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Second Language Implicit and Explicit Knowledge as Indicator of Language Proficiency and Predictor of Working Memory

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Abstract
This study explored the relationship between L2 implicit knowledge, L2 explicit knowledge and working memory. The study aimed to examine whether L2 implicit knowledge as measured by an elicited imitation task and L2 explicit knowledge as measured by Quick Oxford Placement Test could predict EFL learners' working memory capacity as measured by a backward-digit span test. Data were collected from 150 Jordanian university EFL students. The findings revealed a statistically significant positive correlation between L2 implicit knowledge, L2 explicit knowledge and working memory. The results further confirmed that both L2 implicit and explicit knowledge predicted the learners' working memory capacity suggesting an interaction between L2 proficiency and working memory. Finally, the strong positive correlation between the scores of the elicited imitation task and Oxford Placement Test promoted elicited imitation as a reliable indicator of L2 implicit knowledge. The implications of these findings for language, testing, learning and teaching and will be further discussed.
Key words: Language Proficiency (LP), L2 Implicit Knowledge, L2 Explicit Knowledge, Elicited Imitation (EI), Working Memory Capacity (WMC)

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Introduction

Assessing and quantifying language proficiency is thought to be a challenge not only for teachers, but also for learners, educators and researchers (Nakatsuhara, et al., 2019). Due to the complex nature of language proficiency which comprises oral production (Awwad & Alhamad, 2021) and communicative use of a target language in spontaneous and naturalistic contexts, capturing or assessing it accurately using conventional techniques may not be an easy task (Hulstijn, 2015). Language proficiency can be assessed using standard tests (Nakatsuhara, et al., 2019), speech performance (Awwad, et al., 2017), self-reported assessment (Awwad, 2022), learner perception (Awwad, 2019) or teacher awareness (Alhumsi & Awwad, 2020).

Elicited imitation (EI) has been branded as a promising and valid tool for evaluating and assessing second language learners' proficiency and mainly implicit knowledge (Wu & Ortega (2013). Working memory (WM) is further advocated as a contributing factor to language proficiency (LP) due to its decisive role in second language (L2) processing and learning (Wen, 2015). Exploring the connection between L2 implicit and explicit knowledge and their contribution to L2 general proficiency is a pivotal issue to research on second language acquisition, learning and teaching (Erlam, 2006). While implicit knowledge refers to the knowledge of a language, explicit knowledge can be regarded as knowledge about a language (Han & Ellis, 1998). This issue has triggered a long-lasting debate on whether L2 explicit knowledge can only serve as a monitor for L2 implicit knowledge (Krashen, 1981) or whether it only facilitates L2 implicit knowledge (Erlam, 2009). It has been further argued that L2 explicit knowledge can be considered as a prerequisite for L2 implicit knowledge (Ellis, 2009). Still, a need exists to scrutinize the relationship between the two types of L2 knowledge, and investigate the extent to which they can be attributed as reliable indicators of L2 general proficiency.

Investigating the relationship between L2 general proficiency and working memory is assumed to broaden the stakeholders' understanding regarding the overlap between the two constructs. Consequently, such investigation can inform instructional practices, language assessment, language testing and curricula design. However, it is important to take into consideration that capturing the relationship between these variables is complex and can be influenced by various contextual and individual factors, requiring a more comprehensive and systematic research approach to contribute more effectively to this line of research (Awwad & Tavakoli, 2022).

Elicited Imitation and L2 Implicit Knowledge

Elicited imitation is a task that is adopted to gauge language learners' proficiency and their implicit knowledge of grammar (Deygers, 2020). An elicited imitation task entails test takers to replicate orally as accurately as possible a set of verbal utterances that steadily increase in length (Erlam, 2009). The test takers receive scores from 0-4 based on the accuracy of their imitation of each stimulus. Hence, their total score is assumed to quantify their level of L2 implicit knowledge and hence their proficiency in the target language (Wu & Ortega, 2013). The scores received from EI tasks can be then matched or correlated to any other conventional tests of L2 proficiency and assessment tools of language skills.

EI has been advocated as a reliable and valid method to assess L2 competency under time pressure as the imitations occur during real time (Lee, 2021). EI as a test requires the participants to listen to a series of stimulus (phrases, words, or sounds), and repeat them literally and immediately. The controversial issue concerning the usage of EI to measure verbal language ability is to determine whether the participants genuinely understand the structure and meaning of the imitated part, or they just parrot it relying on their working memory or their familiarity of the content of each stimulus (Vinther, 2002). Accordingly, Bley–Vroman and Chaudron (1994) suggest that EI comprises a language-processing component (language comprehension and production) and a memory-related component.

