

A meta-analysis of different instructional effects on English underachievers*

Jeong-ryeol Kim · Songsook Wi · Young Hee Kim**
(Korea National University of Education)

Kim, Jeong-ryeol, Songsook Wi and Young Hee Kim. 2015. A meta-analysis of different instructional effects on English underachievers. *Linguistic Research* 32 (Special Edition), 125-150. Researches on teaching English to underachievers have shown mixed effects in the frequency and period of the underachieving classes, appropriate activities, materials and teaching strategies. This study is to clarify the mixed results of English underachievement researches and find effective instructional types and conditions for English underachievers in areas of activities, materials, strategies and programs. 47 underachievement studies were selected and categorized into activity-focused, material-focused, strategy-focused and program-focused instructions. These studies are analyzed to derive the average effect sizes of researches for each category. The result indicated significant effect sizes in program-focused (1.208), activity-focused (1.135), strategy-focused (0.841) and material-focused (0.572). The result showing the most improvement was when the instructional group size was less than 10 (1.214). The size of improvement was in negative correlation to group size. The most effective number of class times was 11-20 times (1.162), and when the instruction lasted 1-4 weeks (1.107). The period of instruction was in negative correlation to the achievement of underachievers beyond 4 weeks. These findings can be used to design English underachievement programs by using the attained information as a guide line for number of classes, class size and instructional period to set up English supplementary classes for underachievers. (Korea National University of Education)

Keywords English underachievers, English underachievement, meta-analysis, cognitive domain

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** Jeong-ryeol Kim is the first author; Songsook Wi is the second author; Young Hee Kim is the corresponding author.

1. Introduction

Attaining functional proficiency of English is increasingly more important under the current globalization and internationalization trend worldwide. English will remain the dominant global language for the foreseeable future because of its pre-eminent position as the language of science, technology, tourism, entertainment and the media. Despite the high cost to the public English education, the investment does not alleviate the low efficiency of English education. Single common concern in English education most English teachers agree upon is the individual achievement gap among English learners where the macro-environment does not require English and the day-to-day first language influence is strong (Ronquillo, 2015). English teachers attempt to narrow the gap by adjusting lesson aims, organizing activities and choosing alternative evaluation instruments. Any serious attempts to improve English education must include a program including teaching English to underachievers and the gap will grow wider otherwise.

There are many studies that analyzed the conditions and causes of English underachievers and suggested effective ways to solve the issues and problems of English underachievement. The results were mixed in that some studies showed positive results in all areas of cognitive and affective areas while others did not show any significant results in their underachievement studies (J. Jeong & J. Kim, 2013). However, because of the wide variety of participants, tasks and instructional conditions employed in the studies of underachievers, it is difficult to conclude coherent results across different studies. In light of such difficulties, synthesizing and analyzing the results with different perspectives, particularly in terms of a methodological approach, would be meaningful to discover a coherent look at the issue. A quantitative meta-analysis, which is a powerful statistical tool to synthesize and analyze the results of the previous studies, can be employed as a statistical option to resolve the wide differences appeared in the underachievement studies. The primary goal of current study analyzes and synthesizes the statistical results of individual studies on English underachievers and their implications, and it explores the optimal English teaching and learning approaches and conditions of instruction for underachievers. The research questions are as follows:

Q1. What is the most effective approach for enhancing English underachievers?

language components and skills?

Q2. What is the optimal condition of underachievers' English classes such as group size, instructional period, frequency and instructional hours?

2. Literature review

2.1 Overall review of underachievement studies

An underachiever is a student with the gap between students' potential (or ability) and their performance (or achievement) (Reis and McCoach, 2000), that is, a student who fails to realize his or her potential or does not do as well as expected. On the other hand, a slow learner is a child with below average intelligence (IQ) who makes low achievement (Greshan, Macmillan & Bocian, 1996).

There are studies of teaching method for English underachievers through analyzing the learners' actual learning condition (Chen, 2007), and a study of English underachievement factors is contrasted with other subjects. The studies also explore the effects with reference to self-directed attitude (J. Kim & E. Jeong, 2010). These studies investigated the characteristics of English underachievers in three categories: learner, lesson, circumstances. Lightbown and Spada (2013) classified each category into (1) learner factors: learning attitude, interests, motivation and self-concept, (2) lesson factors: text books and English class, (3) circumstances: materials, experience of private education and personal background. J. Kim and E. Jeong (2010) casted a different look at the sub-elements of these categories by organizing (1) learner factors: learning attitude, interests, necessity for English, motivation, self-concept about English and learning quantity, (2) lesson factors: domain, tasks, teaching method, materials and text books, satisfaction, and pace of instruction, (3) circumstances: school background and personal background.

