The Interrelationship of Planning, Monitoring, and Evaluation (PME) as High-Order Executive Skills on EFL University Students' Writing Performance

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Abstract:

Writing is complex cognitive task that demands the writer to manage multiple elements simultaneously. Understanding how metacognitive regulation (planning, monitoring, and evaluating) influence writing performance is highly relevant for both educators and students. Proficiency in writing can significantly enhance students' prospects for success. As an essential component of language, strong writing skills are crucial for students to attain their academic and career objectives. High-order executive skills involve the capacity to plan, monitor, control, and adapt one's cognitive processes while performing learning tasks. This present study designs to explore the relationship between PME as high-order executive skills and writing performance among Iraqi university students learning English as a foreign language (EFL). A random sample of 260 students from Iraqi universities, colleges of education, and English departments was chosen throughout the academic year (2024-2025). Data is collected using two instruments: a questionnaire to examine PME and a writing test is conducted to assess their performance in written English. To examine the relation between PME as High-order executive skills and writing performance a correlational analysis is used. Data findings indicate that Iraqi EFL university students have a high PME level as High-order executive skills. Additionally, the level of PME was positively correlated with writing performance, which shows that students are aware of how important it is to monitor their own comprehension and language production, to plan the task in a purposeful way, and to assess their performance as if they wish to improve their skills. It shows that students use metacognitive processes to improve their learning.

Key Words: EFL, High-Order Executive Skills , PME ,Writing Performance

العلاقة المتبادلة بين التخطيط والمراقبة والتقييم باعتبارها مهارات تنفيذية عالية المستوى والأداء الكتابي لدى طلاب الجامعات العراقيين دارسي اللغة الإنجليزية لغة أجنبية

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المستخلص:

الكتابة مهمة معرفية معقدة للغاية تتطلب من الكاتب إدارة عناصر متعددة في وقت واحد. إن فهم كيفية تأثير التنظيم ماوراء المعرفة (التخطيط والمراقبة والتقييم) على أداء الكتابة له أهمية كبيرة لكل من المعلمين والطلاب. يمكن أن يعزز إتقان الكتابة بشكل كبير من احتمالات نجاح الطلاب. باعتبارها مكونًا أساسيًا للغة، تعد مهارات الكتابة القوية أمرًا بالغ الأهمية للطلاب لتحقيق أهدافهم الأكاديمية والمهنية. تتضمن المهارات التنفيذية عالية المستوى القدرة على التخطيط ومراقبة والتحكم وتكييف العمليات المعرفية أثناء أداء مهام التعلم. تهدف هذه الدراسة الحالية إلى استكشاف العلاقة بين PME كمهارات تنفيذية عالية المستوى والأداء الكتابي بين طلبة الجامعة العراقيين دارسي اللغة الإنجليزية لغة أجنبية . تم اختيار عينة عشوائية من 260 طالبًا من الجامعات العراقية وكليات التربية وأقسام اللغة الإنجليزية للعام الدراسي (2024–2025). من اجل تحقيق اهداف الدراسة ، تم جمع البيانات باستخدام أداتين: استبيان لفحص PME ويتم إجراء

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اختبار الكتابة لتقييم أدائهم في اللغة الإنجليزية المكتوبة. تم استخدام تحليل ارتباطي للتحقيق في العلاقة بين PME وأداء الكتابة. وقد اظهرت النتائج أن طلاب الجامعات العراقية في مجال اللغة الإنجليزية كلغة أجنبية لديهم مستوى جيد من PME. علاوة على ذلك، وجدت الدراسة ارتباطًا إيجابيًا بين PME وأداء الكتابة، مما يشير إلى أن الطلاب يدركون أهمية مراقبة فهمهم وإنتاجهم اللغوي، والتخطيط الفعال لمهامهم، وتقييم أدائهم من أجل تحسين مهاراتهم. كما يوضح أن الطلاب يشاركون بنشاط في العمليات المعرفية لتعزيز نتائج التعلم لديهم.
الكلمات المفتاحية: PME؛ المهارات التنفيذية العليا؛ أداء الكتابة؛ اللغة الإنجليزية كلغة أجنبية

1. Introduction

The English language serves as a repository of global knowledge and is widely used as the medium of instruction in higher education worldwide. For students learning English as a Foreign Language (EFL), mastering writing is one of the most challenging tasks. EFL learners often struggle with generating and organizing ideas, as well as translating those ideas into coherent and understandable texts (Nourdad & Aghayi, 2016). According to Chakarverty & Gautum (2000), writing performance "was a reflective activity that demands enough time to think about the particular subject and to assess and order any background knowledge". Also, Olshtain (1991, p. 235) states, "Writing performance as a communicative activity needs to be encouraged and nurtured during the language learner's course of study".