However, as the utterances are getting longer and more complex, benefitting from the test takers' working memory will fade gradually. Instead, they may need to profit from their implicit grammatical and lexical knowledge to compensate for the recession of their working memory during the task (Ortega et al., 2002). As a result, the EI tasks can be perceived as a valid and reliable instrument to detect the test takers implicit language proficiency in the target language. This viewpoint has received substantial empirical and theoretical support (e.g., Deygers, 2020; Kim et al., 2016); Lei & Yan, 2022; McManus & Liu; 2022; Park et al., 2020; Wu & Ortega, 2013) promoting EI as a quick and sufficient measurement of L2 learners' implicit knowledge which is an indicator of language proficiency and development of their interlanguage.

Language Proficiency and L2 Explicit Knowledge

Language proficiency (LP) is a multi-layer concept that is uneasy to describe or define. LP can be described as the capability to understand and use a specific language either orally or written successfully (Hulstijn, 2015). Gaillard and Tremblay (2016) defined LP as the competencies and skills that language users possess which enable them to successfully process, comprehend, produce and use a target language in several real-life contexts or situations. Thus, the quantity and quality of this language competency can be regarded as reliable indicators of the so-called language proficiency. According to (Chapelle et al., 1997), LP is the ability of a person to use the target language for communication appropriately and successfully in various contexts.

According to (Hulstijn, 2012), LP can be seen as general or specific abilities concerning the main language skills (listening, speaking, reading, writing) and subskills (grammar, vocabulary, pronunciation). Nevertheless, it can be argued that possessing the explicit knowledge of a target language or linguistic competency may not secure an appropriate usage of it. Consequently, other non-linguistic competencies need to be included as components of LP that needs to be considered and captured. Hence, LP as a construct should be extended to accommodate other key components such as learners' L2 communicative competence, implicit knowledge, and automaticity (Hulstijn, 2012). This conceptual extension has imposed a challenge on researchers and educators to define and capture LP effectively and comprehensively using conventional measurements (e.g. standardized examinations). As a result, various measurements have been advocated to respond to the need to quantify the components of this multi-faceted construct. Among these measurements, elicited imitation tasks have been introduced as testing tools to measure L2 learners' implicit grammatical and lexical knowledge (Wu & Ortega, 2013).

Working Memory

Working memory (WM) is the part of the brain that is responsible for storing and processing information briefly to be used in various cognitive tasks including comprehending, learning and using language (Skehan, 2015). Thus, WM involves the capability to grasp and operate any incoming information in the mind for short time before making it available for executing different mental operations (Baddeley, 2013). As a system, WM encompasses three components. i.e. the *central executive, phonological loop* and *visuospatial sketchpad.* The *central executive* is in authority of directing the attentional pools and coordinating the activities of the other components. The *phonological loop* is accountable for storing and operating the verbal linguistic data. The *visuospatial sketchpad* is in charge of storing and operating any visual and spatial data (Baddeley & Hitch, 1974).

Due to its role in managing language input and output, WM has been allied directly with language processing and language acquisition (Skehan, 2015). WM is thus vital for successful second language processing, acquisition and learning. Besides, WM is indorsed as an aspect that can help or hinder learners'

abilities to manage and regulate their L2 language repertoire as well as their attention during language use (Wen, Mota, & McNeill, 2015). However, WM is limited in capacity which is needed during handling any L2 input or output (Wen, 2012). Linking WM with factors related to L2 learning, acquisition, comprehension, production, and assessment has motivated a line of research that attempts to explore the relationship between a number language-related factors and WM.

Previous Studies

Weissheimer and Mota (2009) explored the association between L2 learners' working memory and the advancement of foreign language speech production. Thirty-two undergraduate EFL learners participated in this study, which involved a working memory test, a speaking span test and a speech generation task. The findings showed that only participants with a lower span experienced a statistically meaningful improvement in their working memory capacity. However, the improvement was not considered a function of increased language proficiency. The study further indicated that working memory capacity was a strong predictor of L2 speech production than other individual differences factors, such as age, length of exposure to the L2, and L1 proficiency.

