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Interplay of Working Memory Capacity with Implicit/Explicit Metacognitive Strategy Instruction: Listening Comprehension Performance in Focus

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ABSTRACT

This study investigated the differential effect of implicit/explicit metacognitive strategy instruction on the listening comprehension performance of Iranian EFL learners. It also explored the possible interaction of metacognitive strategy instruction with EFL learners' working memory capacity. To achieve these objectives, 63 EFL learners were selected as participants based on their performance on a placement test and were randomly assigned to two experimental (implicit/explicit metacognitive strategy instruction) and two control (active and passive) groups. A task-based explicit metacognitive strategy instruction model was implemented in the explicit group. The implicit group received instruction based on a hybrid metacognitive strategy instruction model. All participants took the Automated Operation Span Test (AOST) as well as a PET listening paper. They also took the listening section of the FCE as their transfer test. The obtained results revealed that while both implicit and explicit metacognitive strategy instructions significantly affected the participants' listening comprehension performance, explicit instruction was of greater effect. The results also showed that listening comprehension variations were not significant in the active control group, which indicated that no positive results can be achieved just by introducing strategies without contextualizing them in practice. Working memory capacity (WMC) also showed to be of significant predictive power for listening comprehension improvement in the explicit instruction group. Finally, the findings of the study demonstrated that implicit metacognitive strategy instruction works much better for learners with limited WMC or groups of learners with heterogeneous WMCs.

Keywords: Explicit Strategy Instruction; Implicit Strategy Instruction; Listening comprehension; Performance Metacognition; Working Memory Capacity

INTRODUCTION

Listening is extensively used in both academic and lifelong learning processes a foreign language learner experience, and this importance is well documented in the literature (Graham & Macaro, 2008; Rost, 2013; Vandergrift, 2003; Vandergrift & Tafaghodtari, 2010). Yet, listening is the least explicit skill (Vandergrift, 2003) and has mostly been overlooked due to the marked attention more visible skills, namely speaking, reading, and writing, receive. Listening is a complex and cognitively demanding skill, too that requires several instants and simultaneous mappings of form, context, and meaning which makes it even harder to handle (Vandergrift & Tafaghodtari, 2010). It goes without saying that mastering such an oblique skill is too much to be acquired just through exposure, specifically in the case of English as a foreign language (EFL) learners who would mostly experience

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classrooms' unauthentic, clinical and controlled context of learning (Goh, 2010). Thus, principled instruction seems inevitable.

In 2004, Vandergrift reported newly developed strides in both research and pedagogy toward listening skill and the literature witnessed an upturn in empirical investigations mostly to find listening success predictors and instruction impact. Studies focusing on success predictors (e.g. Graham & Macaro, 2008; Rost & Rost, 1991; Nasrollahi & Birjandi, 2016; Vandergrift, 2003) have mostly focused on grouping and analyzing the type of strategies used by successful learners of different levels as well as inferring techniques implemented by the more accomplished ones. While studies investigating the instruction impact (e.g. Goh, 2010; Rahimirad & Shams, 2014; Mohamadpour, Talebinejad & Tabatabaei, 2017; Vandergrift & Tafaghodtari, 2010; Yi, 2014) have mostly implemented one type of instruction and attributed the probable consequential improvement in learners' listening to the intervention. Now, after a quarter-century of empirical research on whether and how listening should be taught, the majority of studies endorse the importance of instruction and confirm the benefit of instruction as opposed to no instruction (Dignath & Veenman, 2021). Considering the body of research, on the other hand, it is realized that there is a general inclination towards a correlational and descriptive outlook on instructing the skill so as to frame the relative efficacy of a certain treatment. Zeng and Goh (2018) believe that although curriculums recognize the importance of instructing listening, we are yet to define a principled approach to instructing listening in a way to promote learners who not only perform well in classes but are able to transfer their acquired knowledge to other listening contexts, in other words, a self-regulated learner. A self-regulated learner actively participates in the process of their own learning (Oxford, 2011). As Pintrich and De Groot (1990) identified, self-regulation basically comprises three major constructs metacognition, cognition, and resource management. There are well-established studies to back metacognition as the major construct leading to self-regulation (Dignath & Veenman, 2021; Goh, 2010; Mohamadpour et al., 2017; Vandergrift & Goh, 2012; Zeng & Goh, 2018). In his psychological and philosophical approach to consciousness, Nelson (1996) modeled metacognition as comprising two levels; object level, where cognitive activities are performed, and meta-level, where metacognitive activities initiate. Nelson believed that in case of interference at the level of task performance, meta-level controls object level in a bottom-up process. Veenman (2017), on the other hand, extended Nelson's (1996) model of metacognition to accommodate the learner's instructing themselves as to what steps to take in case of encountering a problem they have faced before, namely acting strategically. In the model Veenman (2017) proposed, meta-level does control object level in a bottom-up fashion, while there is also a top-down influence of object level over meta-level, when a learner activates their metacognitive knowledge and consciously decides to enact the strategy that best fits the learning problem at hand.

