WORKING MEMORY AND INTRINSIC MOTIVATION IN ORAL SKILLS PERFORMANCE IN ENGLISH AS A FOREIGN LANGUAGE STUDENTS[1]

MEMORIA DE TRABAJO Y MOTIVACIÓN INTRÍNSECA EN EL DESEMPEÑO DE HABILIDADES ORALES EN ESTUDIANTES DE INGLÉS COMO LENGUA EXTRANJERA

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ABSTRACT

This article presents findings from a research project conducted between 2022 and 2024 involving high school students from a private school in Medellin. The study aims to analyze the impact of Working Memory (WM) and Intrinsic Motivation (IM) on the performance of oral skills in English as a foreign language (EFL). A correlational research design was employed to explore the relationships between these variables. Measurement involved the use of the Motivational Assessment Questionnaire of the Learning Process (EMPA), the Working Memory Index of the Wechsler Intelligence Scale for Children (WISC-IV), the Controlled Oral Word Association Test (COWAT), and the standardized Cambridge A2 Key (KET) test according to the Common European Framework of Reference for Languages (CEFR). Results suggest a moderate positive influence of WM on oral

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performance, while IM displays a positive but statistically insignificant correlation. It is proposed that investigating the interplay between WM and IM could be a promising avenue for future research, underscoring the significance of cognitive and motivational factors in language acquisition.

Keywords: working memory, intrinsic motivation, oral skills, performance, English as a Foreign Language

RESUMEN

Este artículo presenta hallazgos de un proyecto de investigación llevado a cabo entre 2022 y 2024 con estudiantes de secundaria de una escuela privada en Medellín. El estudio tiene como objetivo examinar el impacto de la Memoria de Trabajo (MT) y la Motivación Intrínseca (MI) en el desempeño de habilidades orales en inglés como lengua extranjera (ILE). Se utilizó un diseño de investigación correlacional para explorar las relaciones entre estas variables. La medición implicó el uso del Cuestionario de Evaluación Motivacional del Proceso de Aprendizaje (EMPA), el Índice de Memoria de Trabajo de la Escala de Inteligencia de Wechsler para Niños (WISC-IV), la Prueba de Asociación de Palabras Orales Controladas (COWAT) y el examen estandarizado Cambridge A2 Key (KET) de acuerdo con el Marco Común Europeo de referencia (MCER). Los resultados sugieren una influencia moderadamente positiva de la MT en el rendimiento oral, mientras que la MI muestra una correlación positiva pero estadísticamente no significativa. Se propone que investigar la interacción entre la MT y la MI podría ser una vía prometedora para futuras investigaciones, destacando la importancia de los factores cognitivos y motivacionales en la adquisición de idiomas.

Palabras clave: memoria de trabajo, motivación intrínseca, habilidades orales, rendimiento, inglés como lengua extranjera.

1. INTRODUCTION

The importance of English in today's globalized world is undeniable. In recent decades, communicative approaches to teach English as a foreign language have expanded significantly worldwide (Nowbakht & Fazilatfar, 2019), including in Latin America, where their impact has been especially notable. As

these approaches continue to grow in educational contexts, and in line with global objectives, the emphasis on developing oral skills has also increased. Speaking a foreign language is a complex skill that relies on various pedagogical, neurological, and psychological factors. Among these, Intrinsic Motivation (IM) and Working Memory (WM) are two key components that strongly influence the development of oral skills in English learners. IM helps students stay interested in the language, encouraging them to continue learning independently. Meanwhile, WM aids in the retention and recall of information, supporting students to remember new words and phrases. Together, IM and WM play a crucial role in a successful language learning process. The objective is to analyze the influence of WM and IM in the oral performance of high school students that are learning English as a foreign language.

The development of oral skills requires a significant commitment and effort from students, as choosing to improve these skills is often a personal decision, especially in environments where this ability may not be essential. Broadly speaking, motivation is the force that drives people to act and is one of the most crucial factors for effective learning. However, to fully understand motivation, it is important to distinguish between its two main types: IM and Extrinsic Motivation (EM). According to Martínez and Rojas Ochoa (2021), IM arises internally, without being influenced by external factors, allowing individuals to take control of their own learning process. Additionally, the literature defines IM as a self-driven urge to learn and understand, which fulfills the internal desire to grasp what is being studied (Tirado et al., 2013).

Both IM and EM are essential elements in the learning process, though they originate from different sources. IM stems from within the individual and is driven by personal interest, satisfaction, and enjoyment in the activity itself. It represents an inner force that motivates individuals to engage in an activity purely for the pleasure it provides, rather than for any external rewards or recognition. In contrast, EM arises from external factors, such as the learning environment, teachers, and classmates. It relies on the perceived adequacy of these elements and can be influenced by external factors, including the pursuit of approval or rewards. While both forms of motivation are important for learning success, IM plays a particularly critical role in the context of language learning. Students who are intrinsically motivated tend to be more engaged in the learning process and are more likely to persevere through challenges (Deci & Ryan, 1985; Martínez & Ochoa, 2021).