On the other hand, a few other studies investigated and categorized the factors of underachievers differently. T. Kim (2010) distinguished the learner aspect in attitude toward the learning subject, English learning motivation, self-esteem and socio-economic background. Additionally, he divided school factors into English teacher and appropriateness of content based on the curriculum. J. Jeong and J. Kim (2013) analyzed English underachievers' state of conditions qualitatively and

characteristics of underachievers in three categories: English underachievement only, underachievement with at least one other subject and underachievement across all the subjects.

Kosel (2013) attributed underachievement to the students' lack of interests and motivation, absence of learning skills, dissatisfaction of teacher's instruction, high difficulty level, unmatched text book level and excessive private education in appearance order. J. Kim (2011) concluded the underachievement in English is caused by the students' apathy toward the repetitive failure in English, lack of basics, conflict with teachers or peer students, absence of appropriate learning strategies, unconcerned parents and English classes focusing on high achieving students. And J. Jeong and J. Kim (2013) analyzed behaviors of English underachievers and problems in their learning, researched their interests, degree of self motivated learning, whether they prepare and review English classes or not, difficulty of English lessons, assignments, parents' concern and private education experiences. Stoeger, Suggate and Ziegler (2013) looked into underachievers' IQs from the sub-domains of calculation ability, inferring figures, speed of awareness, a command of language, inferring language and comprehension ability, and personality factor was also investigated contrasted by the introversion and extroversion. Also she compared learning factors including motivation, anxiety, concentration, data processing, self-checking and management of student's individual circumstances.

2.2 Teaching English underachievers

2.2.1 Activity-focused instruction

In activity-focused instruction, instructions include role-play, drama, songs, chants and games in groups or pairs. Role-plays are important enhancing students' communicative competence because it can narrow the difference between classroom and real-world communicative situation (Chen, 2007). It was found that activity-based English lessons improve underachievers' motivations in learning English.

Using games in English classes could make underachievers' confident by reducing their anxiety of learning English and relaxing their mind and body about making mistakes. Especially J. Kim and E. Jeong (2010) reported that English

classes with games also made learners motivated and stimulated them to join the problem-solving activities and raised their motivation in learning English and challenging new risks. They tested the effectiveness of games with the 5th grade underachievers. As a result, it was verified that instruction with games improved their language proficiency.

Songs are also very effective to practice English accent, rhythm, pronunciation naturally because they motivate students to learn English. And songs could be very important to correct pronunciations and to acquaint new language structures and idioms. It is also efficient to promote listening ability.

On the other hand, studies about group activity instruction such as Choen (2003) and Lightbown and Spada (2013) have it in common that they showed group activities resulting in positive effects on underachievers' language learning. Choen (2003) presents the reading procedure for English underachievers into 'pre-reading – oral reading – cooperative reading comprehension activity – post-reading'. As a result of applying it, he found the improvement in reading proficiency of 15% among low achieving students. Lightbown and Spada (2013) claim that group activities increase chances to practice language and improve quality of learner language, help them learning and build positive learning circumstances. And actually, she found out that group activities improved underachievers' listening proficiency and academic achievement.

2.2.2 Materials-focused instruction

In materials-focused instruction, materials get a particular attention to assist underachievers including visual materials, video clips, multimedia materials and literature materials. Chen (2007) used flash-cards to English underachievers, one of visual materials, and she identified improving their vocabulary. Also she found out instruction with visual materials contributed to enhance underachievers' interests about English.

Using movies or soap operas is a large part of studies in the instruction with video clips. J. Kim (2011) and Chen (2007) claimed that audio-visual materials stimulate visual and auditory senses to improve English listening skills. Movies, soap operas, dramas and sitcoms are effective in retaining and retrieving language into and from learners' long-term memory. Video-clips could be served not only as a

verbal material but also as a non-verbal material. Also it has strength for raising learners' interests and attention to English in action. Especially, J. Kim (2011) reported that English classes with movies could present communicative situation and provide interesting follow-up activities which would lower learners' affective filter and give a chance to learn about the culture. And he showed improving the listening competence of English learners using movies.

J. Kim (1999) summarized characteristics and strengths of using multimedia courseware in her study: (1) Multimedia materials could provide authentic verbal language, images and pictures. (2) It is possible to learn any part of the movie repeatedly, and learners can study specific part whenever they want to. (3) It could adjust quantity and pace to learners' ability. (4) Learners can study and interact without much knowledge on how to use computers. (5) Multimedia materials lift up learners' motivation and interests by using audio, images, videos and games. (6) It makes possible to check and evaluate students' learning. And she found out that using multimedia courseware improved underachievers' listening and speaking competence.

2.2.3 Strategy-focused instruction

In strategy-focused instruction for underachievers, the classes include phonics which learn the alphabetic principles, vocabulary learning strategy, reading strategy, organizational strategy like mind maps and self-directed learning strategy. J. Kim and E. Jeong (2010) identified that phonics improved underachievers' auditory discrimination ability and read-aloud competence. And underachievers' reading attitude also changed positively with phonics strategy training. J. Jeong and J. Kim (2013) divided vocabulary learning strategies into two categories: vocabulary discovery strategy and vocabulary strengthening strategy. Discovery strategy includes word analyzing strategy, inference strategy and dictionary using strategy. Vocabulary strengthening strategy refers to practice, memorize and recall vocabulary which students already learned. In this study, she reached a conclusion that English class with reading strategy could improve learners' reading competence.