Based on Veenman's (2017) metacognitive model, not every metacognitive strategy instruction can help learners engage in the empowering cycle that connects the cognitive and metacognitive knowledge of a learner, and as Dignath and Veenman (2021) proposed, direct strategy instruction, as opposed to indirect strategy instruction, is the means to support both bottom-up and top-down processes, where direct strategy instruction includes both explicit and implicit strategy instruction, while indirect strategy instruction comprises promoting strategic knowledge through creating a powerful learning environment. As defined by Ellis and Shantini (2014) the aim of explicit strategy instruction is to advocate intentional learning by attracting the learner's attention to the target features, while implicit strategy instruction does not involve explaining the rules and requires the instructor to develop certain tasks to engage learners in actively using the strategy without making them aware of the strategy itself. To date, different research studies on strategy instruction have manipulated diverse sets of variables to investigate the efficacy of instructions: different instructional methods, differing groups of participants, varying lengths of treatment, and diverse data analysis processes.

Although the diversity broadens the general picture one may have of the subject, it also complicates drawing definitive conclusions and coming up with worthwhile pedagogical implications (Ahmadian, 2020). It thus calls for adjusting the research perspective as well as delving deeper into ineffective yet overlooked aspects of strategy instruction, namely cognitive individual differences.

Wen, Mota & McNeill (2015) report as a research consensus that learners benefit differently from a specific instructional method due to their different cognitive characteristics such as working memory capacity (WMC). Based on McNamara and Scott (2001) WM is an individual difference factor that plays a critical role in both reasoning and comprehending and refers to the limited, temporary processing and storage system. As they put it, "WM serves as the gateway and workroom for a multitude of cognitive processes" (McNamara and Scott, 2001, p. 10). Vandergrift and Baker (2015) maintain that the development of strategic knowledge, as well as strategic behavior, can be rooted in WM as a cognitive mechanism.

McNamara and Sccott (2001) also associate higher levels of strategy use with learners of higher WMC. Swanson, Kehler, and Jerman (2010) also confirmed the connection to be the other way around. They proved how strategy instruction and strategy use bolsters WMC and WM performance and in a more assuring way, confirmed the close connection between strategy instruction and working memory.

Despite the consensus over the necessity of metacognitive strategy instruction in improving listening comprehension performance, it is yet poorly understood as to which of implicit or explicit metacognitive strategy instruction can effectively supports the listening comprehension performance of learners and what would be the magnitude by which WMC can factor in the process of learners' becoming more strategic listeners. Therefore, the present study aimed to address the following research questions:

Q1: What are the deferential effects of implicit and explicit metacognitive strategy instruction on the listening comprehension performance of Iranian EFL learners?

Q2: How does Iranian EFL learners' working memory capacity mediate the effect of implicit and explicit metacognitive strategy instruction?

METHOD

Participants

Out of a pool of 172 volunteers who took the Oxford Placement Test (OPT), 118 scored 120 to 134 which was one standard deviation below and above the mean (M= 128.47) and thus the homogeneous majority. Except for 15 viable candidates who did not respond back, the remaining 103 lower intermediates were contacted and randomly assigned to four groups.

In each group, as well, a number of participants could not concur with the time of classes, so the study finally started with 63 participants, 29 females and 34 males, already randomly assigned to 4 groups which were further randomly assigned as first and second experimental groups, namely Explicit Experimental Group (EEG) and Implicit Experimental Group (IEG) as well as active (ACG) and passive (PCG) control groups.