IM plays a crucial role in students' oral performance in English as a foreign language. In their study Salehpour and Roohani (2020) indicate that students with high levels of intrinsic motivation develop their oral skills more rapidly than those who lack it. For students learning English as a second language,

strong IM positively predicts both vocabulary acquisition and oral proficiency (Tanaka, 2020). This internal motivation encourages students to be proactive in their learning process, leading to improved outcomes. Moreover, IM becomes even more essential for middle and lower-level students, who often report lower confidence when speaking English as a second language (Ye, 2020), Ramirez and Cardenas also point out that stress and anxiety are common emotions among students when facing English exams, highlighting the complexity of motivating them effectively (2023).

According to Self-Determination Theory by Deci and Ryan (2000), IM arises when people experience autonomy, competence, and meaningful interpersonal relationships. In language learning, intrinsically motivated students are more committed and persist in their studies (Noels et al., 2000). This motivation drives them to learn for the pleasure and satisfaction they find in the process itself, which can enhance the effectiveness acquiring oral skills.

IM centers on a person's interest and enjoyment in an activity itself. This motivation is based on voluntary interest and the pursuit of those elements that drive the individual towards seeking deeper knowledge (Aguilar et al., 2016). Experience also plays a key role in IM, as it helps students guide their processes motivated by the pleasure of discovery. However, not all students have the same experience or desire to learn (Azogue-Punina & Barrera-Erreyes, 2020).

On the other hand, memory is one of the most complex processes of human cognition, as it is directly related to other brain processes such as attention, language, and learning. According to the "*Dictionary of Neuropsychology*", memory is a cognitive process that involve encoding, storage, and retrieval of information (Ardila et al., 2015). Memory gathers new information, organizes it, and retrieves it when necessary, providing humans with the necessary knowledge to understand, analyze, and act in the world around them (García, 2012). In the educational field, memory is fundamental for knowledge acquisition. Cognitive theories of learning consider it to be the result of an active mental process of acquisition, memory, and use of knowledge (González-Pérez & Del Pozo, 2014). Some research has revealed the existence of a highly complex structure in memory: Short-Term Memory (STM), WM, and Long-Term Memory (LTM) (Palacios & Manzano, 2009). Additionally, Sensory Memory is connected to the environment through sensory receptors, storing large amounts of information for short periods (Cowan, 2010).

STM helps the brain manage information and avoid overload by temporarily retaining information, which, if reviewed, transfers to LTM, otherwise, it is forgotten (Meltzer et al., 2007). WM plays a crucial role in the interaction and manipulation of STM and LTM, essential for learning and comprehension

processes. According to the WM model by Baddeley and Hitch (1974), WM significantly impacts learning and supports various language skills, including reading comprehension and speaking activities. This model defines WM as comprising the Central Executive, the Phonological Loop, the episodic buffer, and the Visuospatial Sketchpad, each of which contributes differently to cognitive tasks (Gathercole & Baddeley, 1993).

In this model, the Central Executive is responsible for directing attention and activating representations, which are stored in LTM and briefly held in the Phonological Loop to facilitate language tasks. This process enables the construction of internal representations, supporting comprehension activities by organizing and integrating information. Research by Carroll (1981), Miyake and Friedman (1998), and Skehan (1989) further supports the view that WM is central to language learning, as it allows individuals to manage complex linguistic elements necessary for developing oral skills in a foreign language.

Studies have shown that WM is a significant factor in the acquisition of language skills. Baddeley (2000, 2002, 2003, 2007) confirms that the acquisition of new vocabulary in young children and adults is associated with the Phonological Loop. Additionally, O'Brien et al. (2006) found that Phonological WM correlates with the development of oral fluency, while Juffs and Harrington (2011) add that WM for subsequent learning is a form of attentional control, crucial for success in language learning. These findings highlight the close relationship between WM and the development of oral skills, emphasizing the need to discuss how this influences Oral Performance in English as a foreign language and how educators can use this knowledge to improve their students' oral skills. Despite the importance of oral skills and WM in communication, these areas have not received the same attention as other skills, such as writing and reading, for example Suescun and Arango-Tobón (2022) explored that Extensive reading in English language learning positively impacts WM and motivation, facilitating the development of language skills in EFL students. The study of oral skills and WM represents a great opportunity to expand existing knowledge and contribute to the development of new educational practices.

Similarly, WM capacity is a determining factor in linguistic performance. WM refers to the ability to temporarily store and manipulate information, which is crucial for complex tasks such as language comprehension and production. In his research, Shahnazari (2023) demonstrated that participants with higher WM capacity outperformed those with lower capacity in second-language reading ability. This finding suggests that a robust WM could also facilitate improvement in oral performance, as it enables students to process and use vocabulary and grammatical structures more effectively in real time.

On the other hand, oral proficiency in the context of learning a foreign language can be defined as the individual's ability to express thoughts, ideas, and feelings coherently, fluently, and accurately in spoken conversation. This skill not only involves the correct use of grammar rules, pronunciation, and intonation but also adaptation to the context in which one is interacting with other language speakers. Brown (2004) defines oral proficiency as the ability to generate and comprehend spoken messages in authentic communicative situations. This concept encompasses not only fluency and accuracy but also the ability to linguistically and discursively adapt to the sociocultural context.

