ROLE OF METACOGNITIVE READING STRATEGIES ON ENGLISH READING COMPREHENSION: A META-ANALYSIS STUDY

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ÜST-BİLİŞ OKUMA STRATEJİLERİNİN İNGİLİZCE OKUDUĞUNU ANLAMADAKİ ROLÜ: BİR META-ANALİZ ÇALIŞMASI

(Role of Metacognitive Reading Strategies on English Reading Comprehension: A Meta-Analysis Study)

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ÖZET

YÜKSEK LİSANS TEZİ

ÜST-BİLİŞ OKUMA STRATEJİLERİNİN İNGİLİZCE OKUDUĞUNU ANLAMADAKİ ROLÜ: BİR META-ANALİZ ÇALIŞMASI

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Amaç: Bu çalışmada, üstbilişsel okuma stratejilerinin yabancı dilde okuduğunu anlamaya etkisinin ne düzeyde olduğu ve bu alanda 2007-2016 yılları arasında dünya çapında yapılan araştırmaların sonuçlarının sentezlenerek değerlendirilmesi amaçlanmıştır.

Yöntem: Bu çalışmada meta-analiz yöntemi kullanılmıştır. Google Akademik, Proquest, Science Direct, Ulakbim, Web of Science, Wiley Online Library ve YÖK Tez Merkezi gibi arama motorları taranarak toplamda 1446 sayıda çalışmaya ulaşılmıştır. Analiz kriterleri göz önüne alındığında araştırmaya dâhil edilebilecek bu alana ilişkin deneysel yöntemle veya sebepsel karşılaştırmalı çalışmalar ile oluşturulmuş 52 çalışma belirlenmiştir. Çalışmalar kodlanarak meta-analiz programı olan CMA aracılığıyla analiz edilmiştir.

Bulgular: Analiz sonuçlarına göre, üstbilişsel okuma stratejilerinin ikinci veya yabancı dilde okuduğunu anlamaya ait genel etki büyüklüğü tüm çalışmalar için 0.550, deneysel çalışmalar için 0.911, sebepsel karşılaştırmalı çalışmalar için ise 0.124 olarak hesaplanmıştır. Bu değer, Cohen's ölçütlerine göre, tüm çalışmalar için güçlü, deneysel çalışmalar için çok güçlü ve sebepsel karşılaştırmalı çalışmalar için zayıf bir etki büyüklüğüdür. Çalışmaların uygulandığı yayın türüne göre (yüksek lisans tezi, doktora tezi, makale) en büyük etkinin 0.434 ile tez türünde olduğu, çalışma desenine göre (deney çalışması, sebepsel karşılaştırmalı çalışma) en büyük etkinin 0.744 ile deneysel çalışma türünde olduğu, çalışmaların yapılmış olduğu okul seviyesine göre (ilkokul, ortaokul, lise…) en büyük etkinin 0.439 ile ELT Koleji okul türünde olduğu ve çalışmaların yapılmış olduğu bölgeye göre (Afrika, Amerika, Asya…) en büyük etkinin 0.757 ile Afrika bölgesi olduğu bulunmuştur.

Sonuç: İlgili çalışmaların sonuçları incelendiğinde, üst bilişsel okuma stratejilerinin yabancı dilde okuduğunu anlama üzerine etkisinin olumlu olduğu tespit edilmiştir.

Anahtar Kelimeler: İkinci dilde okuduğunu anlama, okuma stratejileri, üst-bilişsel okuma stratejileri, meta-analiz

ABSTRACT

MASTER'S THESIS

ROLE OF METACOGNITIVE READING STRATEGIES ON ENGLISH READING COMPREHENSION: A META-ANALYSIS STUDY

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Purpose: This study aimed to evaluate the effect of metacognitive reading strategies on foreign language reading and the results of the research studies conducted in this field between 2007 and 2016 by synthesizing them.

Method: The meta-analysis method was used in this study. Search engines like Google Scholar, Proquest, Science Direct, Ulakbim, Web of Science, Wiley Online Library and YÖK Thesis Center were scanned and 1446 studies were reached. By taking the analysis criteria into consideration, 52 studies formed by experimental method or causal comparative studies were determined. The studies were coded and analyzed by CMA, a meta-analysis program.