In a similar study, H.W. Lee and H.J. Ihm (2012) also found out that teaching reading strategy in accordance to students' learning styles could be important to develop reading competence in early stage. Kosel (2013) states that mind maps help

to work with various types of information clearly and to encode new information visually for saving it in a long-term memory. She reported that underachievers among middle school 1st year students could improve their vocabulary using mind maps, and she claimed organizational strategy could help underachievers' learning English.

2.2.4 Program-focused instruction

In program-focused instruction, supplementary programs are customized for underachievers, and/or after-school program is offered depending on schools. J. Jeong and J. Kim (2013) reported that supplementary program on pronunciation, vocabulary and reading helped improve underachievers' English achievement test score. In addition, it was found that underachievers who previously lost interests in English gained inner motivation as they attain the confidence and interests in English learning as the program addressed the needs of students.

H. W. Lee and H. J. Ihm (2012) also reported that after-school program assisted improving underachievers' English proficiency in that the program can be tailored to their learning styles and learning conditions due to the size of classes and the frequency of classes. For example, the after-school program that focused on cultural comprehension was effective in improving both linguistic achievement and cultural achievement of underachievers (S. H. Park & H. Y. Joo, 2012). Also, the study claimed that it is advisable to teach basics with standard contents (level of learners' grade) even if they are underachievers, and it is effective to make them have interests and confidence through dynamic activities such as games, problem-solving and performances. T. Kim (2010) explained that motivation was important factors for students' successful school life and higher achievement. She developed and applied the motivation-raising program to a group of underachievers. As a result, she found out the program helped improve underachievers' self-esteem and motivation for English learning.

2.3 Synthetic procedure of collected researches

The procedure of synthesizing researches consists of five stages: The first stage is to set up the research question and the hypothesis, the second stage is to collect

and select the relevant researches, the third stage is to code the specified variables of the researches, the fourth stage is to analyze the data result and synthesize the results. And the last stage is to present the analyzed data and interpret the effect size.

For the third and fourth stages, the coding schemes for collected researches are developed and tagged for the individual effect sizes. The properties of studies under the current meta-analysis were analyzed and coded for the following information:.

- (1) The basic information of collected studies under analysis includes name of researcher(s), year of study, title and source journal or thesis.
- (2) Grade levels of subjects divided into different school levels: elementary, middle and high schools.
- (3) Dependent variables comprise components and skills for language competence and affective domain.
- (4) Data used for synthesizing effect sizes of collected researches contain mean, standard deviation, t-value, F-value, correlation and z-value.
- (5) The individual effect size for each dependent variable was calculated using formula to be explained in the next section.

The effect size means that the common value for analyzing the specified researches results from the statistical method where the mean of the controlled group is subtracted from that of the experimental group divided by the standard deviation of the controlled group or of pooled standard deviation of experimental and controlled group. In this study, the formula for the effect size uses the pooled estimate of variance presented by Hedges (1981).

In this study, the collected data will be further processed in the consideration of the different numbers of participants in different researches. The mean values subtraction of control group from experimental group divided by standard deviation will be further modified into one that a bigger size research should have more weight to give a proportional balance between effect size and the number of participants. The most common way to balance the difference is using the reciprocal variance of weight (S.S. Oh, 2002).

3. Method

3.1 Database and criteria

After reviewing the literature, keyword searches were extensively conducted by using (*English*) *underachievement*, *low achiever*, (*English*) *underachiever*, *underachievers*. Approximately 2,900 articles and papers that had been published or unpublished were found through the first filtering process by extensive key word. And the research considered articles and papers written between 2000 and 2014.

The eligible studies to be included in the meta-analysis should meet the following selection criteria.

- (1) The research data were collected from primary school and secondary school English underachievers in Korea.
- (2) Studies should have been conducted in either an experimental or a quasi-experimental design with a control group.
- (3) Studies should examine cognitive areas such as vocabulary, listening ability, reading ability.
- (4) Statistical information should be provided with means, standard deviations, F ratios, t-values and standardized values to calculate the effect sizes.

47 papers passed the criteria and are shown in table 1. They are under investigation for the effect sizes by different intervention types.