Materials

The instruments used to carry out this research consisted of three tests, an automated complex span test to measure WMC, an exhaustive list of metacognitive strategies, two sets of tasks to perform explicit and implicit metacognitive strategy instruction as well as a set of classroom activities for the control groups and instructional material. OPT, which was developed and standardized in 2004 was used as a placement tool to ensure the homogeneity of participants. It is calibrated against IELTS and TOEFL and reliably measures the linguistic knowledge of participants in two sections of Use of English and Listening reporting a score out of 200 and leveling them in one of its 10 bands. The calculated Cronbach alpha for this sample was .94 which is a great internal consistency, along with a reliability index of .95. Using the Intraclass Correlation Coefficient, a reliability index of .95 was also obtained.

The listening sections to both Preliminary English Test (PET) and the First Certificate in English (FCE) were used as pre-tests and post-test to ensure the beginning status of participants' listening comprehension to check for probable resulting improvements after the intervention. The listening section of PET includes 25 listening comprehension questions designed in 4 parts with a Cronbach alpha of .86 which indicates high reliability. The listening section of FCE is 30 items arranged in 4 parts and correlates with band 5 of OPT, a band higher than the participants' placement. It was used as a transfer test to investigate possible further qualities gained after the intervention and also check for possible placement misjudgments.

Another means of data collection was AOST, which is a complex span test, designed for the sake of this research. The test includes 5 different strings of 3-7 random English letters, with 3 repetitions as well as simple math problems to deviate rehearsing in participants. Letters were shown to participants in random intervals and they needed to solve a problem before a letter was shown to them. The automated operation span test (AOST) was automated and run by software designed for this purpose. AOST being mouse-driven could be taken completely independent of the researchers.

The math operation stayed on the screen for 4.8 seconds before it automatically changed. The time was decided based on a pilot test on the same participants with 20 simple math problems. Calculating the meantime length for each math problem and adding 2.5 Standard Deviation to it, the researchers came up with 4.8 seconds for each math problem. If a string was recalled correctly but the associated math operations had an accuracy rate of less than %85, that specific string of letters was rendered as an error and thus would not count. After finishing all 15 strings, the results would show on the screen for the participants to so how well they performed. AOST's Cronbach alpha was .94 and indicated a great internal consistency and the Interclass Correlation Coefficient of .95 showed excellent reliability.

The exhaustive list of metacognitive strategies was formed after a thorough review of the literature and was adopted from metacognitive strategy classifications of several sources (Chamot, Barnhardt, El-Dinary & Robbins, 1999; O'Malley & Chamot, 1990; Oxford, 2017; Vandergrift, 2003; Vandergrift & Goh, 2012). The strategies were a) planning, including organizing concepts or principles, directed attention, self-management, setting goals, activating background knowledge, and predicting; b) monitoring, including selective attention, contextualizing, asking if it makes sense, deduction/induction, note-taking, using imagery, self-talk, and cooperation; c) problem solving, including inferencing, substitution, manipulation, using resources, asking for clarification; and d) evaluating, including summarizing, verification of goals, verification of predictions, evaluating strategy use, and self-evaluation.

The intervention was based on differentiating the two experimental groups with explicit and implicit instruction of metacognitive listening strategies. For the explicit instruction, Goh's (2010) Integrated Experiential Learning Tasks (IELT) model was used which comprises five sections, 1) metacognitive listening sequence, 2) self-directed listening, 3) listening buddies, 4) post-listening perception activities and 5) guided reflection on listening which itself consisted of a) diaries, b) anxiety and motivation charts, c) process-based discussion and d) self-report checklists.

The implicit metacognitive strategy instruction was performed through Vandergrift's (2004) Metacognitive Pedagogical Cycle (MPC).

It is also designed in five stages of 1) pre-listening which is the planning and predicting stage, 2) first listening, which comprises the first verification stage, 3) second listening when the second verification takes place, 4) third listening, which is the final verification stage and 5) reflection stage. Metacognitive strategies were embedded in these stages and practiced by the participants till mastery was reached.