Prebianca et al. (2014) explored the interaction between working memory capacity and L2 oral proficiency levels. Sixty Portuguese learners of English as a second language participated in this study. They belonged to three proficiency levels, i.e. elementary, intermediate and advanced. The results of this study spotted significant differences in working memory capacity among different L2 speech proficiency levels. The participants who had achieved a higher level of L2 speech proficiency tended to have higher levels of working memory capacity compared to those who had achieved a lower level of L2 speech proficiency. The findings of the study suggested that working memory capacity was an important factor that influenced L2 speech proficiency levels. Individuals with higher working memory capacity may be better able to process and retain the information needed for L2 speech production, which might contribute to higher levels of proficiency.

Gaillard & Tremblay (2016) examined the effectiveness of the elicited imitation task (EIT) as a method for assessing foreign language proficiency. The participants were 100 learners of French who completed an EIT which comprised 50 statements that gradually increased in length. The learners further did a cloze task and a language background questionnaire. The findings revealed a strong bond between EIT results and the cloze test scores. The results further showed a strong association between EIT performance and the participants' knowledge of French. These results provided empirical evidence of the validity and reliability of EIT in distinguishing between learners of varying proficiency levels. Consequently, EIT can be strongly promoted as a practical instrument for assessing L2 proficiency.

Nowbakht (2019) examined the relationship between working memory and language proficiency among second language learners in learning English anaphoric sentences. Forty EFL learners participated in the study by doing Cambridge Placement Test to measure their L2 proficiency, Operation Span Task to measure their WM, and self-paced reading task to measure their anaphoric sentence processing and comprehension. The findings endorsed WM as a strong predictor of anaphoric sentences comprehension, and that variation in participants' anaphoric sentences comprehension could be explained by variation in LP and WM.

Bouffier et al. (2020) investigated the relationship between attention, verbal working memory and language proficiency. The participants were 72 language learners who spoke Luxembourgish as a mother tongue and German and French as foreign languages. A serial recall test was employed to measure their verbal WM. Auditory-verbal and visuo-spatial attentional tasks were used to assess the participants' attentional span. Receptive and productive vocabulary tasks were adopted as a tool to measure their language proficiency in the three languages. The findings confirmed a strong correlation between verbal WM and non-native language proficiency. However, the findings failed to capture any association between language proficiency and attentional capabilities. Such findings indicated that WM and LP are robustly connected regardless of the learners' attentional capabilities.

Park et al. (2020) investigated the association between elicited imitation as a measure of oral proficiency and WM. The participants were seventy-eight L2 Spanish learners who did an EIT in Spanish, a narrative task, and a non-word repetition to measure their WM. The findings indicated that the EIT scores were predicted by the participants' performance in the narrative task as measured by the complexity, accuracy and fluency of their language performance rather than their WM. The findings further suggested that WM as measured via Phonological Short-Term Memory mediated EIT based on the learners' L2 proficiency in favor of the low-proficiency students.

Awwad & Tavakoli (2022) conducted a study to examine whether the effect of task complexity on L2 speech performance was mediated by learners' WM and L2 proficiency. The participants who were 48 learners of English as a foreign language did two narrative tasks varying in their level of task complexity. Their working memory was assessed by a means of a backward-digit span task. Their L2 proficiency was measured by using Quick Oxford Placement test to measure L2 explicit knowledge and an elicited imitation task to assess L2

implicit knowledge. The findings indicated that WM and LP combined together had the power to predict the accuracy of oral speech production. Both WM and L2 proficiency interacted differently to influence the complexity and fluency of L2 oral performance. Such findings established a relationship between WM, L2 explicit knowledge as measured by Quick Oxford Placement test, and L2 implicit knowledge as measured by EIT.

Manchón et al. (2023) inspected the interaction effects of WM, L2 proficiency and task complexity on L2 written production. WM and L2 proficiency were employed as between-subject variables, while task complexity served as a within-subject variable. The participants completed two writing tasks that differed in terms of their complexity level. The participants' L2 proficiency was measured by employing the Quick Oxford Placement Test. Their working memory capacity was captured using N-back test. The results failed to capture any impact of WM on L2 writing output. However, the study indicated that L2 proficiency was the variable that significantly influenced L2 writing performance. The findings further did not designate any interactive effects between WM, L2 proficiency or task complexity.

Shahnazari (2023) examined the interaction between WM and L2 proficiency on their effect on L2 reading development. The study pursued to explore whether the relationship between WM and L2 reading advancement could be mediated by L2 proficiency. The participants who were 140 EFL students speaking Persian as a first language belonged to three proficiency levels (beginning, intermediate, advanced). The findings revealed a substantial association between WM and L2 reading among learners with lower proficiency levels only with no significant effect at higher proficiency levels. This result advocated that WM had a declining impact in distinguishing performance on L2 reading tests in case of learners with higher L2 proficiency levels. Such interesting findings implied that the connection between WM and L2 reading skill varied according to the learners' L2 proficiency.