Oral skills hold a great importance in the process of learning a foreign language, as they encompass elements of high complexity such as the ability to speak fluently, accurately, and coherently. Richards (2008) points out that speaking is one of the most crucial skills in language learning and is often used as an indicator of language competence. However, despite their importance, oral skills have not been as widely researched as their counterparts, reading and writing. Developing oral skills becomes a real challenge, especially in Latin American contexts, because students do not have frequent opportunities to practice the knowledge they acquire in the classroom in a real-life context.

According to González-Lloret and Ortega (2014), oral interaction in authentic and meaningful contexts is a fundamental aspect for the development of communicative competence. Likewise, Nunan (2015) highlights that constant practice and effective feedback are essential to achieve proper development of oral skills in a foreign language. Speaking is one of the most important skills in language learning, but it is often the most difficult to master. This is especially true in Latin American contexts, where cultural and linguistic differences can make oral performance more challenging. To improve oral performance in Latin American contexts, it is essential to consider the combined influence of IM and WM on individual learning. Fostering an environment that promotes IM, along with strategies that enhance WM capacity can be key to help students overcome the challenges associated with learning to speak a foreign language.

This article begins with a review of the literature on motivation, WM, and their impact on oral skills in a foreign language. The methodology section then describes the participants, instruments, and data collection process. Following this, the results section highlights the main findings of the study. In the discussion, these results are analyzed in connection with existing theories and prior research. Finally, the conclusion provides a summary of the findings, addresses the study's limitations, and offers suggestions for future research.

2. RESEARCH OVERVIEW AND QUESTIONS

With the new challenges in education today, exploring the contributions of psychology and neurology to teaching is essential. Education has evolved significantly, making it hard to address teaching and learning without considering the diverse disciplines involved. Researches in psychology and neurology offers valuable insights that can enrich the pedagogical context. By improving our understanding of these fields, educators can create more effective learning methods and develop strategies that empower students to better understand the world around them.

Based on this research background, the following research question is formulated: What is the influence of WM and IM on the oral performance of students learning English as a foreign language?

This research is framed within the field of neuropsychopedagogy and it focused on analyzing the influence of WM and IM on the performance of oral skills in English as a foreign language among high school students. The literature review revealed a gap in disciplinary knowledge regarding the interrelation of these three aspects, highlighting the need for an interdisciplinary approach to better understand the influence of these components on teaching and learning. This study contributes to the enrichment of the existing literature and establishes new meaningful practices for learning in our context, such as extensive reading and conversations clubs.

3. METHOD

This study is framed within an Empirical-Analytical paradigm, characterized by its emphasis on the collection of empirical data and its rigorous analysis to obtain well-founded conclusions (Sabino, 1978). From a quantitative approach, it seeks to quantify and measure the relationships between variables through the application of statistical techniques. Additionally, it adopts a non-experimental design, which involves observing phenomena as they occur in their natural environment without deliberately manipulating variables or performing random assignments (Toro Jaramillo & Parra Ramírez, 2006). Within this framework, a correlational level is employed, allowing for the identification and measurement of the strength and direction of relationships between the variables of interest (Cohen, 1988). Through this paradigm, approach, and design, the study aims to deepen understanding of how IM and WM influence the performance of oral skills in English as a foreign language among high school students.

In alignment with the previously developed framework, the hypothetical model of this research is based on the variables of IM, WM, and Oral Performance in English. These constructs are operationalized as follows: IM is measured using scores from the Learning Process Motivation Assessment Questionnaire (EMPA); WM is evaluated with scores from the WM Index of the Wechsler Intelligence Scale for Children (WISC-IV) and the Controlled Oral Word Association Test (COWAT); and Oral Performance in English is measured using the Cambridge A2 Key (KET). Considering this theoretical framework and the operationalization of the variables, the following hypotheses are proposed:

- Hypothesis (H1): There is a significant relationship between WM capacity, IM, and Oral Performance in English as a foreign language among high school students.
- Null Hypothesis (H0): There is no significant relationship between WM capacity, IM, and Oral Performance in English as a foreign language among high school students.
- Alternative Hypothesis (HA): There is at least one significant relationship between WM capacity, IM, and Oral Performance in English as a foreign language among high school students.

3.1 Participants

The present study was conducted at the Instituto Salesiano Pedro Justo Berrio, a private institution located in the city of Medellín. This institution provides educational services in primary, middle, and technical education, with a total of 1,322 students enrolled in its various grades and levels. A sample of 90 students aged between 12 and 15, from the seventh, and eighth grades, was selected. This selection was made using predefined inclusion and exclusion criteria. After applying these criteria, the final study sample consisted of 68 students. It is important to mention that this selection process resulted in a non-probabilistic convenience sampling, given the availability and accessibility of the students within the educational institution.

3.2 Inclusion and Exclusion Criteria

These criteria were established to determine which students were suitable to participate in the study and which had to be excluded for various reasons.