The final material developed to be implemented in this study was instructional material. Listening texts were selected from different online and published sources in B1, threshold level, and the participants' actual level as well as B2 and C1, so to keep listening to audio a little over their proficiency level to challenge them without infusing a sense of frustration and disappointment. Three sets of instructional materials were, as well, designed in eight lessons based on the models implemented in each experimental group and one for the control groups. Eight sets of homework were also designed for each group according to the criteria of each instructional model.

Data Collection Procedure

To accomplish the objectives of the study, a true experimental design was adopted so to implement a statistical approach to establishing a cause-and-effect relationship between either explicit or implicit metacognitive instruction and self-regulated listening. The experiment was designed over 14 90-minute sessions, where EEG received explicit metacognitive listening strategy instruction through the tasks Goh's (2010) model posited and IEG received implicit metacognitive listening strategy instruction through the same metacognitive strategies were embedded in the tasks designed by Vandergrift (2004). To control for the possible effect of the mere explicit presentation of metacognitive strategies on listening comprehension performance as well as self-regulated listening, AGC received only an introduction to the same exhaustive list of metacognitive strategies, paired with traditional product-based listening comprehension instruction, while PCG received no strategy instruction and just traditional product-based listening comprehension instruction.

The two initial sessions and the two last sessions were devoted to participants' taking the pretest and posttest on listening sections of PET and FCE, QBELLP, MLSQ, and AOST. Participants were also briefed about the procedures they were going to face based on what group they were in prior to the experiment.

Data Analysis Procedure

The research analysis began with investigating the normality assumptions of pre-and post-test scores. As the skewness and kurtosis of all scores ranged between -1.0 and +1.0, the criteria for skewness and kurtosis were satisfied and it was assumed that there was no violation of normality.

The prominent assumptions before running the parametric test, namely

1) independency of covariate and treatment effect,

2) homogeneity of regression slope and

3) linearity of the relationship between dependent variable and covariate across groups were also checked.

Independency of covariate and treatment effect was met due to both randomized assigning participants into groups and further randomly assigning groups as experimental or control groups. To check the same assumption for each variable, an ANOVA was run with groups as an independent variable and every variable's pretest as the covariate. Regarding every variable, the main effect of the pretest was not significant ($\rho > .05$). Checking for homogeneity of regression slopes is actually checking for the dependent variable in each equation and the covariate in all groups. The output obtained from the procedure for every variable was greater than the significant value ($\rho > .05$), which indicates that the assumed homogeneity of regression slopes was met for every variable. The linearity of the relationship between the dependent variables and covariates was also investigated and resulted in no curvilinear relation between each set, so the linearity was confirmed and thus not violated. After confirmation of the aforementioned assumptions, the following parametric test, as well as a descriptive one, were run which are further explored in the results.

RESULTS

The first research question concerned the probable differential efficacy of implicit and explicit metacognitive strategy instruction on listening comprehension. Table 1 indicates the descriptive statistics for the performance of each group regarding participants' performance in PET and FCE in both pre and post-tests.

Table 1
Descriptive statistics of PET and FCE pre- and posttests

	Mean (S.D.)			
	EEG	IEG	ACG	PCG
PET listening pretest	131.65(14.23)	130.25(3.17)	119.71(7.01)	123.19(14.47)
PET listening posttest	147.41(15.12)	148.13(3.59)	127.50(10.47)	129.06(14.87)
FCE listening pretest	137.65(16.54)	124.31(9.54)	109.93(7.37)	111.63(7.65)
FCE listening posttest	151.18(18.06)	136.88(5.50)	118.93(10.76)	121.44(13.76)

The differences detected in the means reported for each group in both PET and the transfer test were further investigated through running ANCOVA, while considering the pretests as covariates respectively (Table 2). After controlling for the effect of PET pretest, group did prove significantly different, $F (3, 58) = 12.48$, $\rho < .001$.

The large effect size reported for the group, $\eta_p^2 = .392$, also signified the strong effect of the group on listening comprehension as measured by PET

Table 2
ANCOVA by including PET pretest as covariate

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
PET pretest	6121.297	1	6121.297	143.332	.000	.712
Group	1598.983	3	532.994	12.480	.000	.392
Error	2477.008	58	42.707			

As reported in Table 3, parameter estimates were also investigated to have each group compared to the PCG (Table 3) proving EEG ($\rho < .001$) and IEG ($\rho < .001$) as significantly different in their PET performance as compared to the control group, while ACG ($\rho = .49$) did not significantly differ.