Results: According to the results of the analysis, the overall effect size of reading metacognitive reading strategies in second or foreign languages was calculated as 0.550 for all studies, 0.911 for experimental studies and 0.124 for causal studies. According to Cohen's criterion, the value is a strong effect size for all studies, a very strong effect size for experimental studies and a weak effect size for causal comparative studies. According to the type of publication (master's thesis, doctoral dissertation, article), the thesis with 0.434, according to the study design (experimental study, causal comparative study), experimental study with 0.744, according to school level (primary, secondary, high school …) ELT College with 0.439 and according to the region (Africa, America, Asia…) Africa with 0.757 were determined to have the highest effect sizes.

Conclusion: By examining the results of the related studies, it was found that metacognitive reading strategies have a positive effect on reading comprehension.

Keywords: Second language reading comprehension, reading strategies, metacognitive reading strategies, meta-analysis

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ABBREVIATIONS

AR :Agreement rate

CMA :Comprehensive Meta Analysis

CLPE :Centre for Language in Primary Education

EFL :English as a Foreign Language

ELL :English Language Learner

ELT :English Language Teaching

ESL :English as a Second Language

GLOB :Global Reading Strategies

KWL :'What We Know', 'What We Want to Know' and 'What We Learned'

L1 :First Language

L2 :Second Language

MA :Master of Arts

MARSI :Metacognitive Awareness of Reading Strategies Inventory

OSORS :Survey of Online Reading Strategies

PhD :Doctor of Philosophy

PROB :Problem Solving Strategies

SORS :Survey of Reading Strategies

SQ3R :Survey-Question-Read-Recall-Review

SUP :Supportive Reading Strategies

TFM :Trim and Fill Method

CHAPTER ONE

Introduction

In this chapter, firstly the researcher holds a discussion about the philosophy behind the study by pointing out the essential premises over the relevant background. In addition to this, the issues observed in the setting and the expected contributions of the current study as a consequence of which the significance of the study will be critically evaluated. Followingly, the research questions which have the function of being a guide to this study and are formed on the grounds of raising issues in the context will be listed. Then, the terms, the central concepts of the study will be presented to supply a meaningful description of the content. Finally, the researcher will inform the readers about the thesis outline to conclude this section.

Background to the Study

Bacon notes that thanks to reading, a man can be a full person. Reading can be defined as comprehending the meaning of words or written material (as cited in Patel & Jain, 2008). Reading can be assumed as a thinking procedure by consciously or unconsciously. Readers use a variety of different strategies to comprehend what the writer expresses. Readers use their background knowledge and prior experience and compare this to the information in the text. People organize their prior knowledge, experiences, and values in categories called as schemata. Since they pick out specific opinions or facts while reading a written material, they link their background knowledge with this new information. As a result of that, they have an opportunity to generate the text's content (Mikulecky, 2008). Thus, people can update their knowledge in their lives with the help of this crucial reading action (Patel & Jain, 2008). The reader brings not only linguistic knowledge to achieve the task of reading, but also world knowledge and topical knowledge (Pearson, 2006), which is important for reading comprehension. This background knowledge is acquired in the first language and this possibly facilitates comprehension when reading in the second language (Goldenberg & Coleman, 2010). Put it in other words, when we read, we normally use our background knowledge, including our understanding of the ways in which discourse is structured, past examples of reading similar types of text, the particular knowledge we have from these past reading experiences, and our attitudes to the text, the author and the genre (Grabe, 2009).

A reader brings interactive relations in reading and compounds them with the properties of the text; as a result, reading comprehension takes place. A proficient reader

approaches any texts by using related knowledge, text-based or condition model-based deducing abilities, word decoding ability, different reading strategies and metacognitive skills (McNamara, 2007). In the process of meaningful and adequate reading, the reader must infer what he or she reads, think it over and evaluate; that is, comprehension should be promoted. In this aspect, according to Collins and Cheek (1999), because the main aim of the reading is the interaction between the reader and the thoughts, the student must have some skills and strategies that are essential for getting information from the printed resources. As defining the reading strategies, Routman (2003) remarks that plans or means are used for facilitating and extending the comprehension (as cited in Çöğmen & Saracaloğlu, 2010).

