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Explicit Versus Implicit Instruction: A Meta-Analysis of Comparative Studies

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ABSTRACT

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Previous meta-analyses provided inclusive results related to the effectiveness of explicit instruction (EI) and implicit instruction (II). However, the preceding meta-analyses did not afford a robust comparison of two types of instruction, as the data were not drawn from the same population. This meta-analysis study, therefore, aims to provide reliable comparative effectiveness on EI and II in Korean English classrooms. The study also aims to investigate moderating effects (outcome domains, modes, types, educational contexts, L2 proficiency, and duration of instruction) on comparative effectiveness of EI and II. 143 samples from 40 primary studies were coded into the CMA software to calculate effect sizes by computing Hedges' *g*. This meta-analysis revealed a positive overall comparative effect of EI over II; EI is more effective than II in Korean English classrooms. Among six moderating variables only one variable showed a significant moderating effect on the comparative effectiveness of EL and II; EI is more effective for developing cognitive abilities and grammar and vocabulary knowledge than II. Findings and pedagogical and research implications are discussed.

I. INTRODUCTION

Among various factors that affect second language (L2) development, instruction is one of the core elements. A proliferation of L2 studies addressing the effect of various instructional treatments in L2 classrooms was seen over the last four decades. Many studies have revealed benefits of L2 instruction in promoting L2 learning (Doughty & Williams, 1998; Ellis, 2001; Hulstijin, 1997; E. Y. Kang, Sok, & Han, 2019; Long, 1983; Norris & Ortega, 2000; Spada & Tomita, 2010). Long (1983) reported that L2 instruction makes a difference in learning a language when compared to naturalistic exposure. Norris and Ortega (2000) and J. Goo, Granena, Yilmaz, and Novella (2015) addressed the positive overall effect of L2 instructional treatments.

Norris and Ortega (2000), Spada and Tomita (2010), J. Goo et al. (2015), and E. Y. Kang et al. (2019) meta-analyzed the effects of L2 instruction and they all found that explicit instruction was more effective than implicit instruction. However, most of the studies in Norris and Ortega's (2000) meta-analysis measured explicit knowledge data rather than implicit data and this bias could have affected their results (Doughty, 2003). Spada and Tomita (2010) meta-analyzed the effects of instruction (explicit/ implicit), target linguistic features (simple/complex), and outcome measures (controlled/free production) using 30 studies with 10 studies overlapping with Norris and Ortega's (2000) meta-analysis. This research also revealed the same bias to Norris and Ortega's meta-analysis; there was a greater amount of data for explicit instruction than

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implicit instruction.

The research of J. Goo et al. (2015) and E. Y. Kang et al. (2019) tried to solve this bias and included more implicit instruction data. The meta-analysis of J. Goo et al. (2015) with 34 studies (11 of them overlapping with Norris and Ortega's data) showed a higher overall mean effect size of implicit instruction than that of Norris and Ortega (2000) and Spada and Tomita (2010). E. Y. Kang et al. (2019) used 54 studies with 15 studies overlapping with the data of Norris and Ortega (2000). Besides the overall effectiveness of L2 instruction they also found both explicit and implicit instruction had a large effect size on L2 immediate learning and implicit instruction showed a longer lasting effect than explicit instruction. This study also reported that outcome measure, proficiency, setting (lab or classroom), and amount of instruction were significant moderators affecting the effectiveness of L2 instruction.

The meta-analysis of J. Goo et al. (2015) and E. Y. Kang et al. (2019) rendered quite different results of the effectiveness of explicit and implicit L2 instruction than those of previous research. Furthermore, among the previous four meta-analyses mentioned here only the meta-analysis of J. Goo et al. (2015) contained data comparing both conditions of L2 instruction (explicit and implicit), whereas the other research analyzed data comparing either explicit or implicit instruction. Thus, for more accurate and adequate comprehensive effectiveness of explicit versus implicit L2 instruction further meta-analysis research containing both conditions of instruction is needed.

Much of research has been conducted to investigate the effect of FFI (form focused instruction) mainly focused on teaching grammar and the effect of implicit and explicit vocabulary instruction in Korea since the 1990s. However, meta-analysis research of implicit and explicit L2 instruction has been sparsely conducted. Schenck (2019) conducted a meta-analysis on the effectiveness of FFI and reported no difference between implicit and explicit FFI. J. Y. Lee (2015) meta-analyzed the effect of focus on form grammar instruction (Focus on Form vs. Non-Focus on Form) and found no difference between these types of instruction; both types of instruction had a large effect size ($d > 0.8$). Furthermore, these two studies narrowly gleaned their data only from journal articles; especially, Schenck (2019) retrieved studies only from two journals. Cooper (2010) pointed out that "the quality-controlled journal articles should not be used as the sole source of information for a research synthesis" due to the existence of bias against null findings and confirmatory bias (p. 63). This sampling bias should be carefully addressed. Besides, though much research was conducted, there were no conclusive results related to the effectiveness of explicit and implicit instruction in the Korean L2 classroom context; some studies reported benefits of explicit L2 instruction (Y. Y. Hong, 2018; E. J. Kim, 2017; H. Kim, 2018; I. O. Kim & S. Y. Han, 2008; W. Y. Kim, 2004; J. S. Song, 2009), whereas some other studies reported the effectiveness of implicit L2 instruction or no difference between these two types of instruction (S. J. Kang, 2011; H. Kim & H. S. Chung, 2016; H. S. Kim & H. Yoon, 2010; S. W. Kim, 2009; J. A. Seo & M. H. Choe, 2016). There are no meta-analysis research investigating the effectiveness of implicit and explicit vocabulary instruction or overall effect of implicit and explicit L2 instruction in the Korean L2 classroom context.