The review of relevant previous studies that focused on examining the relationship between language proficiency and working memory capacity confirmed a relative interaction between the two constructs. However, there is still a pressing need to consider a broader insight into L2 proficiency by adopting a more systematic approach to comprehensively capture such a multifaceted construct. To address such a limitation, our study operationalized LP through two main indicators, i.e. L2 implicit knowledge as assessed by elicited imitation tasks (EIT) and L2 explicit knowledge as captured by administering Oxford Placement Test.

The following research questions were formulated to fulfill the aims of this study:
RQ1. Is there a relationship between L2 implicit knowledge, L2 explicit knowledge and working memory capacity?
RQ2: Does L2 implicit knowledge as measured by elicited imitation predict learners' working memory capacity?
RQ3: Does L2 explicit knowledge as measured by Oxford Placement Test predict learners' working memory capacity?

Method

Participants

The participants of this study were 150 EFL university students in Jordan. All the participants spoke Arabic as a mother tongue. The participants included 96 females and 54 males with their age in the range of 18-26 years. They have been learning English as a foreign for about 12-16 years. They were doing bachelor degrees with different majors (English language, Translation, Psychology, Business, Law, Engineering). The participants did an elicited imitation task to measure their L2 implicit knowledge, Oxford Placement Test to measure their L2 explicit knowledge, and a backward-digit span test to measure their working memory capacity.

Procedure And Tasks

To measure the participants' L2 implicit knowledge, an elicited imitation task (EIT) (Wu and Ortega, 2013) was used. EIT requires the test taker to listen to a number of sentences that increase gradually in length and repeat them as accurately as possible. EIT is assumed to be a reliable tool for assessing L2 implicit knowledge which is considered an important indicator of L2 proficiency (Ellis, 2005). This study adopted a modified version of Wu and Ortega's (2013) EIT. The modified version comprised ten grammatically correct statements that gradually increase from 8 to 19 syllables. All the statements were audio recorded and the participants were instructed to listen and repeat each statement as accurate as possible. Each attempt received a score ranging from 0 to 4 points based on the accuracy of repetition. Perfect repetition earned four points, while silence or single-word repetition earned zero points. The total score of the EIT ranged from 0 to 40 points representing the participants' level of their L2 implicit knowledge.

To measure the participants' L2 explicit knowledge, Oxford Placement Test (OPT) (Dave, 2004) was employed. OPT is a standardized test that was developed to assess language skills and general proficiency of

English with a focus on assessing the test takers' L2 explicit knowledge (Dave, 2004). OPT is supposed to measure the explicit knowledge of English as a foreign language and is a part of broader standard assessments like TOEFL or IELTS. The participants in this study took the quick pen-and-paper version of OPT, which included multiple-choice questions with a maximum score of 60 points. OPT is widely used in academic and professional settings to quickly assess general proficiency in English and is often used as a placement test for language programs. Based on the OPT scores, the participants can be placed into four levels based on CEFR levels.

The study adopted the Backward-Digit Span test (BDS) (Kormos & Sáfár, 2008) to measure the participants' working memory capacity (WMC). WMC is the ability to hold and manipulate information or input for a short period of time before retrieving it (Baddeley, 2013). The BDS task requires the participants to repeat series of digits that gradually increase in length but in reverse orders (Kormos & Sáfár, 2008). The modified BDS task in this study utilized digits in Arabic to reduce any effect of L2 proficiency on the assessment of WMC. The first attempts included three-digit sets, while the final attempts involved nine-digit sets. Each participant was given three attempts for each set. The participants' WMC was determined based on the last set of digits they repeated backward successfully twice.

Results

The study was designed to explore the relationship between L2 implicit and explicit knowledge as indicators of L2 proficiency and working memory capacity. It further aimed at finding out whether WMC could be predicted through the learners' L2 implicit and explicit knowledge. The 150 participants did an elicited imitation task (EIT) to assess their L2 implicit knowledge, Oxford Placement Test (OPT) to measure their L2 explicit knowledge, and Backward-Digit Span (BDS) task to determine their working memory capacity. L2 implicit knowledge, L2 explicit knowledge and WMC were adopted as continuous variables in this study. Each of the participants' ten elicited imitations received a score of 0-4 points based on the accuracy of the repetition with 10 as minimum total score and 40 as a maximum score of 40 points. The minimum OPT score obtained by the participants was 10, while the maximum score was 56. As for the scores of the BDS task, the obtained scores ranged between three to nine, which represented the span of the participants' WMC. The descriptive data for EIT, OPT, and WMC results are presented in Table 1 below.