Table 1. Selected papers and their information

No.	Author	Pub year	Time (min.)	Freq. (times)	Period (weeks)	Intervent ion type	Treat N	Control N	ES (Hedge's g)
1	Bae & Lee	2012		40	36	material	56	57	0.496
2	Bae, Y.J.	2010	40			material	26	27	0.988
3	Cheon, S.Y.	2003	40			activity	30	29	0.482
4	Choi, Y.S.	2013	30	16	8	strategy	30	30	1.689

No.	Author	Pub year	Time (min.)	Freq. (times)	Period (weeks)	Intervent ion type	Treat N	Control N	ES (Hedge's g)
5	Huh, J.S.	2006	40	24	12	strategy	23	22	0.596
6	Hwang, S.J.	2004	30	30	10	strategy	5		0.302
7	Jang, H.J.	2009		28	14	activity	15	193	1.362
8	Jang, Y.R.	2011	40	11		strategy	33		0.326
9	Jeong, S.J.	2012	40	10	5	program	12	12	1.916
10	Jeon, M.B.	2007				strategy	37	38	1.690
11	Ji, N.Y.	2002	80			strategy	10		1.506
12	Kang, H.J.	2007	45			material	15	15	0.478
13	Kang, S.H.	2010	50	12		program	15		2.320
14	Kim, B.J.	2008	45		8	material	32	32	0.677
15	Kim, H.J.	2013	60	60	36	material	16	16	0.835
16	Kim, Lim, & Yoon	2011	50	32	16	material	36	36	0.004
17	Kim, H.S.	2003	45		20	activity	35	35	0.478
18	Kim, J.J.	2013	40	15	15	strategy	11		0.596
19	Kim, M.R.	2013	50	10	4	strategy	25	25	0.719
20	Kim, P.L.	2009	45	12		material	17		1.104
21	Kim, Y.S.	2010	45	40	8	strategy	26	26	0.841
22	Koo, H.A.	2012	45	22	11	strategy	15	13	0.846
23	Koo, J.J.	2010	45		10	material	42	42	0.319

No.	Author	Pub year	Time (min.)	Freq. (times)	Period (weeks)	Intervention type	Treat N	Control N	ES (Hedge's g)
24	Lee, H.J.	2012	20	10	5	material	28	27	0.575
25	Lee, & Lim	2012	40			strategy	9		2.710
26	Lee, J.D.	2007	45	21	7	activity	16	16	0.770
27	Lee, S.S.	2004		8	4	activity	6	11	1.227
28	Lee, W.H.	2009	40		8	activity	15		1.874
29	Lee, Y.H.	2013	20	24	12	strategy	40	40	0.511
30	Lim, J.H.	2008	50	30	10	strategy	63	54	0.100
31	Maeng, S.B.	2012	60	12	6	activity	6	6	0.987
32	Min, C.R.	2011	45	60	12	program	15		1.676
33	Min, S.D.	2007	50	17	9	activity	11	11	1.509
34	Moon, C.S.	2005		40	36	program	15		0.237
35	Moon, J.W.	2002				material	62	66	0.602
36	Nam, G.S.	2012	50	14		activity	9	9	2.122
37	Park, K.H.	2009				program	10	10	1.480
38	Na, Y.S.	2011	30	8	4	activity	20	16	1.954
39	Noh, H.M.	2008	35	6	3	strategy	15	15	0.689
40	Park, M.H.	2011	45		8	material	16		1.267
41	Park, S.H.	2012	40	22	10	program	10		0.951
42	Park, & Park	2007	20	36	12	material	5	5	0.442
43	Son, J.H.	2002	45			material	20	20	0.554
44	Son, J.I.	2012	40			activity	13	13	0.518

No.	Author	Pub year	Time (min.)	Freq. (times)	Period (weeks)	Intervent ion type	Treat N	Control N	ES (Hedge's g)
45	Yang, E.J.	2006	50		8	program	15	15	0.300
46	Yoon, G.Y.	2009			15	material	34		0.359
47	Yoon, J.H.	2006	90	20	5	material	20	19	0.534

The nature of the current studies attracts action-based researches where teacher/researcher put into practice methodological experimentations to improve their own underachieving students' English skills. The collected data are mostly from master's researches during graduate studies the teachers conducted, though the current study did not exclude the underachievement researches done in other settings. The limited nature of the data is a limitation of this research.

3.2 Descriptive statistics of the studies

The overall characteristics of analyzed studies are found with reference to intervention types to the underachieving students as follows: First, from 2000 to 2014, researches on the topic have increased substantially which means that attention to English underachievers is increasingly paid in elementary and secondary schools in that period. Second, intervention types employed in the studies are as follows in decreasing order: Material-focused intervention is 15 studies (31.9%), strategy-focused intervention is 14 studies (29.8%), activity-focused intervention is 11 studies (23.4%), and program-focused intervention is 7 studies (14.9%).

Third, in terms of group size, more than half of studies have less than 20 students in a group (29 studies, 61.7%). It's difficult to find a large group of underachievers in one grade of the same school. Researchers also prefer small size groups to large size groups to effectuate English underachievers' improvement. Fourth, with intervention hour per period, most studies treated 30 minutes to one hour (33 studies, 70.2%), which roughly accords to the general class time in primary and secondary school. Fifth, in case of intervention sessions, most common frequency treated 11 to 20 times (10 studies, 21.3%) followed by 21 to 30 session studies come next (8 studies, 17%) as shown in table 2.