It proves the efficacy of both implicit and explicit metacognitive strategy instruction in improving learners' listening comprehension as measured by suitable to their level (B1) PET.

The larger partial Eta Squared reported for EEG ($\eta_p^2 = .325$) as compared to the one reported for IEG ($\eta_p^2 = .254$) may indicate explicit metacognitive strategy instruction to be even more influential, although both effect sizes are considered large ones.

ACG's non-significance of performance, when compared to PCG, indicates that the mere act of explicit introduction of metacognitive strategies without incorporating them in practical classroom tasks would not probably make a difference. Checking for the pairwise comparisons on the PET results, the mean difference noticed in Table 1 between the two experimental groups was not significant ($\rho = .38$).

Considering the performance of groups with the transfer test, it was proved that the group factor does not significantly affect FCE results, $F(3, 58) = 1.8$, $\rho = .161$. the Partial Eta Squared reported for the effect of group is not significant as well, $\eta_p^2 = .084$.

Although in checking the parameters estimates to have each group compared to the PCG, EEG difference was significant ($\rho = .04$), IEG did not significantly perform differently from the passive control group ($\rho = .16$).

Although it seems promising to have the explicit metacognitive group performing significantly different from the passive control group, it needs to be in mind that the same results would have been reached due to random sampling errors 4 times in a hundred, even if such significance was not really there.

So, the results, in this case, need to be cautiously handled. To sum up, with regard to the first research question, the statistical analysis of the data proved that a) both implicit and explicit metacognitive strategy instruction significantly improves the listening comprehension performance of learners when tested according to their respective band;

b) explicit metacognitive strategy instruction needs to be paired with classroom tasks to practice and the mere act of explicitly introducing the strategies paired with product-based listening activities would not help, and

c) explicit strategy instruction could be effective with learners' transferring their acquired knowledge into more challenging listening contexts. The second research question asked whether individual differences in WMC have an interplay with explicit and explicit metacognitive strategy instruction. Table 4 summarizes the descriptive statistics on WMC of the participants in all four groups before and after the intervention.

Table 3

Parameters estimates of each group as compared to PCG on PET

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	Partial Eta Squared
EG1	10.536	2.368	4.449	.000	5.796	15.276	.325
EG2	12.540	2.374	5.282	.000	7.788	17.292	. 254
ACG	1.645	2.407	.684	.497	-3.172	6.463	.008
PCG	0[a]						

Table 4

Descriptive statistics on WMC pre- and posttests

	Mean (S.D.)			
	EG1	EG2	ACG	PCG
AOST pretest	.87 (.07)	.87 (.09)	.78(.06)	.76(.10)
AOST post test	.93 (.05)	.94(.06)	.82(.05)	.81(.11)

After adjusting the effect of the listening part of PET as a pre-test and also the effect of the group as confounder variables, subjects-ANOVA was run (Table 5), and AOSP's p-value in the equation ($\rho < .001$) confirmed that WMC predicts participants' listening comprehension performance. The Partial Eta of $\eta_p^2 = .21$ also indicated a large effect size for WMC. The significance value reported on the group ($\rho < .001$) also indicated that the WMC test performed significantly differently across groups in predicting the listening comprehension performance of the participants.

To further verify the magnitude of WMC predicting the listening comprehension performance of the participants, parameter estimates were also taken into account (Table 6).

To confirm the significant effect size of AOST in predicting the listening performance of participants, as is stated in Table 6, participants' listening comprehension scores would increase by 36.30 units for a unit increase in AOST.

Table 5

Between-subjects ANOVA on WMC and PET

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
PET pretest	5136.46	1	5136.46	151.42	.000	.730
AOST pretest	519.35	1	519.35	15.31	.000	.215
group	1747.42	3	582.47	17.17	.000	.479
Error	1899.61	56	33.92			

Table 6
Parameters estimates of each group as compared to PCG on WMC

Parameter	B	Std. Error	T	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	Partial Eta Squared
PET pretest	.94	.07	12.30	.000	.790	1.09	.730
AOST pretest	36.30	9.27	3.91	.000	-17.717	54.88	.215

Because improvements in listening comprehension performance of the participants were attributed to the participants of the intervention received, the newly found interplay of individual differences (WMC) called for further investigation. A Multivariate Analysis of Covariance (ANCOVA) was run to investigate the effect of the working memory capacity test on differences of listening comprehension performance and the participants' listening comprehension scores prior to the intervention in both experimental groups. The results are presented in Table 7.