Table 1. Descriptive Statistics for EIT, OPT and BDS.

Test	Min.	Max.	Mean	SD
Elicited Imitation Task	10	40	25.40	8.56
Oxford Placement Test	10	56	28.60	9.13
Backward-digit WM Test	3	9	5.19	1.43

$N = 150$

Pearson correlation coefficient was run to answer the first research question which asked whether there was a significant relationship between L2 implicit knowledge as measured by elicited imitation task (EIT), L2 explicit knowledge as measured by Oxford Placement Test (OPT), and working memory capacity (WMC) as measured by Backward-Digit Span (BDS) task. As shown in Table 2 below, the output of the analysis identified statistically significant correlations between the three variables under investigation. The results revealed a moderate positive statistically significant correlation between L2 implicit knowledge and L2 explicit knowledge ($r = .563$, $p < .000$). Another significant moderate positive correlation was found between L2 implicit knowledge and working memory capacity ($r = .487$, $p < .000$). Finally, a weak positive correlation was captured between L2 explicit knowledge and working memory capacity ($r = .254$, $p = .002$).

Table 2. Pearson correlation between L2 implicit knowledge, L2 explicit knowledge and WMC.

Variables		L2 Implicit Knowledge	L2 Explicit Knowledge	Working Memory Capacity
L2 Implicit Knowledge	Pearson Correlation	1	.563**	.487**
	Sig. (2-tailed)		.000	.000
L2 Explicit Knowledge	Pearson Correlation	.563**	1	.254**

	Sig. (2-tailed)	.000		.002
Working Memory Capacity	Pearson Correlation	.487**	.254**	1
	Sig. (2-tailed)	.000	.002	

N=150

Simple regression analysis was run to answer the second and third research questions regarding whether L2 implicit and explicit knowledge had the power to predict the participants' working memory capacity. As presented in Table 3 below, the regression analysis confirmed L2 implicit knowledge as a predictor of working memory capacity, (F (1, 148) = 46.030, $p < 0.001$), and that 23.7% of the variance in learners' working memory capacity can be explained through their L2 implicit knowledge as measured by EIT ($R2$ = 0.237). Furthermore, the regression analysis indicated L2 explicit knowledge as a predictor of working memory capacity, (F (1, 148) = 21.051, $p < 0.034$), and that 19.4% of the variance in learners' working memory capacity can be explained through their L2 explicit knowledge as measured by OPT ($R2$ = 0.194).

Table 3. Simple regression analysis for L2 implicit and explicit knowledge predicting WMC.

Regression Weights	***Beta Coefficient***	***R2***	***F***	***t-value***	***p-value***
L2 implicit knowledge → WMC	0.487	0.237	46.030	6.785	.000*
L2 explicit knowledge → WMC	0.254	0.194	46.030	3.236	.034*

Discussion And Conclusion

The study investigated the association between L2 implicit and explicit knowledge as two focal facets of L2 general proficiency and working memory capacity. The study attempted to disclose whether L2 implicit and explicit knowledge could predict WMC, and thus could explain the variance in L2 learners' WMC. The participants who were 150 university students did an elicited imitation task (EIT) to measure their L2 implicit knowledge, Oxford Placement Test (OPT) to quantity their L2 explicit knowledge, and Backward-Digit Span (BDS) task to determine their working memory capacity. The findings spotted a statistically significant correlation between the three variables under investigation, i.e. L2 implicit knowledge, L2 explicit knowledge and working memory capacity. Moreover, the results as obtained from running a regression analysis promoted L2 implicit and explicit knowledge as predictors of WMC.

Such findings confirm the relationship between L2 implicit knowledge and L2 explicit knowledge. The results can further promote elicited imitation task (EIT) as a reliable instrument to assess learners' L2 implicit knowledge as suggested by a number of researchers (e.g., Elder & Ellis, 2009; Ellis, 2009; Erlam, 2009; Gaillard & Tremblay (2016). Consequently, the results can be regarded as empirical evidence that L2 implicit knowledge and L2 explicit knowledge are two sides of the same coin, i.e. general L2 proficiency. The positive statistical correlation between L2 implicit and explicit knowledge that was captured in this study was in harmony with Awwad & Tavakoli (2022) who found a strong positive correlation between the scores of EIT which measured L2 implicit knowledge and OPT which measured L2 explicit knowledge.