Table 2. Characteristics of analyzed studies

	Division	Number of Studies	Percentile (%)
Publishing year	2000~2004	7	14.8
	2005~2009	16	34.1
	2010~2014	24	51.1
	Total	47	100
School level	Elementary	18	38.3
	Middle School	18	38.3
	High School	11	23.4
	Total	47	100
Type of intervention	Activity-focused		
	Game	4	8.5
	Song & Chant	2	4.3
	Play	1	2.1
	Small group	3	6.4
	Listening	1	2.1
	Material-focused		
	Visual	1	2.1
	Video clip	4	8.5
	Multimedia	6	12.8
	Literature	4	8.5
	Strategy-focused		
	Phonics	4	8.5
	Vocabulary	6	12.8
	Reading	2	4.3
	Organization	1	2.1
	Self-directed	1	2.1
	Program-focused		
	Supplementary	3	6.4
	After-school	2	4.3
Motivation	1	2.1	
ESP	1	2.1	
Total	47	100	
Group size	10 or less	9	19.1
	11 to 20	20	42.6
	21 to 30	7	14.9

	31 to 40	7	14.9
	Over 40	4	8.5
	Total	47	100
Instruction hour	No information	7	14.9
	Less than 30min.	6	12.7
	30min.~1hour	32	68.1
	Over 1 hour	2	4.3
	Total	47	100
Frequency	No information	17	36.3
	1 to 10 times	6	12.7
	11 to 20 times	9	19.1
	21 to 30 times	8	17.0
	31 to 40 times	4	8.5
	Over 40	3	6.4
	Total	47	100
Period	No information	15	31.9
	1 to 4 weeks	4	8.5
	5 to 8 weeks	11	23.4
	9 to 12 weeks	10	21.3
	13 to 16 weeks	4	8.5
	17 to 20 weeks	1	2.1
	Over 21weeks	2	4.3
	Total	47	100

3.3 Calculating effect sizes

3.3.1 Statistical synthesis of individual studies

The effect size is a standard measure for analyzing and comparing individual studies' results in statistical way. An effect size is typically by taking the difference in means between two groups and dividing that number by their combined (pooled) standard deviation. Intuitively, this tells us how many standard deviations' difference there is between the means of intervention (treatment) and comparison conditions.

Hedge and Olkin (1985) pointed that the effect sizes can be biased by the sample size of each study and proposed a formula for calculation of effect taking sample sizes into consideration. Present study calculated individual studies' effect sizes with the following formula.

$S_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$	<p>Sp: Pooled standard deviation n_1: Samples of treated group n_2: Samples of controlled group s_1: Standard deviation of treated group s_2: Standard deviation of controlled group</p>
$g = \frac{(X_e - X_c)}{S_p}$	<p>g: Unfixed effect size X_e: Mean of treated group X_c: Mean of controlled group S_p: Pooled standard deviation</p>
$d = (1 - \frac{3}{4m - 9})g$	<p>d: Fixed effect size m: Samples of treated group + Samples of controlled group</p>

3.3.2 Homogeneity test

In order to combine different effect sizes, it must be verified whether or not different effect sizes are heterogeneous enough through homogeneity test. For examining homogeneity of distribution of the observed effect sizes, homogeneity based on a Q statistics proposed by Hedge and Olkin (1985) was tested. The formula for Q is following.

$se = \sqrt{\frac{n_1 + n_2}{n_1 n_2} + \frac{ES}{2(n_1 + n_2)}}$	<p>se: Standard error of effect size n_1: Samples of treated group n_2: Standard deviation of controlled group</p>
$w = \frac{1}{se^2}$	<p>ES: Unfixed effect size w: Weighted reciprocal se: Standard error of effect size</p>
$Q = \sum(w * ES^2) - \frac{\sum(w * ES)^2}{\sum w}$	<p>Q: Homogeneity of effect sizes w: Weighted reciprocal ES: Unfixed effect size</p>

The Q value is thus calculated n-1 degrees of freedom in the distribution of χ^2 . If the Q value is not significant at 0.05 level, it means that the studies are derived from the same population. In this case, average effect size is calculated by the fixed

effects model. And if the Q value is significant at 0.05 level, it means that the results of studies are from the different population in which case it should be analyzed based on the random effect model. The random effect assumption is that individual specific effects are uncorrelated with the independent variables. If the independent variable is categorical, it is analyzed by analysis of variance (ANOVA). And if it is continuous or binary variable, it is analyzed by the multiple regression test.