Learners need to read effectively provided that, they want to be successful while learning a new language. First and foremost, once learners read properly, they are able to construct the base for learning a second language. Thanks to this basement, they can use textbooks, revise, edit, write, develop vocabulary, acquire grammar and use computer-assisted language learning programs. Therefore, it can be inferred that reading is a crucial part of all foreign language curriculum. Hence, it is necessary to figure out many fundamental facts related to reading, teaching methods and literacy for ensuring efficient instruction in reading (Mikulecky, 2008).

Block and Pressley (2002) (as cited in Cummins, Stewart & Block, 2005) state that, in the last 30 years, researchers have had ideas about comprehension. This new information has assured educators with innovative strategies which are designed to improve comprehension instruction. Children have been taught to find main ideas, to ask questions, to preview a book, to consider the structure where the book is written, and to attend to access features for years. As these strategies make it hard for students to view them as a unified process of mental activity that flows back and forth, most of them have been taught as standalone procedures for the reader who tries to follow an author's line of thought (Cummins et al., 2005).

The teaching of reading generally seems to be affected more by historical and political effects than by concrete proof, but, as it has been put in the recent research, it is particularly prone to new initiatives. Therefore, we can have difficulty in figuring out the aim of metacognition in reading. The main aim of a reading teacher is to reassure that learners master at reading fast and transfer the phonemes into words effortlessly and effectively. Reading not only involves having the ability of decoding the symbols, but also of converting letters into words with their meanings. Thus, metacognition is the most effective feature for teaching learners how to read (Larkin, 2010). Therefore, a teacher's goal must be teaching metacognitive processes that work together to bring about meaning at different times during a

reading owing to the fact that reading comprehension is not an isolated process, which is activated only after reading, but a network of in-the-head processes that work together before, during, and after reading. To help learners develop their thinking about text at these times, teachers use different comprehension strategies such as predicting, previewing, questioning, determining vocabulary, text structure, input properties, writer's aim, thinking critically, and composing graphic organizers or mind maps while they share a book of expository text together. Students should be taught to write their thoughts about three comprehension processes (having inferences, setting purposes for reading and drawing conclusions) with post-it notes placed strategically on the pages of a book. Researchers have noted that it takes longer to develop automaticity in comprehension than in decoding setting purposes for reading (Samuels & Farstrup, 2011; Stewart, 2004). The fact that readers have the aims of figuring out the world, exploring new territory, learning and inspiring themselves to take steps in the direction of doing something while reading seems to prove that reading must be something more than decoding. Moreover, the teachers must know the grounds for reading while teaching or modeling different kinds of methods and strategies. Furthermore, reading can be also for having fun, yet it is obvious that some learners have some difficulties in finding enjoyable sides of reading with checklists of strategies in hoops although the books for reading are envisaged in order to improve reading skill and comprehension (Larkin, 2010).

To Flavell (1979) (as cited in Perfect & Schwartz, 2004), metacognition is generally predefined as the knowledge and experiences people have about their own cognitive processes. In *Handbook of Reading Research*, Baker and Brown (1984) present that there is an important relation between metacognitive skills and effective reading. They explain this relation as an influential trend in developmental cognitive psychology to study the information and control the readers have on their own thinking and learning actions which include reading (Schmitt, 2005). For decades, the processes and preconditions of metacognition, as well as the development and testing of metacognitive skills, have been a center of theoretical and empirical research. In the field of reading comprehension, research has indicated several times and for various competency levels that metacognition plays a fundamental role in text comprehension. However, little is known about teacher knowledge of metacognition although both teacher competencies and metacognition are known to play an essential role in learning (McElvany, 2009).

Metacognitive strategies have been commonly studied since the early groundbreaking work of Brown (1983) and Flavell (1979), and have been identified as a crucial component of learning. Generally, the term 'metacognition' is used to refer to reflecting on one's own

thinking to monitor progress toward a particular aim and to presume active control over the strategies needed to achieve it (Gourgey, 2002). In other words, it refers to a person's observing of cognitive processes and knowledge and using of them to learn successfully. If we apply this to reading, metacognition includes the reader's observing of if the text is properly understood, accompanied by active reading strategies that are important for improving and repairing comprehension (McNamara, 2007).