The purpose of this study is, therefore, to provide a more comprehensive picture of the effectiveness of explicit instruction over implicit instruction in the Korean L2 classroom context by synthesizing the findings of previous experimental and quasi-experimental research conducted in Korea inclusively. The study also investigates the effects of moderate variables on the comparative effectiveness of explicit and implicit instruction. For these the following questions guided the present meta-analysis.

1) Is explicit or implicit instruction more effective for promoting L2 learning in Korean English classrooms?
2) What moderate variables affect the comparative effectiveness of explicit and implicit instruction in Korean English classrooms?

II. LITERATURE REVIEW

1. Explicit vs. Implicit Approach

"In the instructed second language acquisition literature there is a general consensus that instruction is beneficial for L2 development" (Spada & Tomita, 2010, p. 263). These previous studies have the common theoretical premises that the goal of L2 instruction should be the enhancement of learner's focal attention when they are learning L2 (Sharwood Smith, 1993 as cited in Norris & Ortega, 2000). Thus, a great concern for teachers is what kind of formal instruction is more effective to promote learners' L2 learning. Ellis (2008) discussed the relative effects of different types of instruction (input-based, explicit vs. implicit, inductive vs. deductive, error-inducing production practice, and corrective feedback) and reached inconclusive results. Since this study aims to find the overall effect of explicit instruction over implicit instruction, only this type of instruction will be examined in this section.

Explicit instruction (EI) involves the direct explanation of grammatical features (Ellis, 2008, 2010) whereas implicit instruction (II) encourages learners to infer rules without metalinguistic awareness of the target rule. Housen and Peirrard (2006) differentiated these with a number of characteristics. EI directs whereas II attracts learners' attention to the form; EI is predetermined and planned whereas II is delivered spontaneously; EI is obtrusive whereas II unobtrusive; EI presents target forms in isolation whereas II in context; EI uses metalinguistic terminology whereas II encourages free use of the target form (p. 10). This distinction also applies to other modes of language. EI involves when learners' attention is direct-

ed to the target vocabulary (Nation, 2001) and II occurs when teachers attract learners' attention to the target form by focusing on understanding a text or using language for a communicative purpose (Decarrico, 2001; Nation 2001).

Much of the research conducted in Korea has also focused on the relative effectiveness of explicit and implicit grammar instruction and vocabulary instruction. Some studies showed the effectiveness of explicit instruction. Y. J. Jung (2019) reported that explicit grammar instruction (i.e., noticing) was beneficial for learning explicit knowledge measured by a grammatical judgement task but not for implicit knowledge measured by a sentence completion task. Y. Y. Hong (2018) also found that explicit grammar instruction improved grammar knowledge of university students more than implicit grammar instruction. E. J. Kim (2017) mentioned that high school students in an explicit grammar instruction (oral and written grammar instruction) group showed higher scores in a grammatical judgement task than those in an implicit grammar instruction (input flood, textual enhancement) group. M. H. Do and I. Choi (2014) concluded that explicit grammar instruction promoted high school students' receptive knowledge more than implicit instruction, but they reported that the effect was significant in accuracy measures but not in fluency measures.

W. Y. Kim (2004) found that explicit vocabulary instruction (focused on target form by providing a word list and a reading plus word activity) was more beneficial than implicit vocabulary instruction (reading without paying attention to the target vocabulary) when university students learned low frequency L2 vocabulary. Daly and C. I. Lee (2015) found that explicit morphological instruction improved university students' reading speed and comprehension skills. I. O. Kim and S. Y. Han (2008) mentioned that explicit vocabulary instruction (making a picture dictionary and activities focused on the target vocabulary) enhanced elementary students' vocabulary knowledge (choosing meaning and pictures) significantly whereas there was no significant difference between the two types of instruction in terms of interest in learning vocabulary. H. S. Kim and H. Yoon (2010) found that explicit instruction was more effective to promote middle school students' productive collocation knowledge whereas there was no difference between explicit and implicit instruction in terms of receptive collocation knowledge.