3.3.3 Average effect sizes and confidence interval

When calculating average effect sizes, calculating weighted average effect sizes is typically used with standard error. The current study use the same procedure proposed by Hedge and Olkin (1985). The formula for weighted average effect sizes is as follows:

$ES_{mean} = \frac{\sum (w * ES)}{\sum w}$	<i>ES_{mean}</i> : Mean effect size w: Weighted reciprocal ES: Unfixed effect size
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After getting average effect size, the confidence interval of average effect size is calculated in order to confirm if the average effect size is 0. In this study, the significance of average effect sizes is verified by calculating 95% confidence interval.

$SE_{ESmean} = \sqrt{\frac{1}{\sum w}}$	<i>SE_{ESmean}</i> : Standard error of mean effect size W: Weighted reciprocal
$ES_{mean} \pm 1.96(SE_{ESmean})$	<i>ES_{mean}</i> : Mean effect size <i>SE_{ESmean}</i> : Standard error of mean effect size

3.3.4 Interpretation of effect sizes.

Cohen (1988) proposed rules of thumb for interpreting effect sizes: a “small” effect size is .20, a “medium” effect size is .50, and a “large” effect size is .80. Effect sizes can also be interpreted in terms of the percent of non-overlap of the treated groups’ scopes with those of the untreated group, it is called U_3 (percentile of non-overlap). Because the effect sizes follow a normal distribution, one can find a corresponding Z value in each effect size’s normal distribution and plus .5 along with it (U_3).

4. Result

4.1 Average effect size of alternative teaching

The studies of this meta-analysis were a total of 47 papers having used different intervention types to raise English underachievers learning standard. To combine effect sizes of different studies, a homogeneity test was conducted, and the Q value resulted in 143.598 at the significant .05 level. It means that each study in the collected list is heterogeneous so that the meta-analysis needs to be processed based on random effect model 1, and the average effect size is valid since each study is derived from different population.

On the other hand, total effect size of the studies was .696 as shown Table 3 which is a medium effect size by Cohen’s (1988) proposal for interpreting effect sizes. So alternative teaching methods (or approach) that hired in the studies are more effective in general than traditional teaching methods for English underachievers’ learning. And U_3 was 75.67%, it can be interpreted alternative teaching treatment is more effective as much as 25.67% than untreated group.

Table 3. Average Effect Size of Alternative Teaching for Underachievers

	Number of studies	Q	ES_{mean}	95% CI	U_3
Total	47	143.598*	0.696	0.612~0.779	75.67%

* $P < .05$

This result indicates that schools without the underachievement program must install intervention programs to reduce the increasing gap between regular students and underachieving students. Any listed type of intervention is shown to be more beneficial to students than no intervention.

4.2 Mean effect size by intervention types

A test was conducted to examine the homogeneity test of the variability of standard error in this study. However, it rejected the null hypothesis, which means the population of the effect sizes is heterogeneous at .05 level. The effect sizes are divided into different intervention groups. The dependent variables were separated by different intervention types: activity-focused, material-focused, strategy-focused and program-focused group in this meta-analysis as shown in table 4.

Table 4. Mean effect size of intervention types

	Number of studies	Q	ES_{mean}	95% CI	U_3
Activity	11	26.917	1.135	0.760~1.510	87.18%
Game	4	2.484	1.458	1.032~1.885	92.73%
Song & Chant	2	5.406	1.265	0.304~2.833	89.71%
Play	1	0	1.874	1.050~2.697	96.96%
Small group	3	0.531	0.537	0.226~0.847	70.22%
Listening	1	0	1.509	0.590~2.428	93.43%
Material	15	19.714	0.572	0.417~0.727	71.63%
Visual	1	0	0.575	0.043~1.107	71.72%
Video clip	4	9.970	0.624	0.121~1.127	73.37%
Multimedia	6	7.183	0.544	0.326~0.761	70.67%
Literature	4	2.312	0.608	0.332~0.884	72.81%
Strategy	14	53.790	0.841	0.530~1.152	79.95%
Phonics	4	10.153	1.073	0.478~1.668	85.83%
Vocabulary	6	19.297	0.781	0.377~1.185	78.23%
Reading	2	12.785	1.316	-1.235~3.865	90.49%
Organization	1	0	0.846	0.092~1.600	80.11%

Self-directed	1	0	0.302	-0.424~1.028	61.84%
Program	7	28.079	1.208	0.591~1.825	88.65%
Supplementa	3	12.095	1.083	0.059~2.108	86.05%
l	2	5.091	1.595	0.257~2.934	94.42%
After school	1	0	1.916	0.972~2.859	97.16%
Motivation	1	0	0.300	-0.401~1.000	61.79%
ESP					

Table 4 shows mean effect sizes for different intervention types in teaching English to underachievers. Among different intervention types, program-focused mediation was the most effective where the mean effect size reached 1.208. Percentile of non-overlap (U_3) of the program-focused mediation was 88.65% which means the mean of the program-focused treatment group is higher than the mean of the conventional group, 38.65%. Mean effect sizes of different programs within the program-focused groups are listed in decreasing order as follows: motivation raising program (1.916), after-school program (1.595), supplementary program (1.083) and English for specific purpose program (0.300). The limitation of the current study to keep in mind is that the number of studies being analyzed is small. Within limited number of studies the generalization of the meta-analysis is drawn in that the best way to teach English underachievers is starting a tailored program for underachievers. And it is worthy to note that programs focused on learners' motivation are more effective than others, which means that underachieving students are very sensitive to the encouragement that they can do well in English.