Inclusion criteria: Students of the institution with ages between 12 and 15, whose legal representatives authorized their participation in the study. This ensured that the participants were active students within the age range relevant to the study and that they provided informed consent to participate in the research.

Exclusion criteria: Students with any neuropsychological diagnosis or disorder were excluded, as their condition could affect oral skill performance and potentially distort the study results. Additionally, students who received additional instruction or were in enriched contexts for English speech development were excluded, as their prior exposure to similar interventions could bias the study results. The application of these exclusion criteria is of vital importance to ensure the precision and reliability of the results.

3.3 Variable analysis
All analyzes were carried out using Microsoft Excel and the Jamovi 2.2.5 statistical package (free software).

3.4 Instruments
Motivational Assessment of the Learning Process Questionnaire (EMPA)
The instrument consists of 33 items that provide information on Intrinsic, Extrinsic and Global Motivation, with a Cronbach's alpha coefficient of 0.83, 0.93 and 0.93, respectively. Research has shown that the EMPA questionnaire has a validity index of Aiken's V (0.99) based on the evaluation of four criteria (clarity, context, congruence, and construct mastery), which indicates a high level of validity of the instrument. According to various studies in Europe and Latin America, the questionnaire provides excellent reliability and presents psychometric properties with sufficient validity and reliability. Each of the answers in the questionnaire corresponds to a type of motivation, as follows:

- Intrinsic Motivation: items 3, 4, 6, 8, 9, 13, 15, 16, 17, 18, 19, 20, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 and 33.
- Extrinsic Motivation: items 1, 2, 5, 7, 10, 11, 12, 14, 21 and 22.

When analyzing the results, a division will be made by gender and age. Once the direct scores are obtained, they should be converted into percentile values to facilitate interpretation. These scores range from 0 to 100, with 50 being the value corresponding to the student's average motivation, lower values corresponding to low motivation, and higher values corresponding to high motivation (Quevedo-Blasco et al., 2016).

Working Memory Index from Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV)
To evaluate WM, specific sections of the WM Index of the Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV) were used. This is an instrument that is administered individually to evaluate the intelligence of children or

adolescents between 6 years 0 months and 16 years 11 months. The WM section of this test measures the ability to retain and store information, as well as the ability to perform mental operations on that information. The test consists of three subtests:

- Digits (D): Measures immediate and WM, indicating sequencing, planning, vigilance, and cognitive flexibility skills.
- Letters and Numbers (LN): Measures the ability to store and combine two types of information, organize the information and form collections according to instructions.
- Arithmetic (A): Optional, time-controlled test focused on analytical numerical reasoning, flexibility in processing and reorganizing information, attention, and Short-Term Memory.

Its reliability and validity have been studied in both the United States and Europe, as well as in Latin American contexts, in which satisfactory evidence of the psychometric properties of the WISC-IV has been found. For this study, only the Digits and Letters and Numbers subtests were used due to their relevance to the specific purpose of the research.

Controlled Verbal Association Test (COWAT)

To evaluate the Phonological Loop subsystem, the Controlled Verbal Association Test (COWAT, Benton et al., 2017) was used. It is a fluency test that measures verbal fluency (lexical-semantic memory), processing speed, inhibition capacity, planning and organization. There are two common forms of testing, one using the letters /F/, /A/ and /S/, to evaluate the phonological component, and the other using the categories /Fruits/, /Animals/ and /Countries/, to evaluate the semantic component. Participants are typically asked to say words that begin with the indicated letters, excluding proper nouns. This process is repeated three times. Candidates have 60 seconds for each test. The examiner records the words spoken by the participants. The exam usually lasts 5 to 10 minutes. Performance on COWAT is measured by counting the total number of acceptable words generated by all letters and categories. This indicator excludes errors and repetitions.

Cambridge A2 Key (KET) - English Test (Speaking Section) for oral skills in English

The A2 Key English Test (KET) is the most basic of the Cambridge exams. It corresponds to level A2 of the Common European Framework of Reference for Languages (CEFR) Framework and measures the candidate's knowledge of

English in simple situations. The test assesses four English language skills: reading comprehension, writing, listening, and speaking. For the purposes of this study, the speaking section was used. In this section students are placed in pairs and asked to initiate a dialogue with the examiner and then with each other. This group format is intended to be closer to reality than a conversation between two people. The examiner grades for performance, using the Global Achievement scale. The evaluator awards points for three individual criteria:

- · Grammar and vocabulary.
- · Pronunciation.
- · Interactive communication.

The A2 Key for Schools assessment scale is divided into six bands from 0 to 5, with 0 being the lowest and 5 being the highest. Descriptors are provided for each criterion at bands 1, 3, and 5, indicating what is expected from a candidate at each band.

3.5 Procedure

In the data collection process, the participation of parents was required, they read and signed the informed consent for their children to be part of the study. Additionally, they completed a sociodemographic questionnaire that provides relevant information about the family environment and characteristics of the students. Then, the evaluative process took place in three sessions:

- · In the first session, the evaluation of WM was carried out using the WM Index of the Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV). Additionally, the Controlled Verbal Association Test (COWAT) was performed.
- · In the second session, the Motivational Assessment of the Learning Process Questionnaire (EMPA) was administered.
- · Finally, in the third session, the Cambridge A2 Key English Test (KET) was administered, specifically the oral section, which assessed the students' oral English skills.