Table 7
MANOVA parameters estimates on WMC and PET pretest and difference of pre- and posttests

group			B	Std. Error	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	Partial Eta Squared
EEG	PET pretest	intercept	86.31	56.48	1.52	.149	-34.82	207.44	.143
		AOST pretest	16.02	60.44	.26	.795	-113.60	145.65	.005
	Difference between pretest & posttest	intercept	92.73	30.99	2.99	.010	26.25	159.21	.390
		AOST pretest	73.12	33.17	-2.20	.045	-1.97	144.26	.258
IEG	PET pretest	intercept	117.10	12.250	9.559	.000	90.635	143.56	.875
		AOST pretest	5.802	13.077	-.444	.665	-34.053	22.450	.015
	Difference between pretest & posttest	intercept	36.63	7.117	5.147	.000	21.254	52.006	.671
		AOST pretest	.249	4.072	.061	.952	-8.549	9.046	.000

The correlation between both working memory capacity tests and the listening part of PET as a pretest (AOST, ρ = .79, ARST, ρ = .36) was not significant in EEG.

The automated operation span test, however, significantly predicted the changes in listening comprehension in EEG (ρ = .04). It means that statistically speaking, the listening comprehension improvement that was earlier reported for the group and attributed to the explicit metacognitive listening comprehension instruction may not be solely due to the model's being superior and partly, the success can be attributed to the learners' working memory capacity as reported by AOST in EEG.

Things were different considering IEG, though. AOST results still did not significantly (ρ = .66) correlate with the PET listening comprehension pretest and did not predict the improvement that was earlier reported for the listening comprehension performance of participants in this group (ρ = .95) as well.

Thus, WMC is not predictive of implicit metacognitive strategy instruction IEG received and listening comprehension improvement can be more confidently attributed to the intervention in IEG. In relation to research question number two, the results indicated that a) WMC can predict listening comprehension performance with a fairly large effect size; b) a unit increase in WMC predicts 36.30 units increase in listening performance; c) the success attributed to the intervention explicit group received is at least partly due to WMC of the participants in that group; d) WMC was not predictive to the results obtained in the implicit group.

DISCSSION

This research aimed to investigate the differential efficacy of implicit and explicit metacognitive strategy instruction on the listening comprehension performance of Iranian EFL learners as well as to see if learners' WMC mediates the effect of the intervention conditions in question. The results revealed that both implicit and explicit metacognitive strategy instruction resulted in significant improvement in listening comprehension performance, as compared to the control groups.

The obtained results on ACG also indicated that the mere act of explicitly presenting the strategies serves learners no more than not introducing them (case of PCG). Although both experimental groups showed significant improvement in listening performance, the larger effect size reported for EEG maintained that explicit metacognitive strategy instruction could be more effective as compared to implicit metacognitive strategy instruction. Also, the findings indicated that only explicit instruction proved significantly successful in helping learners perform meaningfully better on transferring the test which was a level higher than their actual level (B1) based on CEFR.

These findings confirm the results of studies in the literature that endorse the importance of metacognitive strategy instruction in general (Mohamadpour, et al., 2017; Vandergrift, 2003; Vandergrift & Baker, 2015; Vandergrift & Goh, 2012; Zeng & Goh, 2018) and explicit metacognitive instruction to improving listening comprehension performance in specific (Dignath & Veenman, 2021; Emerick, 2019; Goh, 2010; Guan, 2014).