On the other hand, Meta-cognition can thus be understood as a specialized form of cognition, or most precisely, a subset thereof. According to Schraw & Dennison (1994), Metacognition is the capacity to consider, comprehend, and regulate one's own learning. Brown (1987, p. 30) indicate that metacognitive regulation (MR for short) " is a dimension of metacognition; the means by which we regulate our cognition". However, high-order executive skills refer to "advanced cognitive processes that enable individuals to manage and regulate their thoughts, actions, and emotions effectively. These skills are crucial for problem-solving, reasoning, planning, monitoring, evaluating and they build upon core executive functions" (Was and Christopher, 2024, p. 6).

The cornerstone of effective metacognitive regulation is high-order executive skills (known as HOES). Cognitive flexibility, for example, is beneficial for the monitoring process, as it enables learners to adjust their plans in response to the evaluations they are making during learning (Tomasello, 2024). Working memory is brought into play when planning, by holding and manipulating information to set goals. When people practice inhibition, they train themselves to resist temptation and prioritize long-term goals instead. Strong reasoning skills enhance the ability to evaluate performance critically, leading to improved future planning (Was and Christopher, 2024).They can set specific goals, break tasks into manageable steps, and allocate their time and resources effectively. Consequently, there are many difficulties that both teachers and students of foreign languages face, especially when it comes to developing and imparting practical skills.

The writing challenges that Iraqi EFL students often face such as organization, coherence, and self-regulation. Although previous studies have emphasized the role of metacognitive strategies in writing, little is known about how planning, monitoring, and evaluation interact as HOES and how they impact performance in writing. Also, no study investigated the interrelationship in between Planning, Monitoring and Evaluation (PME) Strategy as High-Order Executive Skills and performance in writing skills of Iraqi EFL University students. The present also aims to address this gap successfully.

Thus , the study questions are:

1. What is the level of PME among Iraqi EFL university students as High-Order Executive Skills and their performance in writing skills?
2. Is there a relationship between writing skills performance and the degree of Iraqi EFL Iraqi university students in PME as High - Order Executive Skills?

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2. Literature review

2.1 The concept of Metacognitive Regulation and High-Order Executive Skills

Metacognition refers to the awareness and control individuals have over their own cognitive processes, including their thinking, learning, and problem-solving strategies. Flavell (1979), defines metacognitive regulation (MR) as referring to:

" **a set of activities that help learners control their learning, working on the basis of the metacognitive knowledge and referring to processes to ensure realization of learning goals. This management involves planning, monitoring, and manipulating the cognitive processes to obtain optimal learning outcomes" (p. 906**).

Metacognitive regulation is also important due to the ability to regulate learning by monitoring the process itself (Jafarzadeh, 2016).

In this way, Tomasello (2024) considers high order executive skills as dynamic cognitive processes, context-dependent skills which combine cognition, emotion, and behavior in order to electrify goal-directed behavior, act accordingly, and adaptive problem-solving. These are planning, working memory, inhibitory control, cognitive flexibility, and metacognition.

High-order executive skills (HOES) are teachable, strategy-based, cognitive processes for finessing learning and task execution (e.g. essay construction, progress monitoring, outcome evaluation, strategy adjustment) (Barkley, 2012). In education, they are commonly positioned as instruments for maintaining student agency and academic achievement.

2.1.1 The Components of Metacognitive Regulation and High-Order Executive Skills

According to Baker (1989), Lai (2011), Mahdavi (2014), Schraw and Dennisson (1994), and Stephanou and Karamountzos (2020), meta-cognitive regulation is comprised of three essential components that support the process dimension. These components include planning, monitoring and evaluating. They are as described below:

1. Planning

According to Mahdavi (2014), Planning means choosing the best strategies for learning language as well as allocate resources that are effective in achieving the goals. "Planning includes goal setting, activating prior knowledge and managing time allocation at different stages of learning." (Schraw & Flowerday, 2003, p. 1090)

For planning, Dowling (2009) and Tanner (2012) has also emphasized that Schraw (1998) has present a checklist to enhance meta-cognitive regulation.

a) What is the nature of the task?
b) What is the objective that I am trying to achieve?
c) What in my previous knowledge and can it help me do this specific task?
d) Where do I want my thinking to lead me?
e) What ought I to make initially?
f) What particular knowledge and tactics will I need?
g) How much time would I require, roughly speaking?

2. Monitoring

Monitoring is defined as constant managing and observing the adoption of strategies to determine a target (Cera et al., 2013). More specifically, it covers self-observation activities, which Monitor, cognition, need, attitude, task demands, time, and motivation (Zimmerman, 2002).