However, the argument is still ongoing regarding how to separately assess the two layers of L2 knowledge, and how to distinguish between their roles and contributions to general L2 proficiency. A correlational study like this one which is exploratory in nature is still limited to find out whether L2 explicit knowledge can facilitate L2 implicit knowledge as suggested by Krashen (1981) or can be transformed later into implicit knowledge as advocated by Erlam (2009). More empirical evidence is yet needed to advocate whether L2 implicit knowledge and L2 explicit knowledge overlap in their contribution to general language proficiency or they function separately in a parallel or sequential manner.

As for the findings of this study concerning the association between L2 implicit and explicit knowledge and working memory capacity, the positive statistically significant correlations that were captured supported the results attained by Prebianca et al. (2014) who confirmed a robust association between L2 proficiency and WMC. Our results were also in agreement with Bouffier et al. (2020) who confirmed a strong correlation between verbal WM and non-native language proficiency. The findings further agreed with Awwad & Tavakoli (2022) who detected a correlation between L2 implicit knowledge as measured by EIT, L2 explicit knowledge as

measured by Quick Oxford Placement test and WMC as measured by BDS. Finally, our results were in harmony with Shahnazari's (2023) findings who spotted a substantial association between WM and L2 reading proficiency among learners with lower general proficiency levels.

This study promoted L2 implicit and explicit knowledge as predictors of working memory capacity. Such obtained result was in line with Weissheimer and Mota (2009) who advocated WMC as a strong predictor of oral proficiency, and Nowbakht (2019) who endorsed WM as a predictor of L2 comprehension. Furthermore, our findings supported those of Park et al. (2020) who found a mediation effect between L2 proficiency and WMC in favor of learners with low proficiency. However, the results contradicted those obtained by Manchón et al. (2023) who failed to confirm any interactive or mediating effects between WM and L2 proficiency.

The study attempted to look at the interaction between L2 proficiency and WMC from a different angle. It sought to examine whether any gains in L2 proficiency as designated in the implicit and explicit knowledge of the second language could have positive consequences on learners' WMC. The obtained findings can partially advocate for the beneficial effects of knowing a second language on expanding the span of L2 learners' WMC. However, this result should be considered with caution because the power of predictability of L2 implicit and explicit knowledge of working memory capacity was low. It was found the that the two types of L2 knowledge combined together could only explain 21.5% of the variance in the learners' WMC. Moreover, the moderate correlation between L2 proficiency and WMC may point to other individual variables that can have interactive effects on WMC.

The findings of this study can offer a number of implications for language testing, language teaching and language learning. The findings imply that it is important to agree on reliable and valid assessment tools that tap into L2 implicit and explicit knowledge separately. Experts in language testing and assessment need identify what constitutes or shapes each type of knowledge before agreeing on any standardized testing instruments. Furthermore, there is a pressing need to understand how L2 implicit and explicit knowledge separately and combined contribute to general language proficiency. The correlation between L2 implicit and explicit knowledge indicates the existence of some overlap between the roles of the two types of knowledge in general language proficiency. EFL teachers are recommended to identify what instructional components and activities promote each knowledge type.

The confirmed association between L2 proficiency and WMC in this study should encourage EFL stakeholders to capitalize in strategies and activities that facilitate the role of working memory in advancing L2 implicit and explicit knowledge resulting in gains in general language proficiency. Most of previous research focused on investigating WM as a predictor or mediator of language proficiency, fluency or performance. However, very few studies have explored the effects of the enhancement of L2 implicit and explicit knowledge on activating and improving L2 learners' WMC. There is still a need to more thoroughly and systematically examine the relationship between WM and each facet of L2 proficiency.

It is worth mentioning that our study is correlational and exploratory which adopted specific tasks and tests to measure L2 implicit and explicit knowledge and WMC. Therefore, the generalization of the results can be limited due to the research instruments' effects. Furthermore, the characteristics of the sample of the study may influence what the findings indicate. The narrow scope of the study has limited us from addressing issues such as whether L2 explicit knowledge serves as a facilitator or prerequisite of L2 implicit knowledge. Additionally, the idea of whether the two types of L2 knowledge functions parallelly or sequentially is an issue that requires additional research. More in-depth research is recommended to explore how WM can be associated differently to each type of L2 knowledge and how enhancing L2 implicit and explicit knowledge can offer positive consequences on language learners' working memory.

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