Other studies showed the effect of implicit instruction or no difference between implicit and explicit instruction. J. E. Lee (2008) reported the effect of implicit instruction for middle school students; for high-level learners, implicit instruction is more beneficial only in finding the exact meaning of psychological verbs; for low-level learners, it is beneficial both in finding the meaning of verbs and using them in a proper context. M. S. Ko (2006) found that no differential effect was found between implicit and explicit instruction in a university on the comprehension of easy vs. difficult grammatical rules, whereas explicit instruction showed a greater effect on producing easy vs. difficult rules. H. Kim (2018) showed no difference between explicit and implicit instruction on university students' pragmatic awareness. J. K. Lee and E. S. Jeong (2005) reported that explicit and implicit vocabulary instruction did not show any difference in promoting elementary students' vocabulary knowledge, but that only explicit instruction enhanced students' self-confidence.

The above research showed mixed results on the effectiveness of explicit and implicit instruction when they were directly compared. These inconclusive results were also affected by various variables such as age (educational context), mode of language, types of task and measurements, and instruction time. Therefore, it is necessary to investigate the overall comprehensive effect of explicit instruction over implicit instruction and the moderating effects of the variables.

2. Meta-Analysis of Effects of Explicit and Implicit Instruction

Several studies were conducted to investigate the overall effects of explicit and implicit L2 instruction. Norris and Ortega's (2000) meta-analysis reported a clear advantage of explicit instruction over implicit instruction; an overall effect size for 29 implicit instructional treatments was $d = 0.54$ and that for 69 explicit instructional treatments was $d = 1.13$. This advantage, however, was not found in association with long-term and short-term treatments. In addition, the study revealed that the effect size of an outcome measure varied according to its types: meta-linguistic judgement ($n = 14$, $d = 0.82$), selected response ($n = 19$, $d = 1.46$), constrained constructed response ($n = 32$, $d = 1.20$), and free constructed response ($n = 8$, $d = 0.55$). Within their data, explicit instruction used more selected response measures and fewer free constructed response measures; implicit instruction used more constrained constructed-response measures. Overall, 10% of outcomes were from free productive use of the L2 (free constructed response) and 90% of outcomes from application of L2 rules. Thus, a greater amount of data on explicit instruction and the greater difference in measurements might have affected the results of the effect sizes of explicit and implicit instruction.

Spada and Tomita's (2010) meta-analysis also found overall advantages for explicit instruction over implicit instruction. More specifically, a large effect size was found in explicit instruction for complex forms ($d = 0.88$) and simple forms ($d = 0.73$). A small effect size was revealed in implicit instruction for complex forms ($d = 0.39$) and simple forms ($d = 0.33$). They grouped Norris and Ortega's four types of outcome measures into two types, controlled and free construction tasks; they categorized metalinguistic judgements, selected responses, and constrained constructed responses into a controlled task and renamed free constructed responses as free constructed tasks. Unlike the results of Norris and Ortega, the effect sizes for controlled and free outcome measures in explicit instruction were greater than those in implicit instruction. However, this study also carries sampling bias; it carried

much more data on explicit instruction than on implicit instruction.

J. Goo et al. (2015) meta-analyzed the overall effects of explicit and implicit instruction and confirmed the advantages of explicit instruction (g = 1.29) over implicit instruction (g = 0.77). However, the effect size of implicit instruction was greater than that reported in Norris and Ortega (2000) and Spada and Tomita (2010). As in the research of Norris and Ortega (2000) this study found that the overall effect sizes of selected response measures (g = 0.598) and controlled response measures (0.584) were greater than that of free production measures (0.454) in both types of instruction but the significance of the difference was not conducted (Q-test). In addition, J. Goo et al. reported no significant difference in effect sizes between two types of instruction (explicit g = 1.361, implicit g = 0.830) on immediate posttests. Though the advantage of explicit instruction over implicit instruction was found regarding short-term delayed (8-9 days), and long-term delayed posttests (30 days), the sample sizes of these timing of posttests were not large enough (k < 10) to yield valid effect sizes. There was no significant difference between the two instruction conditions in terms of other moderating variables (mode of instruction, educational context, linguistic features).

E. Y. Kang et al. (2019) also meta-analyzed the overall effects of two types of instruction (explicit vs. implicit), four types of outcome measures as in Norris and Ortega's (2000), three modes of outcome measures (written vs. oral vs. combined), and methodological features (linguistic target, L2 proficiency, education setting, education context, research setting, and duration and intensity of instruction). In addition to the benefits of instruction in L2 learning, they reported the advantage of both implicit (g = 1.38) and explicit (g = 1.11) instruction on L2 learning on the short-term side (immediate post-tests) and the advantage of implicit instruction (g = 1.76) over explicit instruction (g = 0.77) on the long- term side (delayed post-tests). Furthermore, significant moderator effects on L2 instruction were found in the mode of outcome measures (oral/combined > written), linguistic targets (syntax/morphology > pragmatics), L2 proficiency (novice learner > intermediate/advanced learners), research setting (labs > classrooms), duration of instruction (short treatment less than 7 days/long treatment more than 14 days > medium treatment more than 8 and less than 14 days), and intensity of instruction (brief-1 hour treatment/medium-more than 3 hour and less than 6 hour treatment > short-more than 1 hour and less than 3 hour treatment/long-more than 6 hour treatment).