4. RESULTS

In the characterization of the sample, most responses regarding Socioeconomic Status (SES) fall into categories 3 and 4, representing 79% of the data. This suggests that most participants have a moderate to high level of agreement or conformity with the item in question. Additionally, most participants have education up to the

8th grade. In terms of handedness, most participants were right-handed (91%), which is consistent with the general population distribution. Furthermore, the study included a higher proportion of male participant (74%). Lastly, regarding the level of oral proficiency in English according to the CEFR, most participants were at levels A1 and A2, suggesting that the sample was primarily composed of individuals with basic to intermediate knowledge of the language (See Table I).

Table I. Socio-demographic characteristics.

Item		Frequency	Percentage
SES	2	1	2%
	3	19	29%
	4	33	50%
	5	11	17%
	6	2	3%
SCHOOLING	7°	29	44%
	8°	37	56%
HANDEDNESS	Right-handed	60	91%
	Left-handed	4	6%
	Ambidextrous	2	3%
GENDER	Male	49	74%
	Female	17	26%
CEFR LEVEL	A1	22	33%
	A2	30	45%
	B1	10	15%
	PA1	4	6%

Table II presents important descriptive statistics regarding the scores obtained on the WISC-IV test, an assessment used to measure cognitive functioning in children and adolescents. The mean score on the WISC-IV test was approximately 94.95, suggesting that, on average, participants scored within the normal range for WM. However, it is crucial to note that the mean can be influenced by outliers, so it does not necessarily reflect the typical score of the sample. The standard deviation of the scores on the test was approximately 17.81, indicating a higher variability in individual scores relative to the mean. These results suggest that the normal range for WM is preserved in this test.

Table II. Working Memory (WISC-IV).

Test	X	SD
WISC-IV	94.95	17.8.

The data presented in Table III provide a detailed overview of the results obtained in two measures of verbal fluency: the COWAT Phonological test and the COWAT Semantic test. Starting with the COWAT Phonological test, the mean score was approximately 25.38, indicating that, on average, participants generated around 25 valid responses within the allotted time for this part of the assessment. This suggests a moderate level of verbal fluency in the phonological aspect. Additionally, the standard deviation of 7.15 indicates some variability in individual scores relative to the mean, reflecting differences in verbal fluency ability among participants. On the other hand, in the COWAT Semantic test, the mean score was 48.45, suggesting that participants generated, on average, around 48 valid responses in this part of the assessment. This indicates a higher level of verbal fluency in the semantic aspect compared to the phonological test. Similar to the previous test, the higher standard deviation of 10.75 suggests greater variability in individual scores relative to the mean, indicating a wider range of verbal fluency abilities in this aspect. In summary, the results of both tests provide a detailed picture of the participants' verbal fluency in phonological and semantic aspects, highlighting individual differences in verbal ability.

Table III. Working Memory (COWAT).

Test	X	SD
COWAT phonological	25.38	7.15
COWAT semantic	48.45	10.75

The data presented in Table IV provide a detailed overview of the levels of extrinsic, intrinsic, and general motivation among the participants. Regarding EM, the mean score was approximately 45.91, suggesting that, on average, participants exhibit a low level of EM toward the activity or task in question. However, the standard deviation of 26.10 indicates considerable variability in individual scores relative to the mean, suggesting that some participants have much higher or lower levels of EM than others. As for IM, the mean score was approximately 50.53, indicating that, on average, participants have a moderate level of IM toward the task in question. The standard deviation of 24.68 shows some variability in individual scores relative to the mean, although it was slightly

lower than the standard deviation for EM. Finally, regarding general motivation, the mean score was approximately 50.67, suggesting that, on average, participants have a moderate level of general motivation toward the activity or task in question. The standard deviation of 25.43 indicates some variability in individual scores relative to the mean, similar to IM.

Table IV. Motivation (EMPA).

Test	X	SD
EMPA-Intrinsic Motivation	50.53	24.68
EMPA-Extrinsic Motivation	45.91	26.10
EMPA-Global Motivation	50.67	25.43

When analyzing the mean scores in each oral skill (See Table V), it is observed that for Grammar and Vocabulary, the mean was approximately 3.02; for Pronunciation, it was 3.30; for Interactive Communication, it was 3.36; for Global Achievement, it was 3.20; and for Practice Test Scores, it was 28.88. These values represent the average scores obtained in each area by the participants. The standard deviation, which provides information about the dispersion of the data around the mean, was 1.00 for Grammar and Vocabulary, 1.08 for Pronunciation, 1.21 for Interactive Communication, 1.01 for Global Achievement, and 8.95 for Practice Test Scores. A higher standard deviation indicates greater variability in the scores, suggesting a wider range of performance among participants in that specific area. These findings offer a deeper understanding of the average scores and variability in different evaluation areas, which can be useful for identifying strengths and weaknesses in participants' performance.

