writing. Furthermore, morphological structure may be implicitly understood during production, but it is not explicitly tested unless it is the focus. Therefore, the digital system did not demonstrate its effectiveness in this area. Similarly, with

regard to lexical awareness, students tend to rely on their existing vocabulary rather than unfamiliar terms, even when these are provided by ChatGPT. Furthermore, vocabulary growth does not manifest directly or quickly in students' writing; it requires repeated practice in various contexts.

2. Nature of the sample:

Due to the age and specialisation of the students, ChatGPT had a stronger influence on aspects of writing that are directly evident, such as spelling, grammar, style and semantics, than on components that require prior vocabulary knowledge, such as morphology and the lexicon. Students also tend to focus more on the communicative function of language than on its internal structure. This is why ChatGPT's impact was more pronounced in terms of grammar and style.

3. Duration of the experiment:

The experiment was too short to bring about substantial changes in components of linguistic awareness, particularly morphological and lexical awareness.

Recommendations:

In light of the study results, we recommend the following:

- Utilisation of AI tools: Use artificial intelligence tools (such as ChatGPT) in Arabic language departments at universities to enhance students' linguistic awareness.

- Development of writing activities: Design digital writing activities and specific training programmes that use feedback to improve students' linguistic awareness.

- Integration of ChatGPT with curricula: Integrate ChatGPT into theoretical and practical Arabic courses to transform theoretical knowledge into interactive, live practice.

- Support for collaborative writing: Use ChatGPT as a supportive tool to enhance collaborative writing and increase collective linguistic awareness.

- Guidance for university students: Use university students' awareness to guide them in using ChatGPT, thereby enhancing their learning independence and improving their linguistic and cognitive abilities.

- Integration of Linguistic Components: Strengthen integration between grammar, morphology and the lexicon, and creative and academic writing, through real tasks utilising digital tools.

Suggestions:

In light of the study results, we recommend the following:

1. Further studies on interactive AI: Conduct more research on interactive artificial intelligence and Arabic language education, covering broader categories and longer time periods, to explore its long-term impact on linguistic awareness.

2. Comparative studies: Carry out studies comparing the impact of ChatGPT with that of other digital tools on learners' linguistic awareness.

3. Focused studies on specific components: conduct studies focusing on a single component of linguistic awareness, with long-term directed activities to accurately measure the impact of ChatGPT.

4. Explore the relationship between developing linguistic awareness with ChatGPT and developing other skills, such as linguistic creativity and communicative competence.

5. Comparative Analysis Across Languages: Conduct comparative studies to analyse the effect of ChatGPT on increasing awareness of the Arabic language and its impact on other languages

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