As is further discussed by Ahmadian (2020) designation of limited attentional resources is better handled through instruction. Listening comprehension's online and fleeting nature makes the aural input very difficult for the learner to process, and as there are several instant and simultaneous mappings of form, context, and meaning to handle while listening, EFL learner faces cognitive overload. The findings of this study proved that direct metacognitive strategy instruction and the two, explicit metacognitive strategy instruction can better help learners strategically attend to the salient features so as to control the data overload and thus perform as better listeners. The parallel success results with a slightly smaller effect size obtained on implicit metacognitive strategy instruction can be understood in the light of Dignath and Veenman's (2021) emphasis on a rich instructional environment which includes the teacher's attitude, the instructional material, and tasks and motivational processes on the part of the learner. De Boer, Donker, Kostons & Van der Werf (2018) also reported no long-term superiority for explicit metacognitive strategy instruction in their meta-analysis which confirms the interdependence of instruction success with being in close contact with a rich instructional environment.

The results also demonstrated that WMC mediates the results of explicit metacognitive strategy instruction, while there was no such significant interplay between WMC and the improvement of listening comprehension performance in the implicit strategy instruction group.

Such prediction of listening performance success in the explicit group can be understood by taking McNamara and Scott's (2001) justification into account. They believe that awareness of strategies makes learners more strategic and more strategic learners are to be strategic memorizers as well, and aware strategy use can contribute to a correlation between WMC and language performance.

Oxford (2017) maintains that mental processes order the received information into an existing schema or classify them into chunks which will later, with the help of additional information that hopefully will pile on them, turn into schema themselves. This procedure heavily taxes working memory which, in turn, mandates moving processes from declarative to procedural to ease working memory. Doing the same thing, explicit strategy instruction imposes high cognitive and attentional loads on WM and as further confirmed by Swanson, et al. (2010) strategy instruction bolsters WMC and WM performance, so the empowering cycle will not only improve WMC through strategy instruction but also boost better learning through finer declarative to procedural process. Thus, explicit metacognitive strategy instruction specifically benefits from higher WMC and those with better WM performance are more likely to improve in an explicit instruction environment.

Implicit metacognitive strategy instruction, on the other hand, does not tax learners' WMC as explicit instruction does, as learners are not exposed to much declarative data and all they need to know is embedded in the tasks they face (Vandergrift & Tafaghodtari, 2010). It can be discussed that as WMC does not predict improved listening performance in implicit metacognitive strategy instruction group, thus the improvement can be more confidently attributed to the intervention. It is, as well, concluded that implicit instruction is more likely suitable for learners with not very high WMC or for those learners with varied WMCs.

Despite the positive results the study obtained, the research faced certain limitations that need to be acknowledged. First is the diversity of the data collection medium. As testified by Vandergrift and Baker (2015) using multiple elicitation instruments and techniques provides the researcher with a better perspective on the experiment and helps the study to result in more robust and generalizable conclusions. This experiment could have a much better grasp of performances in each of the groups through a self-report on learners' individual perspectives added to the researcher's noted observations. Second, the study can benefit from other parallel forms of working memory span tests to complement the working memory battery already used in this research. Finally, focusing much attention on other listening strategies as well would certainly light the path to a more fruitful and enjoyable instruction of the skill.

CONCLUSION

On the whole, this study confirmed the effectiveness of metacognitive strategy instruction in furthering learners' ability to handle listening comprehension tasks on tests at both their level and a transfer one. In particular, this study has revealed that both implicit and explicit metacognitive strategy instruction can foster significant improvement in the listening performance of learners, while it is also noteworthy that explicit instruction can be more effective in one way or the other.

The results draw our attention to the way listening strategy instruction is handled as well. As the findings indicate the mere act of explicitly presenting and introducing the metacognitive strategies would not work. The strategies need to be presented, in an explicit instruction context, and the context needs to be an empowering environment to support the metacognitive strategy use by the learners through different task and rehearsal plans. Implicit metacognitive strategy instruction would need the same context and probably even to a higher degree since the learners are deprived of declarative knowledge, which they gain through the mere act of strategy introduction and need a rich context for the metacognitive strategies to embed in.

The magnitude of the effectiveness of WMC is yet another point this research concludes. Working memory capacity is of great importance in direct strategy instruction and as it does have a tendency to become greater with strategy training, WMC can have a pivotal role in explicit metacognitive strategy instruction. Thus, although the reported success of explicit metacognitive strategy instruction cannot be fully attributed to the intervention, it is concluded that explicit strategy instruction better suits learners with greater WMC. Explicit strategy instruction, on the other hand, would better match groups of learners with either not very high WMC or those with little WMC homogeneity.

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