As with Schraw (1998), Burner (2007, p. 39) provided a list of types of monitoring in a checklist to facilitate meta-cognitive regulation

a) Do I completely understand?
b) Do I achieve my objectives?
c) Do I head in the correct direction?

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d) What do you need to remember?
e) Do I change the pace according to the difficulty?
f) If I don't get it, what do I have to do?
g) Do changes needed to be made?

1. Evaluating

Evaluation "refers to appraising the products and regulatory processes of one's learning" (Schraw et al., 2006, p. 114). It relates to assessing the results obtained and the identifying the responses of the learner to these outcomes. Moreover, as Veenman et al. According to the (2006, p. 8) state evaluation is "the process of assessing the progress achieved towards goals, which can then be drawn upon to guide future planning, monitoring and evaluation".

Similar to Schraw (1998) and Burner (2007), Anderson (2002) emphasized a regulatory checklist of evaluation to enhance metacognitive regulation as followed:
a) Did I accomplish these objectives?
b) To what extent did I perform effectively?
c) Did my writing produce more or less than I anticipated?
d) To what degree was success achieved?
e) What was ineffective?
f) What other actions may I have taken?
g) In what ways can I apply this mode of reasoning to other issues?
h) Must I retreat in any manner to comprehend specific "blanks" in my understanding?

2.1.2. The Components of High-Order Executive Skills (HOES)

As mentioned by Moore et al. (2019) and Was and Christopher (2024). The High-Order Executive Skills, which facilitate the process aspect, are made up of: **Cognitive Flexibility, Working Memory, Inhibition, Reasoning and Problem-Solving and Planning**. They are as follows:

Cognitive Flexibility: The capacity to give a different response to the new, dynamic, or unexpected situations.

- **Key Features:**

1. This has not moved us to take a break or to try to move on to other tasks or viewpoints.
2. Changing the approach when coming up against adversity.
3. Creative problem-solving.

- **Examples in EFL Contexts:**

1. Writing in different styles as a result of another (academic essays vs blogposts)
2. Participating in listening comprehension tasks with different accents/dialects.
3. More of the kind of work that you are trained on (until1203)

Working Memory: The capacity to retain and manage information mentally over short durations when executing tasks.

- **Key Features:**

1. Retention and processing of information at the same time.
2. Avoiding cognitive overload during challenging tasks.

- **Examples in EFL Contexts:**

1. You have remembered the grammar rule when you are making sentences.
2. How to keep the main points in mind while writing an essay?
3. Following multi step instructions in group work.

Inhibition: Taming impulses, focus on work, resisting distractions

- **Key Features:**

1. Preventing off-topic thoughts or behaviors.

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2. Focusing in spite of external or internal distractions.

- **Examples in EFL Contexts:**

1. Focusing on an essay topic without going off course.
2. Fighting the urge to use one's first language during activities conducted exclusively in English.
3. Listening exercises ignoring the background noise you have.

Logical Reasoning: The skill of processing information in a logical and structured manner.

- **Key Features:**

1. Reasoning and problem-solving skills.
2. Innovation – Creativity to generate new solutions

- **Examples in EFL Contexts:**

1. Readings that contain a main idea and supporting details
2. Just solving grammar puzzles (e.g., fixing errors in sentences).
3. Your prompt is about developing a thesis statement for an essay.

Planning: You can determine what to achieve, formulate your plans, and arrange the steps that need to be done to get the work done.

- **Key Features:**

1. Dividing tasks into achievable steps.
2. Knowing potential hardships and having answers ready.

- **Examples in EFL Contexts:**

1. Prewriting an essay (making an outline before writing.)
2. Lexical studies should be planned in advance.
3. Organizing a presentation (e.g., introduction, key points, conclusion).

2.1.3 The Nature of Relationship between High-Order Executive Skills and PME in EFL

Metacognition refers to the study of the human cognitive process and the development of methods to fortify its capabilities, and it is a popular subject among educational experts. In fact, knowledge level of the learners is the level of interest for most education researchers and specialists. Consequently, learners are needed to critical thinking of what they listen to or read, to link ides and the intention in the way (Okmawati, 2021).

Piaget's theory asserts that the mind constructs a meaning-making system that employs ordered cognitive operations to engage with increasingly complex and abstract characteristics and relationships in the environment (Adey et al., 2007). Drigas et al. (2022) present an integrative model that contrasts with the models proposed by Özgüven et al. (2021), which assert that the entire cognitive mechanism is fundamentally dependent on the development of a corresponding metacognitive mechanism, structured hierarchically through processes of self-organization and knowledge acquisition.