Table V. Oral skills in English (A2 Key).

Item	X	SD
Grammar And Vocabulary	3.02	1.00
Pronunciation	3.30	1.08
Interactive Communication	3.36	1.21
Global Achievement	3.20	1.01
Practice Test Score	28.88	8.95

The data presented in Table VI reveal the results of Spearman correlation analyses between WISC-IV test scores and various language assessment areas,

including Grammar and Vocabulary, Pronunciation, Interactive Communication, Global Achievement, and Practice Test Scores. Starting with the correlation between the WISC-IV test and Grammar and Vocabulary, a Spearman correlation coefficient (Rho) of 0.28 was identified, with a p-value of 0.024. This observation indicates a moderate positive correlation between performance on the WISC-IV WM test and grammar and vocabulary skills, suggesting that participants with higher scores on the cognitive test tend to have a better command of grammar and vocabulary in the evaluated language. For Pronunciation, a correlation of 0.23 was recorded, with a p-value of 0.063, indicating a weak positive but not statistically significant correlation between cognitive test performance and pronunciation skills in the language. Regarding Interactive Communication, a correlation of 0.19 was obtained, with a p-value of 0.117, indicating a weak positive and not statistically significant correlation between cognitive test performance and interactive communication skills in the language. For Global Achievement, a correlation of 0.30 was observed, with a p-value of 0.013, indicating a moderate positive and statistically significant correlation between WISC-IV WM test performance and global achievement in the evaluated language. Finally, for Practice Test Scores, a correlation of 0.27 was found, with a p-value of 0.027, suggesting a moderate positive and statistically significant correlation between cognitive test performance and performance on language practice tests.

Table VI. Working Memory (WISC-VI) and performance in oral skills in English - Spearman correlation.

WISC-IV	Spearman's rho	Df	P-Value
Grammar And Vocabulary	0.28*	64	0.024
Pronunciation	0.23	64	0.063
Interactive Communication	0.19	64	0.117
Global Achievement	0.30*	64	0.013
Practice Test Score	0.27*	64	0.027

* p < .05, ** p < .01, *** p < .001.

The information provided in Tables VII and VIII details the results of Spearman correlation analyses between scores on two measures of verbal fluency, the total COWAT Phonological and the total COWAT Semantic, and various language assessment areas, such as Grammar and Vocabulary, Pronunciation, Interactive Communication, Global Achievement, and Practice Test Scores. When analyzing the correlation between verbal fluency measures and Grammar and Vocabulary skills, it is observed that for the total COWAT Phonological, the Spearman

correlation coefficient (Rho) was 0.23, with a p-value of 0.066, indicating a moderate positive correlation although not statistically significant. For the total COWAT Semantic, the correlation was 0.17, with a p-value of 0.176, suggesting a weak positive and not statistically significant correlation. Regarding Pronunciation, it was found that for the total COWAT Phonological, the correlation coefficient was 0.33, with a p-value of 0.007, indicating a moderate positive and statistically significant correlation. On the other hand, for the total COWAT Semantic, the correlation was 0.20, with a p-value of 0.107, suggesting a weak positive but not statistically significant correlation. For Interactive Communication, it was observed that for the total COWAT Phonological, the correlation coefficient was 0.31, with a p-value of 0.012, indicating a moderate positive and statistically significant correlation. In the case of the total COWAT Semantic, the correlation was 0.23, with a p-value of 0.064, suggesting a moderate positive but not statistically significant correlation. Analyzing Global Achievement and Practice Test Scores, similar patterns were observed. In both cases, a positive and significant correlation was found with the total COWAT Phonological and the total COWAT Semantic, with higher correlation coefficients for the total COWAT Phonological compared to the total COWAT Semantic.

Table VII. Working Memory (Phonological COWAT) and performance in oral skills in English - Spearman Correlation.

COWAT Phonological	Spearman's rho	df	P-Value
Grammar And Vocabulary	0.23	64	0.066
Pronunciation	0.33**	64	0.007
Interactive Communication	0.31*	64	0.012
Global Achievement	0.32**	64	0.009
Practice Test Score	0.34**	64	0.006

* $p < .05$, ** $p < .01$, *** $p < .001$

Table VIII. Working Memory (Semantic COWAT) and performance in oral skills in English - Spearman Correlation.

COWAT Semantic	Spearman's rho	df	P-Value
Grammar And Vocabulary	0.17	64	0.176
Pronunciation	0.20	64	0.107
Interactive Communication	0.23	64	0.064
Global Achievement	0.24	64	0.054
Practice Test Score	0.23	64	0.059

* $p < .05$, ** $p < .01$, *** $p < .001$

The results of the Spearman correlation analyses between three different measures of the EMPA exam and various language assessment areas indicated that for Grammar and Vocabulary, the Spearman correlation coefficients (Rho) were close to zero in all versions of the EMPA exam (EMPA-PCME, EMPA-PCMI, and EMPA-PCMG), with p-values greater than 0.05 in all cases. These results indicated a lack of statistically significant correlation between these EMPA exam measures and grammar and vocabulary skills. Regarding Pronunciation, correlation coefficients were again close to zero for all versions of the EMPA exam, with p-values greater than 0.05 in all cases. This suggests no significant correlation between Pronunciation scores and the different versions of the EMPA exam. Similar patterns were identified for Interactive Communication, Global Achievement, and Practice Test Scores. The correlation coefficients were low and not statistically significant in all versions of the EMPA exam, with p-values greater than 0.05 in all cases. These findings indicated the absence of a significant association between these EMPA exam measures and interactive communication skills, Global language achievement, or performance on practice tests (See Table IX).