Second effective mediator for underachievers' language development was activity-focused intervention groups. The mean effect size was 1.135, and it is strongly positive according to Cohen (1988). Also the percentile of non-overlap (U_3) was 87.18%, which means activity-focused teaching is more effective than conventional teaching, 37.18%. The mean effect sizes of activity-focused programs are listed in decreasing order as follows: role-play (1.874), listening activity (1.509), game activity (1.265) and small group learning (0.537). All the underachieving groups raise their average effect size to over 0.8 which is a large effect size except the small group learning. The pedagogic implication of the result is that role-play,

listening and games must be included in the underachievement program due to their focused skill practice and integrated nature of activities.

The third most effective mediator is strategy-focused groups. The mean effect size is 0.841 that is a large effect size by Cohen's (1988) proposal for interpretation of effect sizes. The percentile of non-overlap (U_3) was 79.95%, and the mean effect sizes of different activity-focused groups are reading-strategy instruction (1.316), phonics instruction (1.073), organization strategy instruction (0.846), vocabulary strategy instruction (0.781) and self-directed strategy instruction (0.302) in decreasing order. This indicates that underachieving students often lack strategies in application of certain language skill and need strategies training. Underachieving students also needs additional support the basic components of language such as phonemic awareness, phonics and vocabulary.

The least effective mediator is material-focused groups, but even the lowest effective mediator for English underachievers is 0.572 which is about medium effect size, 0.5. Order of appearance in terms of their effect sizes in material-focused groups is video-clip materials (0.624), literature materials (0.608), visual materials (0.575) and multimedia materials (0.544), which show no big difference in the effect sizes among different groups using different materials compared with other alternative teaching groups shown above. This implicates that materials are not as important as others if they suffice being program-fit with activities and strategies supporting basic components of language which underachieving students have missed in the course of English learning.

4.3 Group size, intervention hours, frequency and period factors

The current meta-study explores whether or not there is difference in effect sizes depending on group sizes, intervention hours, frequency, intervention period, and the results are shown from table 4 to table 7. First, the effect is the most strongly positive where the effect size is 1.214 ($U_3=83.42\%$) when the group is less than 10. More information according to group size is in Table 5.

Table 5. Effect sizes of group sizes

	Number of studies	Q	ES_{mean}	95% CI	U_3
Less than 10	9	16.004	1.214	0.757~1.670	88.58%
11~20	20	51.621	1.006	0.751~1.261	84.27%
21~30	7	12.028	0.832	0.534~1.129	79.72%
31~40	7	26.689	0.557	0.215~0.899	71.12%
Over 40	4	4.268	0.383	0.159~0.608	64.91%

The finding is that the larger the group size is, the less the effect size is likely to be of underachievers' learning. In other words the effect size on underachievers is counter-proportional to the size of group. A conclusion can be drawn that the instruction will work better on smaller groups since the instruction is more likely tailored to the individual needs of the underachieving students.

Class hour per each instructional session indicates that over one hour session shows effect size 0.971 ($U_3=83.42\%$), less than 30 minutes session is 0.918 ($U_3=82.06\%$), and 30 minutes to less than one hour session is 0.807 ($U_3=79.01\%$) as shown in Table 6.

Table 6. Effect sizes of instructional hour

	Number of studies	Q	ES_{mean}	95% CI	U_3
Less than 30 Min.	6	21.489	0.918	0.370~1.466	82.06%
30 Min. ~ 1 hour	32	90.538	0.807	0.626~0.988	79.01%
Over 1 hour	2	3.553	0.971	0.023~1.191	83.42%

These findings indicate that when we teach underachievers, over an hour session or less than 30 minute session is more effective. However, studies over an hour session are only two which is far less than the number required for confirmation. Besides the effects across different intervention hours are strongly positive where all variables show over 0.8. The instruction hour factor is found to be inconclusive as shown in table 6.

Concerning frequency of sessions, 11 to 20 sessions is 1.162 ($U_3=87.74\%$), 1 to

10 times is 1.108 ($U_3=86.6\%$), over 40 sessions is 0.940 ($U_3=82.64\%$) as shown in Table 7.