When looking back at Flavells conceptualisation and how it connects with the second or foreign language learning process, Flavell (1976, 1979, 1981) observed that metacognition does not directly link to the foreign or second language acquisition process. He reinforces the role of metacognition if one wishes to assign more understanding to various domains of language development. He argues that metacognition " is an important factor in the oral communication of information, oral persuasion, oral comprehension, reading comprehension, writing, language acquisition, attention, memory, problem solving, social cognition, and many forms of self-control and self-instruction" (Flavell 1979, p. 906).

On the contrary, high-order executive skills enable metacognitive regulation (Diamond, 2013). Thus, the related are:

1. Cognitive Flexibility and Monitoring : cognitive flexibility enables students to alter their thinking and adapt approaches to new activities based on their continual monitoring of their comprehension. This also allows for flexible monitoring, allowing learners to figure out when a strategy gets off track and change course.

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2. Working Memory and Planning: Working memory is critical to retain information while planning. It enables people to reflect on several aspects and possibilities when planning goals and strategies.
3. Inhibition and Self-Regulation: This falls in line with inhibition, and is very important for self-regulation, ensuring that we can focus on the long-term facts of a task instead of short-term distractions. This is important for proper monitoring and evaluation.
4. Reasoning and Evaluation: Engagement in reasoning helps performing self-evaluation. People can analyze what worked or what did not work and plan better in the future.

This means that students with good PME are high-order executive skills, so they can monitor and faster-learning processes; they are able to master the information and can use the learning strategies and use their knowledge to solve problems (Meltzer, 2018) Moreover, students trained by PME as HOES know their own learning and know when and how to implement the most appropriate strategies to accomplish a given task; they also know how to carry out an activity in a more effective way (Zhang & Goh, 2006). Higher levels of autonomy and self-motivation are shown by students who use more metacognitive regulation strategies. They are more active, involving more people in planning, managing, monitoring and evaluation (Mengjiao and Was. 2023).

Moreover, students with good PME as high-order executive skills have the ability for monitoring and managing their own learning processes; they can control their information and utilize the learning strategies for solving problems more effectively (Meltzer, 2018). Zhang and Goh (2006) explain that students who have been trained with PME as HOES, are conscious of their own learning and know how and when to apply the most suitable strategies necessary for carrying out a particular task; furthermore, they are familiar with how to conduct a specific task in an optimal way. An increase in metacognitive control mechanisms results in enhanced autonomy and self-motivation. Increased activities lead to more participation in planning, organizing, monitoring, and evaluation (Mengjiao and Was, 2023).

2.1.4 Benefits of PME as HOES in EFL

Some examples of specific impacts may include **PME as HOES** :

1. ***Enhanced academic achievement****:* PME techniques can enhance students performance in language learning settings. A study by Flavell et al. (2002) eastern language learning found higher meta-cognitive academic performance .
2. ***Enhanced Language Learning Strategies****:* By breaking the reading language down into manageable chunks (PME), learners can better control their reading by choosing the most effective strategies (HOES) needed to understand the language. This awareness encourages choosing and utilizing appropriate language learning strategies such as goals setting, information organization and self-assessing going on (O'Malley & Chamot, 1990 ; Teng, 2019).
3. ***Enhanced Self-Reflection*** : PME as HOES helps language learners reflect on their language learning experiences and recognize strengths and weaknesses (Travers & Locke, 2015), leading them to deeper self-reflection. By reviewing their achievement and discovering their styles of learning, they are able to change their method and will be able to learn a language more quickly (Vandergrift & Goh, 2012).
4. ***Autonomy and self-direction:*** PME as HOES encourages learners to own their learning. Through the process of monitoring their understanding and progress, learners can recognize when they have not reached their goal, and try to find support and practice to improve English sounds, structure, and meaning (Oxford, 2011; Teng, 2017).
5. ***Greater engagement:*** PME as HOES strategies can lead to greater engagement in EFL (Uliewe & Mousa, 2023). According to Zimmerman (1990), the aspect of metacognition contributes to development and transference of self-regulation which is goal setting, self-controlling, and self-reflection that may help engagement.
6. ***Increased Problem-Solving Skills***: Meta-cognitive strategies are strongly related to problem-solving skills (Sutarto, 2022). Cohen and Aphek (1980) examined the relationship between ELL meta-cognition and problem-solving abilities and found that there was a positive relationship between incorporating theoretical knowledge metacognitive skills and problem-solving performance.

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7. ***Creativity and innovation***: Meta-cognitive strategies can also promote creativity and innovation in EFL (Zhang & Zhang, 2013). This means that metacognitions enable individuals to examine multiple ideas, develop new ones, and think critically (Sternberg, 1999) by observing their thoughts via regulation.