Three studies of meta-analysis on the effects of implicit and explicit instruction in Korean school classrooms are found. J. Y. Lee (2015) conducted a meta-analysis with 30 published articles and reported a large effect size of L2 grammar instruction overall (d = 0.907). No significant moderating effects were found in terms of the duration and types of grammar instruction but a significant effect was reported in terms of the educational context. Grammar instruction was found to be more effective for middle school (k = 16, d = 1.108) and university (k = 37, d = 1.093) students than high school (k = 10, d = 0.215) and elementary (k = 4, d = 0.201) students. However, samples from high school and elementary school were not large enough to calculate a valid effect size.

Schenck (2019) used 22 published studies from only two journals and meta-analyzed the effect of form focused grammar instruction. Though both types of instruction yielded a large effect size, no significant difference was found between explicit (d = 1.91) and implicit (d = 1.90) form focused instruction. Implicit instruction (d = 1.22) was more beneficial for lexical features than explicit instruction (d = 0.28), whereas no difference was revealed for morphological and syntactic features. However, the results of moderating effects of linguistic features should be examined carefully since this study did not provide information of sample sizes for each linguistic feature that could cause bias in interpreting the data. In addition, though the researcher reported large moderating effect sizes on L2 proficiency, the samples of low (n = 4, k = 4) and high (n = 10, k = 10) beginners and high intermediate learners (n = 2, k = 2) were too small to calculate valid effect sizes. Thus, further analysis related to moderating effects of L2 proficiency is needed.

J. Kim (2020) meta-analyzed the effect of implicit and explicit focus on form instruction with 59 journal articles. He reported the overall advantage of grammar instruction (k = 135, g = 0.935) over vocabulary (k = 22, g = 0.282) and language skills (k = 42, g = 0.282), and the same advantage was also revealed regarding explicit and implicit instruction. Furthermore, in both explicit and implicit instruction, significantly different effect sizes were reported in regarding to the educational context (large effect size for middle school and university > medium effect sizes for elementary and high school). However, no significant difference between explicit (g = 0.791) and implicit instruction (g = 0.721) and no moderating effect on the duration of treatments were found.

All the studies except the one mentioned above confirm the effectiveness of explicit instruction over implicit instruction. However, the results of the effect of moderator variables on the two types of L2 instruction were inconclusive due to the lack of an adequate sample size and inconsistent outcome measurements. Moreover, the previous meta-analyses retrieved data only from quality controlled-published journal articles and thus this sampling bias could have affected the results (Copper, 2010). As E. Y. Kang et al. (2019) mentioned, the effectiveness of explicit and implicit instruction could be more precisely and validly gauged if the precedent datasets were collected from studies comparing both conditions of L2 instruction directly. Therefore, this study will reinvestigate the precise overall effect of explicit instruction over implicit instruction and the moderating effects of educational context, duration of instruction, and modes and types of outcome measures by selecting data comparing both conditions of L2 instruction directly. A comparative effect size shows direct contrast between the two types of instruction and

provides conclusive evidence about the superiority or inferiority of one over the other.

III. METHOD

1. Selection of Studies

The data for this study were collected through an extensive online search using multiple data bases shown in Figure 1. The timeline of the literature search was from 2000 to 2019 and the following key words were used: explicit learning/instruction, implicit learning/instruction, form focused instruction, grammar/vocabulary teaching, and proficiency. The phases of sampling data are presented in Figure 1.

Abstracts of 1,042 studies were screened, and only comparative studies designed to compare two types of L2 instruction directly (an explicit instructional treatment group and an implicit instructional treatment group) were selected to gauge more valid effectiveness of explicit instruction over implicit instruction. Comparative studies "afford a more robust comparison as each study involved participants drawn from the same population" (Shintani, Li, & Ellis, 2013, p. 317). As a result, the full texts of 54 studies were reviewed and 12 studies with insufficient statistical data and two studies conducted abroad were excluded. Finally, 40 studies were included in this meta-analysis (see Appendix I). In order to reduce possible bias, quality-controlled journal articles, dissertations, and MA theses were used as the sources of information for this meta-analysis.

2. Coding and Analyzing Data

Based on previous studies of meta-analysis (E. Y. Kang et al., 2019; Norris & Ortega, 2000; Spada & Tomita, 2010) a coding scheme was developed with three categories: type of L2 instruction, outcome measures, and methodological features (see Table 1).