Table 7. Effect sizes of frequency

	Number of studies	Q	ES_{mean}	95% CI	U_3
1-10 times	6	13.580	1.108	0.618~1.597	86.60%
11-20 times	9	35.276	1.162	0.690~1.635	87.74%
21-30 times	8	14.071	0.623	0.327~0.918	73.33%
31-40 times	4	5.425	0.340	-0.054~0.735	63.31%
Over 40 times	3	7.441	0.940	0.266~1.615	82.64%

Mostly they showed large effect sizes except 31 to 40 session groups. It shows that up to 20 sessions are strongly effective, but more than 20 sessions do not necessarily lead to the success of underachieving student learning. This means that intervention sessions need to be minimized to attain the expected effects on underachievers by covering components and skills of language the students are falling behind.

Instructional period shows very similar patterns to instructional sessions where 1 to 4 week period is 1.107 ($U_3=86.58\%$), and 5 to 8 weeks is 0.994 ($U_3=83.98\%$). These two period types show strong effect size, but 9 to 12 weeks is 0.648 ($U_3=74.15\%$), 13 to 16 week period drops to 0.522 and more sessions than that leads to the further drop in effect size as shown in Table 8.

Table 8. Effect sizes of frequency

	Number of studies	Q	ES_{mean}	95% CI	U_3
1 to 4 weeks	4	7.458	1.107	0.512~1.701	86.58%
5 to 8 weeks	11	24.42	0.994	0.680~1.308	83.98%
9 to 12 weeks	10	21.788	0.648	0.346~0.951	74.15%
13 to 16 weeks	4	11.073	0.522	0.043~1.002	69.91%
17 to 20 weeks	1	0	0.478	0.008~0.948	68.36%
Over 20 weeks	2	1.870	0.479	-0.096~1.054	68.30%

The finding shows that an optimum period of intervention is about 8 weeks, and the longer instruction period does not necessarily lead to the success of underachievers' learning. The combined number of sessions and period of intervention session can be optimized into 20 sessions for 8 weeks which comes down to about 2-3 sessions a week. What we can learn from the findings is that underachievement programs must be a two-month 2-3 sessions a week in elementary school level to be most effective.

5. Conclusion and discussion

The present study investigated the effective teaching and learning for raising English underachievers' cognitive domain through meta-analysis. Total 47 experimental studies were selected by criteria which investigated English underachievers' cognitive domains like vocabulary, listening, reading ability etc. Selected studies were analyzed and categorized according to the mediating factors such as intervention types, group size, frequency, time and period. As a result of homogeneity test for individual studies, the population of the effect sizes is heterogeneous, and thus a random-effects model was applied for this meta-analysis. Based on that, mean effect sizes are calculated in terms of intervention types, group sizes, frequency, time and period, and they are analyzed with Cohen's (1988) effect size analysis by comparing U_3 .

Based on the results, the methodological and practical suggestions can be made as follows: First, the most effective teaching and learning for raising English underachievers' language learning is the activity-focused intervention using games, role-play, listening activity in terms of the methodological point of view. Also it turned out that program-focused intervention is most strongly effective compared to materials and strategy-focused interventions probably because it allows programs to be tailored to the needs of underachievers.

Second, as a practical view, it is more effective making small group of less than 10 students in a group for underachievers, and in case of teaching session, less than 30 minutes might be better, though it's inconclusive. Teaching frequency is more effective less than 20 sessions, and in terms of period, less than 8 week period is more effective than other period types.

Present study investigated the most effective English teaching and learning for improving underachievers' cognitive domain through meta-analysis. Lately quite a few studies on the intervention to underachievers have been accumulated in English education area. Thus, meta-analysis is very meaningful to simplify and generalize the accumulated studies by synthesizing individual studies about different factors considered in these researches rather than replicating another similar experimental study.

As we discussed before, underachievers struggle to accomplish even lowest level of teaching and learning goals stated in the curriculum in spite of their having normal intellectual ability and potential ability. If a verified instruction is offered for underachievers taking into consideration practical learning strategies, effective learning condition and appropriate approaches etc., it will be very helpful for teachers who are having a hard time with the underachieving learners who cannot cope with the regular progress in the school curriculum. In addition, designing and running classes and programs based on the verified conditions could assist to solve complex underachievement issue interwoven with many different factors. The findings in this study can provide the basis of underachievers' instruction integrating appropriate instructional factors found in this study. However, the present study has the limitation in implementing meta-analysis where qualitative information of the instructions and their circumstances cannot be considered even if they have meaningful implications due to big number of studies under consideration. Also, studies of affective domains which are important factor in instruction are not reflected, and only studies about cognitive domain are included.

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Jeong-ryeol Kim

Department of Elementary Education
Korea National University of Education
250 Taesongtapyeon-ro, Cheongju, 363-791, Korea
E-mail: jrkim@knue.ac.kr

Songsook Wi

Department of English Education
Korea National University of Education
250 Taesongtapyeon-ro, Cheongju, 363-791, Korea
E-mail: olivecookie2@hanmail.net

Young Hee Kim

Department of Elementary Education
Korea National University of Education
250 Taesongtapyeon-ro, Cheongju, 363-791, Korea
E-mail: cats3337@naver.com

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