2.2. Writing Performance

2.2.1 Definition of Writing Skill

Written expression is widely considered to be the most difficult language skill for non-native speakers of English to acquire a notion supported by its intricate grammar, vocabulary, pronunciation, and spelling (Rao, 2017).

Byrne (1988, p. 183) states that writing is "a process of encoding (putting messages into words) with a reader in mind". A Raymond (1980, p. 2) point out that writing is

"M**ore than a medium of communication, it is not only a way to communicate with each other but it also functions as a means of expressing ideas and emotions. Through writing, words are permanent, thus, it expands the collective memory of human beings from the relatively small store that people can remember and pass on orally to the unlimited capacity of a modern library**".

Chakarverty & Gautum (2000) writing is a reflective activity that takes time to think about the subject, and to explore and categorize background knowledge.

2.2.2 Features of writing

Which can be summarized in a few keys as cited by Aryadoust (2016);; Kane (2003) ,Ghafar and Mohamedamin (2022), and Kellogg and Raulerson (2007) :

1. ***Clarity:*** Good writing is clear, so the ideas are easily understandable by the intended audience. It delivers ideas, information, and messages in a clear and straight forward way, without ambiguity or confusion. Effective writing uses compact vocabulary, logical sequencing, and cohesive syntax and paragraphing.
2. ***Conciseness:*** Keep your writing concise, so that information and ideas are communicated in as few words as possible, while still making sense. And refrain from needless repetition, or redundancy, or verbosity and excessive jargon or erudition. Concise writing is efficient, cutting out the fluff to deliver the message and get to the point.
3. ***Completeness:*** The information should provide all the details necessary to ensure that the information is profitable. Your response must not leave any significant aspect of the topic or subject matter unanswered with no major gaps or blanks.
4. ***Correctness:*** Being able to rely on information provided in the writing. This must be information that is verifiably of fact and backed with evidence or credible sources. Just make sure each and every thing is well researched and fact checked to be absolutely sure about the content!
5. ***Implementation:*** You have backup on your writing, showing credible sources, research or experts. This increases the credibility of the writing by validating support and recognizing counterclaims.
6. ***Consideration:*** Writing should take into account how the reader could react, what the reader may question, what may not be understood. As writers, we must attempt to meet the reader's needs, offer pertinent context, and anticipate and counter likely counterarguments or concerns.
7. ***Vitality:*** Active voice should be used over passive voice in writing whenever possible. Using the active voice makes for more vigorous, immediate, and interesting writing. It focuses on the subject in action, which leads to well-structured, active sentence

2.2.4 Domains of Writing

In fact, Domains of writing can be differentiated through the most general purposes or contexts in which the writing is used. According to Bhowmik (2021), Elbow (1998) Danoff-Burg (2010) and Hacker and Sommers (2016) .Thus some of the common domains of writing include:

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1. **Academic Writing**: This type of writing is typically done within an educational context. The purpose of academic writing reads on a more mechanistic level - disseminate knowledge, support arguments with evidence, and follow particular conventions of academic writing.
2. **Creative Writing**: Writing that is imaginative or poetic in nature, including novels, poetry, plays, or creative nonfiction. Creative writing focuses on artistic and literary devices, eliciting emotions and telling stories or ideas.
3. **Narrative Writing**: Writing that narrates a narrative or retells the events of a story. Characters, a plot, a setting, and a distinct story progression are all common components of narrative writing.
4. **Descriptive Writing**: Writing that provides a detailed account of a person, place, object, or experience. Descriptive writing assists the reader in gaining a perspective on the world from that particular moment.
5. **Expository Writing**: intends to prime, make clear or depict a theme or idea. Expository writing contains facts, analysis, and explains the subject matter.
6. **Journalistic Writing:** Writing that appears in newspapers, magazines, online news sites, and other media. Journalistic writing is the style used to write news, features and investigative stories and follows journalistic ethics and standards.
7. **Free Writing:** This is an exercise used frequently as a brainstorming or creative technique. So, your time is limited, and you write as fast as you can, without regard to grammar, punctuation and coherence. The intent is to get the thoughts on the page, generating ideas without worrying about someone judging the quality.
8. **Essay Writing**: Essay writing is a type of writing with a structured format which gives you an argument or discusses a particular topic in a logical way. It usually proceeds in a certain order with an introduction, body paragraphs, and a conclusion. Writing an essay goes beyond the basic skill of putting words on paper: it involves critical thinking, research and analysis on the part of the student, and the ability to present their ideas in an orderly and convincing manner. It is frequently utilized in educational environments, where pupils have to submit essays, either as a portion of an assignment or a test.