TABLE 1
Data Coding Scheme

Category			Variable
L2 Instruction			Explicit, Implicit
Outcome Measures	Cognitive Factors	Mode	Vocabulary vs. Grammar vs. Language Skills
		Type	Receptive Test vs. Productive Test
	Affective Factors		Interest, Attitude, Confidence, Motivation, Participant, Anxiety, Efficacy, Prohibition
Methodological Features			L2 Proficiency (High vs. Mid vs. Low)
			Educational Context (Elementary vs. Middle School vs. High School vs. University)
			Duration of Instruction (Long vs. Mid vs. Short)

All the studies included in this meta-analysis were designed to compare the effect of L2 instruction by comparing an explicit instructional treatment group with an implicit instructional treatment group. Thus, a comparative effect size was calculated by coding data associated with explicit instruction as experimental data and those with implicit instruction as baseline data. Outcome measures were coded into main domains (cognitive and affective) and subcategories (mode and type of knowledge). The individual tests were categorized into either *receptive* or *productive*; if a test requires learners to comprehend L2

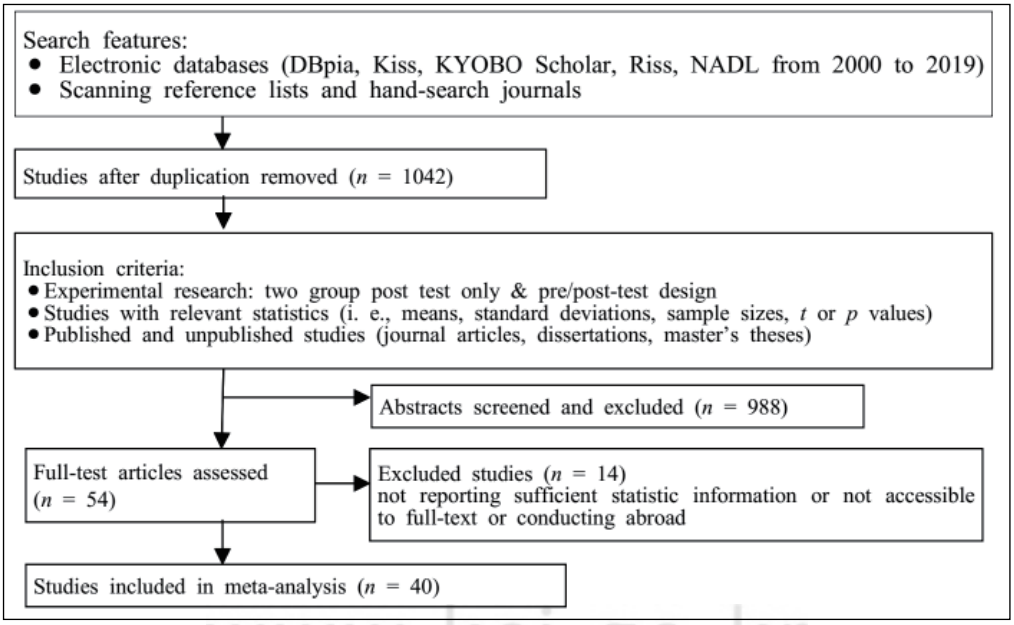

FIGURE 1 Flow Diagram for Data Sampling

input, it is coded as *receptive* and if it requires to produce the target L2 features in oral or written form, it is coded as *productive*. Thus, grammar judgment tests, forms of multiple-choice questions (selected responses), and any type of receptive recall of form and meaning were coded as a receptive test; constrained constructed responses (producing language varying from one word to a complete sentence) and free constructed tasks (speaking and writing tasks) were coded as a productive test. The duration of instruction of individual studies was assigned to three groups: short < 5hrs, medium 5hrs ≤ mid < 12hrs, long ≥ 12hrs.

Study names, statistical data, and variables were coded into the Comprehensive Meta-analysis software and effect sizes were gauged by computing Hedges' g[1] to calculate an unbiased estimate of the size of effects (Borenstein, Hedges, Higgins & Rothestein, 2009). A funnel plot and Duval and Tweedie's Trim and Fill were used to check the publication bias and reduce the variance of the effects (Borenstein et al., 2009). The test of homogeneity (Q test) was conducted to select an effect model (fixed or random effect model) to meta-analyze the data. To investigate the effect of moderating variables a subgroup analysis was also conducted.

IV. RESULTS

1. Results of Overall Comparative Effects of Instruction

The funnel plot (see Appendix II) and Duval and Tweedie's Trim and Fill presented in Table 2 showed no publication bias in the studies on the comparative effects of explicit and implicit instruction. The results in Table 2 presented no difference between observed and adjusted values; thus, the reported effect sizes from the sample studies can be considered valid (Borenstein et al., 2009).

The overall comparative effect size of explicit instruction (EI) and implicit instruction (II) was gauged from 143 independent samples from 40 studies. A summary of the effect size and homogeneity testing is reported in Table 3. The significant value of Q was 375.8965. Since no homogeneity exists among the primary studies used in this meta-analysis, it is more reliable to use a random effects model to calculate effect sizes. Therefore, all the comparative effect sizes reported in the present meta-analysis were gauged under the random effects model. The overall comparative effect size of (ES) of EI over II was g = .4324, a medium effect according to Cohen's (1988) scale.[2] Since the comparative effect size was computed based on the mean differences between EI and II, the positive effect size (g = .4324) indicates a superior effect for EI.