Table IX. Motivation (EMPA) and performance in oral skills in English - Spearman correlation.

Spearman correlation		EMPA Extrinsic motivation	EMPA Intrinsic Motivation	EMPA Global Motivation
Grammar And Vocabulary	Spearman's Rho	-0.03	0.10	0.08
	df	64	64	64
	P-Value	0.818	0.404	0.536
Pronunciation	Spearman's Rho	0.10	0.05	0.10
	df	64	64	64
	P-Value	0.439	0.678	0.444
Interactive Communication	Spearman's Rho	0.03	0.02	0.01
	df	64	64	64
	P-Value	0.800	0.872	0.906
Global Achievement	Spearman's Rho	0.07	0.07	0.10
	df	64	64	64
	P-Value	0.570	0.571	0.410
Practice Test Score	Spearman's Rho	0.07	0.08	0.09
	df	64	64	64
	P-Value	0.599	0.538	0.463

* p < .05, ** p < .01, *** p < .001

Kruskal-Wallis analysis

The results of the Kruskal-Wallis analysis indicate that there are no significant differences between groups regarding WISC-IV test scores, at least at a significance level of 0.05. However, the effect size is relatively small, suggesting that other factors might be contributing to the variability in test scores (See Table X).

Table X. CEFR LEVEL and Working Memory (WISC-VI) - Kruskal-Wallis.

Kruskal-Wallis - CEFR LEVEL	χ^2	df	p	ε^2
WISC-MT	3.68	3	0.298	0.06

The results in Table XI suggest that there is a significant difference in total COWAT Phonological scores between the evaluated groups. However, since the effect size is not very large, other variables or factors may be contributing to these differences in phonological verbal fluency scores between the groups.

Table XI. CEFR LEVEL and Working Memory (phonological COWAT).

Kruskal-Wallis - CEFR LEVEL	χ^2	df	p	ε^2
COWAT Total Phonological	8.77	3	0.033	0.13

The next results suggest that there are no significant differences between the groups in terms of total COWAT Semantic scores. However, since p-value is close to the significance threshold of 0.05 and the effect size is not very large, additional studies may be needed to confirm these findings and better understand the potential differences between groups in semantic verbal fluency (See Table XII).

Table XII. CEFR LEVEL and Working Memory (Semantic COWAT).

Kruskal-Wallis - CEFR LEVEL	χ^2	df	p	ε^2
COWAT total Semantic	6.75	3	0.080	0.10

Table XIII. CEFR LEVEL and Extrinsic Motivation (EMPA).

Kruskal-Wallis - CEFR LEVEL	χ^2	df	p	ε^2
Extrinsic motivation	7.85	3	0.049	0.12

The results in Table XIII indicate that there is a significant difference in EM between the different levels of linguistic competence according to the CEFR. However, since the effect size is not very large, other variables or factors may be contributing to these differences in EM between the groups.

On the other hand, the results in Table XIV indicate that there are no significant differences between the different levels of linguistic competence according to the CEFR LEVEL in terms of MI. However, since the effect size is small, there may be other factors contributing to the variability in MI that are not being captured by the CEFR LEVEL.

Table XIV. CEFR LEVEL and Intrinsic Motivation (EMPA).

Kruskal-Wallis - CEFR LEVEL	χ^2	df	p	ε^2
Intrinsic motivation	2.26	3	0.521	0.03

Kruskal-Wallis statistical analysis was used to examine the relationship between CEFR level and general motivation in a study group. The results revealed a value of $\chi^2 = 3.86$ with 3 degrees of freedom, which gives a p-value of 0.277. This p-value indicates that there is insufficient evidence to reject the null hypothesis, suggesting that there are no significant differences in Global motivation between different levels of CEFR. Furthermore, the estimated effect size ($\varepsilon^2 = 0.06$) indicates that the relationship between CEFR level and general motivation is relatively small. In summary, according to this analysis, no significant differences were found in general motivation between the different levels of CEFR in the group studied (See Table XV).

Table XV. CEFR LEVEL and General Motivation (EMPA).