3. Methodology

3.1 Population and Sample

The population in this study represented (3614) third year university students studying morning studies at the Department of English in Iraqi colleges of education for human sciences except in the Kurdistan region for the academic year 2023-2024. The study sample (260) second year university students randomly selected from the colleges of Education

3.2 Instruments

To achieve the aims of the present study, two instruments have been used. The first one is PMEQ (planning, monitoring, and evaluation questionnaire),which has been adopted from Schraw & Dennison (1994). (35) The items comprises of subscales designed to evaluate the planning, monitoring and evaluation of the participants. The items are divided within the following categories:

- Planning = 7 items ranging (1-7)
- Monitoring = 22 items ranging (8-29)
- Evaluating = 6 items ranging from (30-35).

It is graded by using five Likert scale of five points on a scale from 1 (strongly disagree) to 5 (strongly agree), with each positive item receiving a score of 1, 2, 3, 4, and 5, and each negative item receiving a score of 2-4. The total score of the questionnaire is the sum of the points that each scale of the item selected by the respondent received. The minimum score would be (35), the maximum score would be (35 x 5 = 175). The higher scores translated sign of the higher levels of metacognitive regulation and conversely for lower scores.

The second instrument is the writing performance test (WPT), which is associated with the essay writing test. The students must pen an essay in response to a question that requires them to state, explain, and support their opinion on an issue. The writing skill test consists of an essay, which should have (250-

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300) words as the minimum count. The subject of the writing is selected on the basis of the topics that they have already addressed and criterion in compliance with genuine authenticity. Scoring Rubric consists of five category of speaking: Content, Organization, Vocabulary, Grammar, and Mechanics as seen in the table below (20) these components are rated from one to four (poor, fair, good, excellent). So the maximum enrollment score of an student is (20) and minimum enrollment score is (4).

3.3 Psychometric Properties of the Instruments

3.3.1 The Validity

Validity, according to Brown & Rodgers (2002, p. 221), is "the degree to which a test truly measures what is meant to assess." However, Face validity is defined "as the degree to which test respondents view the content of a test and its items as relevant to the context in which the test is being administered" (McNamara, 2006 ,p.133).

To confirm the face validity of the two study instruments, they were evaluated by a panel of experts in English Language Teaching and Applied Linguistics. The jury members are tasked with evaluating the suitability of the instruments used to measure the examined variables. The jury comprises 10 professors and assistant professors from various Iraqi institutions. The jury members concur on the appropriateness of the instruments and the scoring method for fulfilling the study's objectives, with the exception of certain language adjustments that will be considered prior to finalizing each instrument.

3.3.2 Pilot Administration

A pilot study is a technique for introducing a research instrument to a small sample group prior to its ultimate implementation (Mohamad et al., 2015). Conducting any analysis is a key step. This administration has been executed to:

1. Check the intelligibility of the instrument's instructions, and
2. Estimate the time allocated for responding to the questionnaire or test.
3. The two instruments were administered to a sample of 50 students, who are not part of the main sample, from the Department of English at the College of Education - Ibn Rushed for Human Sciences, selected for the pilot administration of the research instrument. The pilot research is conducted on October 15th and 17th, 2024. Thus, the implementation of the pilot research reveals no significant uncertainty regarding the responses to the instruments. The duration needed to complete the PMEQ is seen to vary from 15 to 25 minutes. The duration allocated for the writing test is 35 minutes, whereas the entire course lasts 50 minutes

3.3.3 Reliability

In addition to validity, reliability is a crucial attribute in the assessment of outcomes. In quantitative research, reliability denotes the consistency, stability, and reproducibility of results; specifically, a researcher's findings are deemed credible if analogous outcomes are achieved under comparable yet distinct conditions (Daniel & Frederick, 2018). The reliability coefficient ranges from 0 to 1, where a value of 1 indicates complete dependability and a value of 0 signifies no reliability(Harmer ,2001 and DeVellis, 2012).

There are numerous methods for determining reliability, including the test-retest, split-half, Kuder-Richardson, and Alpha-Cronbach methods. In particular, when the instrument comprises multiple items or queries that are designed to measure the same fundamental construct, Cronbach's alpha is a frequently employed approach to evaluate the internal consistency reliability of a measurement instrument. It offers an estimate of the degree to which the elements within the instrument are closely related (Heale & Twycross, 2015; Quintão, et al., 2020).Conversely, Test-Retest Reliability necessitates administering the identical instrument to the same group of participants on two distinct occasions. The instrument's consistency over time is evaluated by comparing the scores or measurements obtained from both administrations using statistical techniques (Madan & Kensinger, 2017; Ustun, et al.,2023).