2. Results of Moderator Analyses

Moderator analyses were also conducted to investigate the extent to which the overall comparative effect of EI and II was moderated by other variables. For this the effect sizes of subgroups were computed and summarized in Table 4. The Q statistics ($Q_{between}$) revealed a significantly different moderating effect in the outcome domains but not in the modes and types of outcome measures, educational contexts, proficiency levels, and duration of instruction.

More specifically, the comparative effectiveness of EI and II in terms of the cognitive domain (g = .4848, a medium effect) was larger than that in terms of the affective domain (g = .2789, a small effect). Second, no significant moderating effects were shown on the mode of outcome measures. Most primary studies investigating the effect of explicit instruction over implicit instruction were conducted in the area of vocabulary and grammar instruction. However, not many studies were conducted in the areas

TABLE 2
Duval and Tweedie's Trim and Fill

	Fixed Effects				Random Effects			Q value
	Studies Trimmed	Point Estimate	Lower Limit	Upper Limit	Point Estimate	Lower Limit	Upper Limit	
Observed Values		.3891	.3474	.4308	.4324	.3620	.5028	375.8965
Adjusted Values	0	.3891	.3474	.4308	.4324	.3620	.5028	375.8965

TABLE 3
Overall Result: Comparative Effects

Model	95% CI					Heterogeneity			
	k	ES (g)	Lower Limit	Upper Limit	p	Q	df	p	I^2
Fixed Effects	143	.3891	.3474	.4308	.000	375.8966	142	.000	62.2236
Random Effects	143	.4324	.3620	.5028	.000				

[1] "The standardized mean difference is often called Cohen's d in research synthesis and d has a slight bias, tending to overestimate the absolute value of δ, the size of effects, in small samples. This bias can be removed by a simple correction that yields an unbiased estimate of δ, with the unbiased estimate called Hedges' g" (Borenstein et al., 2009, p. 27).

[2] The values of Cohen's effect size are small (.10-.30), medium (.40-.70), and large (.80).

TABLE 4
Random Model: Moderator Analysis Results

Moderator Variable				95% CI			Heterogeneity	
		k	ES (*g*)	Lower Limit	Upper Limit	*p*	$Q_{between}$	*p*
Outcome Domain	Cognitive	106	.4848	.4037	.5658	.000	6.3669	.011
	Affective	37	.2789	.1410	.4167	.000		
Outcome Mode	Grammar	29	.4356	.2608	.6103	.000	4.9132	.296
	Vocabulary	71	.5280	.4158	.6402	.000		
	Pragmatics	2	.1964	-.4658	.8588	.581		
	Pronunciation	2	.3472	-.3943	1.0888	.917		
	Reading	2	.9677	.3155	1.6198	.003		
Outcome Type	Receptive	49	.4469	.3258	.5680	.000	2.9160	.404
	Productive	32	.4910	.3376	.6444	.000		
	Both	17	.5165	.3083	.7246	.000		
Edu. Context	Elementary	44	.4291	.2983	.5600	.000	5.4418	.142
	Middle School	56	.3481	.2350	.4613	.000		
	High School	21	.5932	.4070	.7795	.000		
	University	22	.4878	.3253	.6504	.000		
Proficiency Level	High	31	.3839	.2191	.5486	.000	.6304	.959
	Middle	4	.3624	-.1369	.8618	.154		
	Low	19	.4680	.2557	.6803	.000		
Duration of Instruction	S (< 5hrs)	60	.4082	.2980	.5184	.000	6.0633	.108
	M (5-12hrs)	48	.4751	.3572	.5930	.000		
	L (≥ 12hrs)	33	.3644	.2274	.5014	.000		

of linguistic features or language skills. The comparative effectiveness of EI over II on reading (g = .9677, a large effect size) was larger than that on vocabulary (g = .5280, a medium effect size) and grammar (g = .4356, a medium effect size). The comparative effect sizes of EI over II on pragmatics and pronunciation were g = .1964 and g = .3472, respectively; they represented a small effect in regard to Cohen's scale. However, these comparative effect sizes were not significant with a large confidence interval. Furthermore, the samples of instruction on reading, pragmatics, and pronunciation were not large enough to calculate valid effect sizes. Thus, further studies with a large sample size are needed to provide a valid comparative effectiveness of EI and II on reading, pragmatics, and pronunciation.