Kruskal-Wallis - CEFR LEVEL	χ^2	df	p	ε^2
General Motivation	3.86	3	0.277	0.06

5. DISCUSSION

Relationship Between Working Memory and Performance in Oral English Skills

The correlation analysis results indicate WM, as measured by the WISC-IV WM index and the COWAT Phonological and Semantic tests, has a moderately positive influence on performance in several oral skills. Significant correlations were observed between the COWAT Phonological scores and specific oral skills areas, such as Pronunciation (Rho = 0.33, p = 0.007), Interactive Communication (Rho = 0.31, p = 0.012), and Global Achievement (Rho = 0.32, p = 0.009). This suggests that phonological processing, which involves the retrieval and use of sounds, is crucial for spoken language tasks. In contrast, no significant correlation was found between the COWAT Semantic test and any oral skills. A possible explanation for this discrepancy is that the COWAT Semantic test was administered in Spanish, which may not have activated the English-specific semantic associations necessary to influence English oral performance effectively.

These findings are consistent with previous research indicating that WM is crucial for the processing and production of oral language. For instance, studies by Engle et al. (1999), Baddeley (2003), Gathercole & Alloway (2008), and Unsworth et al. (2009) have demonstrated that greater WM capacity facilitates the manipulation and effective use of linguistic information, which is essential for complex skills such as pronunciation and interactive communication. According to their research, WM capacity is crucial for executive control and the manipulation of information in complex language tasks. Additionally, Swanson (2011) suggests that WM is directly related to the ability to retain and process information simultaneously, which is fundamental for fluency and coherence in speech.

Influence of motivation on performance in oral skills in English

Motivation, assessed using the EMPA, shows a positive but non-significant correlation with most English oral skills, with exceptions in specific areas such as pronunciation and practice test scores. Although the correlations are positive, the p values do not reach levels of statistical significance, suggesting that motivation alone is not a robust predictor of performance in these skills. This result can be explained through Deci and Ryan's Self-Determination Theory (1985), which postulates that while motivation is an important factor, its impact on performance also depends on other factors such as perceived competence and contextual support. In this context, it might be that the participants' motivation alone is not sufficient to translate into significant improvements in specific oral skills without the presence of other supportive factors.

The Kruskal-Wallis analysis reveals a differential influence of motivation types across CEFR levels. Specifically, a significant difference in EM was observed between proficiency levels, while IM and global motivation remained consistent. This may suggest that, as students advance in language proficiency, external play a larger role, while internal motivation remains a stable driving force. Additionally, Dörnyei (2001) argues that motivation in language learning is dynamic and can vary according to the learning context and personal experiences, which could explain the variability in the results.

Although there is research suggesting that motivation energizes various processes in foreign language learning, this study did not provide conclusive evidence supporting that IM has a significant positive influence on oral English skills performance. However, this does not mean that IM has no influence at all on oral skills performance. It is important to delve deeper into this topic and conduct new studies to expand the acquired knowledge.

Interaction Between Working Memory and Motivation

The interaction between WM and motivation could be an interesting area for future research. The results suggest that while WM has a more direct and significant impact on oral skills performance, motivation might play an indirect role, possibly moderating or mediating the impact of WM on performance.

For example, a student with high WM but low motivation might not fully apply their cognitive abilities, resulting in suboptimal performance. In contrast, a student with high WM and high motivation could fully leverage their cognitive capacities, leading to better performance in oral English skills. This integrative approach aligns with Pintrich's (2003) perspectives, which highlight the importance of the interaction between cognitive and motivational factors in learning.

6. CONCLUSION

The results of this research suggest that WM has a significant influence on the performance of oral English skills, while IM specifically shows a weaker and non-significant relationship. This indicates that students with greater WM capacity tend to perform better in activities that require the use of oral language, likely due to their ability to process and store verbal information more efficiently. These findings underscore the importance of considering multiple factors, both cognitive and motivational, when designing educational interventions to improve oral English skills. It is crucial that educational programs not only focus on enhancing students' cognitive abilities, such as WM, but also seek strategies to increase IM. Although motivation did not show a significant relationship in this

study, it remains a vital component for long-term learning and engagement with the language.

A possible direction for future research is the implementation of longitudinal studies that allow for periodic measurements. This approach would be valuable for an in-depth analysis of the effects of IM and WM on the process of acquiring oral English skills. A longitudinal study would provide more robust and detailed data on how these variables influence learning over time, offering a more comprehensive view of their impact and evolution. Longitudinal studies enable the observation of how IM and WM change and develop in students as they progress in their language learning. This type of study can identify patterns and trends that are not visible in cross-sectional studies, which only capture a specific moment in time. Additionally, a longitudinal approach could help determine if interventions designed to improve WM and IM have lasting effects and how these effects evolve.

Similarly, an integrated approach that combines the enhancement of cognitive and motivational capacities could lead to greater success in acquiring language skills. Future explorations might also consider additional factors such as the learning environment, social support, and individual differences in learning styles to develop a more comprehensive understanding of the processes underlying language learning and how they can be effectively improved. This holistic approach can provide valuable insights that inform educational practice and enhance student outcomes in learning English as a foreign language.

Regarding the limitations of the present research, it is important to note the inability to conduct probabilistic sampling to obtain more representative and generalizable results. This limitation may affect the generalization of the findings, as the sample may not optimally represent the studied population. Additionally, the reliance on self-reported data can introduce biases, suggesting that future research should incorporate more diverse and robust data collection methods to mitigate this issue.

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