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Nevertheless, the test-retest method and Cronbach's Alpha equation are employed to estimate the reliability of PMEQ, whereas the Cronbach's Alpha formula is employed to estimate the reliability of WPT.

Table 3.1 Cronbach Alpha coefficient and Test-Retest of PMEQ and WPT

Instrument	Test-retest	Cronbach's alpha
PMEQ	0.82	0.84
Writing	----------	0.82

In order to determine the reliability of the test-retest approach, the two questioners are first administered to a pilot sample consisting of fifty students in their second year. After a period of fourteen days following the initial administration, the Pearson correlation coefficient is then computed to determine the correlation between the two sets of questions. Based on the information presented in Table (3.1), the value is satisfactory and possesses an excellent stability coefficient. (Messick, 1995; Zohrabi, 2013) The reliability of the test is considered to be satisfactory if it is not less than 0.5, and it is considered to be very excellent if it is greater than 0.8.

4. Discussion of finding

To assess the skill level of Iraqi EFL university students in PME as HOES and their writing skills, arithmetic means and standard deviations were calculated. The researchers used a t-test on a single sample to evaluate the disparity between the arithmetic and theoretical means. The findings reveal that the sample arithmetic mean is 119.681, accompanied with a standard deviation of 13.792. An independent sample t-test is employed to determine the significant difference between the arithmetic mean and the theoretical mean of 105, as presented in Table 4.1 and Figure 4.1. The calculated t-test statistic (20.195) exceeds the crucial t-test value (1.96). The results indicate a statistically significant difference at the 0.05 level of significance with 259 degrees of freedom, suggesting that Iraqi EFL university students possess a commendable level of PME as HOES.

Table 4.1 The Mean, Standard Deviation, and T- Test Value for the PMEQ as HOES

Variable	Sample	Arithmetic Average	Standard Deviation	Theoretical Mean	T-Value		Significance (0.05)
					Computed	Critical	
PMEQ	260	119.681	13.792	105	20.195	1.960	Significant

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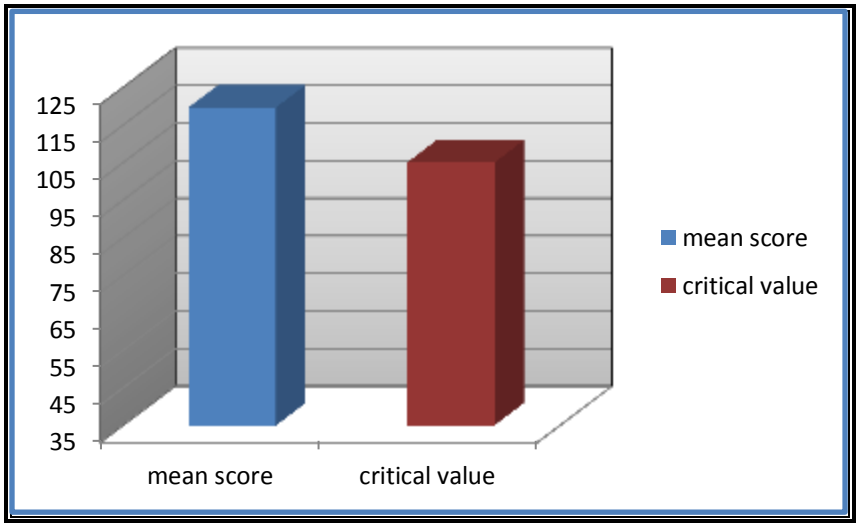
Figure 4.1 Computed and Theoretical Mean for PME as HOES