Third, on the types of outcome measures, studies using receptive tests (g = .4469) yielded a medium effect and a similar effect was reported for productive tests (g = .4910), thus suggesting EI was more effective than II in both types of outcomes. Fourth, on the educational context, the comparative effect sizes of elementary (g = .4291), high school (g = .5932), and university (g = .4878) represented a medium effect according to Cohen's scale, whereas the comparative effect size of middle school (g = .3481) represented a small effect. However, no significant difference among the educational contexts was reported and this suggested the superiority of EI over II in all educational contexts. Fifth, on L2 proficiency, the comparative effect size of EI over II on low-proficiency learners (g = .4680) represented a medium effect size and that on high (g = .3839) and middle (g = .3624) proficiency learners represented a small effect size. However, this difference was not statistically significant and the comparative effect size of middle proficiency learners was not statistically valid with a large confidence interval and a small number of samples. Thus, careful interpretation and further investigation on the moderating effect of L2 proficiency on instruction are needed. Sixth, though the comparative effect size of the medium hours of instruction (g = .4751) was largest and, in turn, followed by shorter hours of instruction (g = .4082) and longer hour of instruction (g = .3644), this difference was not statistically significant; all of them represent a medium effect, thus suggesting that instruction time was not associated with the effectiveness of EI.

V. DISCUSSION AND CONCLUSION

The present meta-analysis sampled 40 comparative studies of EI and II in Korean classrooms spanning 14 years (2000-2019) and yielded a positive medium effect size (g = .4324). The results indicate that EI is more effective than II in Korean English classrooms. This confirms the results of Norris and Ortega (2000), Spada and Tomita (2010) and J. Goo et al (2015), whereas it does not support the results of E. Y. Kang et al. (2019), J. Y. Lee (2015), Schenck (2019), and J. Kim (2020) reporting no significant difference of overall effects between EI and II. This discrepancy might have stemmed from the data sizes and sampling bias. Unlike the preceding meta-analyses this meta-analysis examined only comparative studies affording a more robust comparison with participants from the same population. Thus, it can be concluded that EI is more effective than II in L2 learning in Korea. Explicit instruction provides a series of instructional support by breaking the target features into learnable units based on learners' cognitive capabilities. In addition, it is usually delivered by clear descriptions and demonstrations of skills, support-

ed practices, and timely feedback. These characteristics might be associated with the advantage of EI over II when learning L2 (Norris & Ortega, 2000; Spada 1997; Swain, 2000).

The present study also investigated moderating effects. Of the six moderator variables only one was found to have a significant moderating effect on the comparative effectiveness of EI and II. The effect size of the cognitive variable (g = .4848) was larger than that of the affective variable (g = .2789). This result indicates that the advantage of EI is clearer in promoting cognitive abilities than affective abilities. In other words, EI is more clearly effective for developing cognitive abilities than II.

The other five moderator variables did not have a significant moderating effect on the comparative effectiveness of EI and II. The effect sizes for measuring overall vocabulary and grammar knowledge were .5280 and .4356, respectively. This result suggests that the effectiveness of EI is evident in developing both vocabulary knowledge and grammar knowledge. However, the advantage of EI over II was not found in developing pragmatic and pronunciation knowledge due to the lack of samples. Overall, EI is more effective to enhance grammar and vocabulary knowledge than II in Korean English classrooms. E. Y. Kang et al. (2019) investigated moderating effects on linguistic target features and found a significant difference among them (syntax > morphology > pragmatics), but this meta-analysis did not find significant moderating effects on pragmatics and pronunciation due to the lack of related data. Thus, further comparative studies of EI and II targeting different linguistic features and language skills are needed.

The effect sizes of receptive knowledge and productive knowledge were medium. In other words, EI was found to be more effective to develop both receptive and productive knowledge than II. Unlike the previous research supporting that explicit instruction is effective to develop discrete and focused linguistic tasks (receptive knowledge) and implicit instruction is effective to develop productive knowledge required for fluent and spontaneous use of contextualized language (Doughty, 2003; Housen & Pierrard, 2006; Norris & Ortega, 2000; Spada & Tomita, 2010), this result provides ample evidence that explicit instruction is beneficial to enhance both receptive knowledge under controlled conditions and productive knowledge under free use of target forms. Along with the results of E. Y. Kang et al. (2019) and J. Kim (2020), the results of no moderating effects on educational context and duration of instruction were also found in this meta-analysis. E. Y. Kang et al. (2019) reported an advantage over novice learners, but this study did not find any difference in L2 proficiency. However, this study found that regardless of the educational context, duration of instruction, and L2 proficiency EI was once again more effective than II.

In short, the overall results of this meta-analysis confirm the effectiveness of EI over II. Especially, EI is more effective to develop cognitive abilities and grammar and vocabulary knowledge than II. The effectiveness of EI over II is also clear in enhancing receptive and productive knowledge. L2 acquisition theories and research implicate the importance of both input- and output-based types of language practice in L2 learning (Ellis, 2008; Renandya, 2013). The present meta-analysis provides an important insight that EI is effective to promote both types of language practice and this can lead learners to succeed in learning L2 in Korean English classrooms. Thus, teachers and instructors at all grade levels in Korea must consider implementing EI in their English classrooms for a certain amount of time when aiming to improve students' receptive and productive knowledge of grammar and vocabulary more efficiently.

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APPENDIX I

Summary of Synthesized Studies

	Study	Pub	EC	Mode/L2P	Outcome Type	I-Time
1	W. Y. Kim (2018)	A	U	G/H	grammaticality judgment	10 w
2	S. R Lee. (2018)	MA	U	V	meaning translation, fill in the blanks	16 w
3	H. J. Song (2019)	MA	E	G	grammaticality judgment	9 w (18 times)
4	N. Y. Oh (2019)	PhD	M	G	writing tasks	16 times
5	Y. J. Lee (2018)	MA	E	G	meaning translation, constrained constructed responses	8 times
6	E. H. Lee & M. R. Park (2018)	A	U	V	meaning translation, sentence construction	6 w
7	H. K. Kim (2018)	A	U	Pragmatics	writing tasks	8 times
8	Y. Y. Hong (2018)	A	U	G	selected responses	9 w
9	C. H. Park (2012)	MA	M	V	meaning translation	3 w (3 hours)
10	Y. M. Kim (2017)	MA	E	V	selected responses	6 w (12 times)
11	S. Y. Bae (2013)	MA	M	V/H	meaning translation, sentence construction	6 w (6 times)
12	S. M. Lee (2008)	MA	M	V	meaning translation	3 w
13	Y. J. Jeon (2017)	MA	M	V/H-L	meaning translation, sentence construction	5 w (6 times)
14	H. L. Shin (2015)	MA	E	V	meaning translation	8 w (23 times)
15	J. H. Park (2013)	MA	M	V/H-L	selected responses	6 w (22 times)
16	D. H. Kim (2015)	MA	E	V/H-M-L	meaning translation, spelling (word writing)	6 w (6 times)
17	H. M. Choi (2012)	MA	M	V	underline errors sentence construction	5 w (5 times)
18	S. G. Kim (2010)	MA	E	G	grammaticality judgment, writing task, confidence, participation, interest,	10 w (20 times)
19	H. S. Kim (2013)	MA	E	G/H-M-L	grammaticality judgment, constrained constructed responses	10 w (20 times)
20	M. A. Gu (2008)	MA	E	G	speaking & writing tasks	6 w (24 times)
21	H. J. Yoo (2015)	MA	M	Pronunciation/ H-L	listening task, motivation, risk-taking, anxiety, inhibition, efficacy, interest	7 w (10 times)
22	H. Y. Lee (2009)	MA	E	G	selected responses, comprehension test	8 w (4 times)
23	J. K. Lee & E. S. Jeong (2005)	A	E	V/H-L	selected responses, meaning translation, confidence, interest	8 w
24	I. O. Kim & S. Y. Han (2008)	A	E	V	selected responses, interest	14 w
25	H. S. Kim & H. Yoon (2010)	A	M	V	meaning translation, constrained constructed responses	6 w
26	S. J. Jung (2015)	MA	E	V/H-M-L	meaning translation	6 w (6 times)
27	M. S. Ko (2006)	A	U	G	grammaticality judgment, controlled writing	2hrs per week
28	J. E. Lee (2008)	A	M	G/H-L	meaning translation, selected response, constrained constructed responses	2 w (12 times)
29	S. K. Byun (2018)	MA	H	G	selected response, constrained constructed responses, speaking/writing fluency test	6 w
30	H. J. Lee (2010)	MA	H	V	meaning translation, selected response, constrained constructed responses	5 w (5 times)
31	A. Y. Jang (2013)	MA	E	V	meaning translation, constrained constructed responses	6 w (12 times)
32	S. Y. Han (2016)	MA	M	V/H-L	meaning translation, constrained constructed responses	4 w
33	H. S. Shin (2002)	MA	E	V/H-L	meaning translation, selected response	16 w (16 times)
34	H. J. Kim (2012)	MA	M	V	meaning translation, constrained constructed responses, motivation, confidence, attitude, interest	5 w (6 times)
35	S. H. Kim (2015)	MA	H	V/H	meaning translation, selected response, constrained constructed responses, motivation, confidence, attitude, interest	9 w
36	S. W. Kim (2009)	MA	H	R	reading strategy	10 w
37	S. M. Choi (2006)	A	H	V	no information	no information
38	J. S. Song (2009)	A	U	V	meaning translation, reading test	6 w
39	J. Ha & H. Yoon (2016)	A	H	V	oral imitation, error correction	4 w
40	J. E. Jang (2013)	A	U	G/H	constrained constructed responses	no information

Note. Pub: publication, A: article, MA: master's thesis, PhD: doctoral dissertation, EC: educational context, V: vocabulary, G: grammar, R: reading, L2P: L2 proficiency, E: elementary school, M: middle school, H: high school, I-Time: Duration of instruction, w: week

APPENDIX II

Funnel Plot of Sample Studies