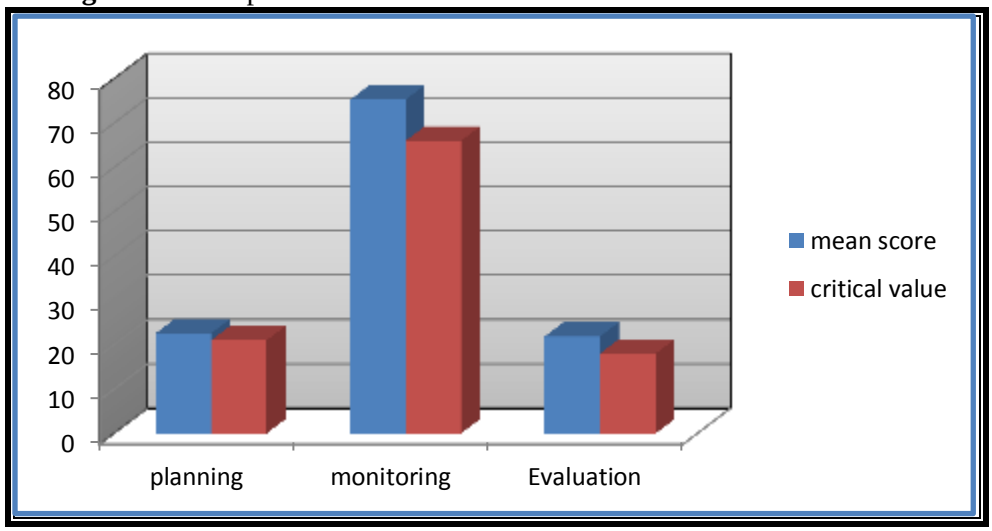


An independent sample t-test is conducted, with results presented in Table (4.2) and Figure (4.2), following the extraction of the arithmetic mean and standard deviation for each domain of PME to ascertain the significance of the distinction between the arithmetic mean and the theoretical mean for each domain.

Table 4.2 The Mean, Standard Deviation, and T-test Value for Domains of the PME as HOES

Domains of PMEQ	Sample	Arithmetic Average	Standard Deviation	Theoretical Mean	T-Value		Significance (0.05)
					Computed	Critical	
Planning	260	22.567	4.168	21	7.131	1.96	Significant
Monitoring	260	75.272	7.677	66	22.916	1.96	Significant
Evaluation	260	21.842	3.067	18	23.762	1.96	Significant

Figure 4.2 Computed and Theoretical Mean of Domains of PME as HOES



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According to the Table (4.2) and Figure (4.2) above, the results can be summarized as follows:

1. For the domain of planning : The sample's arithmetic mean, standard deviation, and theoretical mean for the planning domain are 22.567, 4.168, and 7.131, respectively. These values above the critical value of 1.96 at a significance level of 0.05 and degrees of freedom of 359. This indicates that there is a respectable level of planning in the research population.

2. For the domain of monitoring : The sample's theoretical mean is 66, its arithmetic mean is 75.272, and its standard deviation is 7.677 for the monitoring area. With 359 degrees of freedom and a significance threshold of 0.05, the computed t-test result of 22.916 is higher than the critical value of 1.96. This suggests that there is a respectable degree of monitoring in the research sample

3. For the domain of evaluation: The arithmetic mean of the sample is 21.842, with a standard deviation of 3.067. The theoretical mean stands at 18, while the computed t-test value is 23.762, surpassing the critical value of 1.96 at a significance level of 0.05, considering 359 degrees of freedom. This suggests that the study sample demonstrates a notable level of evaluation.

In order to achieve the second goal, Pearson correlation coefficients and t-tests for correlation significance were used to determine the relationship between PME as HOES and WPT. The findings are shown in Tables (4.4).

Table 4.6 The Correlation Between PME as HOES and WPT

Productive skills	Sample	Pearson Correlation Coefficients For PME as HOES	T-Value		Significance (0.05)
			Computed	Critical	
WPT	260	0.452	10.044	1.96	Significant

According to the Table above, the correlation coefficient between PME as HOES and writing talent is (0.452), as shown in the table above. A t-test is utilized in order to determine the significance of the link between the two variables. The findings indicate that the computed t-value is (10.044), which is more than the crucial t-value (1.96), when the threshold of significance is set at 0.05 and the degree of freedom is set at 358. The conclusion that can be drawn from this finding is that the connection between PME as HOES and writing skills is a statistically significant positive association. This suggests that the greater the degree of PME as HOES that Iraqi university students have, the better their writing skill is.

5. Conclusions

1. Iraqi EFL university students have a good level of PME as HOES.

2. Iraqi EFL university students' writing skills performance is at a good level.

3. Iraqi EFL university students' PME as HOES are statistically correlated with their writing skills, which indicate that PME as HOES are positively employed by students.

4. PME as HOES helps students organize their writing efficiently. Writers with excellent metacognitive control abilities are more likely to participate in pre-writing tasks such as brainstorming, planning, and assessing their target audience and reason for writing. This deliberate preparation method helps to create more comprehensible and well-structured written materials.

5. Self-monitoring is a crucial part of PME as HOES, allowing students to examine and monitor their writing process in real-time. They may assess the quality of their writing, identify areas for development, and make appropriate changes. Effective self-monitoring entails identifying flaws, inconsistencies, or gaps in material and taking corrective action.

6. PME as HOES allows pupils to self-evaluate. Self-reflection allows pupils to evaluate their own writing performance and make decisions regarding its efficacy. This self-evaluation approach enables students to obtain useful insights into their writing process, make conscious writing decisions, and continuously improve their writing talents over time.

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