Van Kraayenoord and Schneider (1999) state that metacognitive knowledge of learning strategies is vital to discriminate good and poor readers. The fact that good readers used more metacognitive reading control strategies than poor readers revealed in the international PISA 2000 study in which 26 countries attended and compared 15-year-old readers and the older ones (Artelt, Baumert, McElvany & Peschar, 2003). Veenman and Beisuizen (2004) indicate that metacognition makes a unique contribution to text comprehension in terms of metacognitive activities assessed by the think-aloud procedure in spite of the fact that these activities are correlated with intelligence. National Institute of Child Health and Human Development (NICHD, 2000) emphasizes the need for training in comprehension-monitoring processes (metacognition) as one of the effective means of literacy promotion for the enhancement of reading comprehension.

For college students reading and learning from a text is an essential part in their lives. A student's academic success depends on how well he or she retains information from reading, so cognitive psychologists and educators have focused on self-assessment of comprehension. In this respect, it is indicated that, if learners want to assess or monitor the reading, they can have an idea about metacognition (Flavell, 1979) (as cited in Maki & McGuire, 2004), that is, learners' cognition about their cognitive phenomena. For a written material, metacognition consists of reasoning of comprehension and learning of the text, and estimations about future memory for the material. At this point, Maki and Berry (1984) (as cited in Maki & McGuire, 2004) used the term metacomprehension to refer to metacognition involving text material because of the importance of comprehension in learning from text.

In the light of the facts mentioned above, it can be concluded that metacognitive reading strategies are significant in fostering reading comprehension, especially ESL/EFL reading comprehension, and indeed a great deal of research has been done on the effects of metacognitive reading strategies for reading, reading comprehension and academic success in the different countries of the world, education levels (primary, secondary, high school…), with different researching methods (survey, experimental studies…). However, there would appear a need to synthesize these findings considering the fact that any researcher who wants

to study this subject will spend a lot of effort and time to access all the studies, and additionally, differences of the studies (region, school level, method, sample size…) and publication bias of these studies may have a negative side to evaluate these studies precisely. Therefore, meta-analysis, defined as the statistical analysis of an enormous mass of analysis outcomes from particular studies for synthesizing the findings (Cooper, Hedges & Valentine, 2009), would be a useful technique for presenting the relevant points of metacognitive reading strategies put in the studies in a summative way.

Dinçer (2014) states that in social sciences, especially in educational sciences, experimental studies are generally done with at least two groups by implementing different methods to these groups and these studies investigate whether there is a significant difference between the groups. This difference is evaluated with p-value. Generally, if p-value is under 0.05, it is supposed that there is a significant difference between the groups; namely, the method employed in one group for instruction or other aspects shows significant difference compared to the other methods used in other groups. Similarly, with a single group design it is also possible to search if there would be any significant difference between pre-test and post-test. Naturally, it is expected to find a significant difference at least to some extent, so it is of importance to find out how effective the instruction or the method used is. For example, in one study, X method and Y method are compared to explore which one is actually effective by implementing them in two groups who share common features and it is found that X method has a significant difference. However, X method requires much money, effort, and time compared to Y method. In this case, it is more important to look into the effect of a method implemented rather than to focus on significant difference. If the use of the method shows the less significant difference, is this difference worth spending so much money? It is really hard to understand this by comparing t-test and means. Thus, effect size obtained via meta-analysis can create an opportunity to evaluate the effect of the study as low, medium, or high effect. Moreover, one study can be done in different parts of the world by different researchers, but it is really hard to combine or compare these studies quantitatively one by one as it is necessary to obtain raw data of each study. Also, the result, showing that a study has higher or lower effect compared to similar studies, seemingly remarks the need for further studies that would clarify the reason or reasons behind the difference. In this regard, with the help of meta-analysis, a summary effect size for all the primary studies can be found out.

Thus, the main purpose of the current study is to pool the results of the studies to deal with controversy in a broader universal set. Taking into account the literature on reading comprehension and metacognitive reading strategies, another purpose of the study is to

uncover metacognitive reading strategies and their effect on reading comprehension. Furthermore, the study aims to create a single, more precise estimate of effect metacognitive reading strategies have on reading comprehension by combining data from different reports into one report.

Significance of the Study

Developing reading comprehension is apparently a challenging task for students who learn a second/foreign language with a great amount of new items embedded in a text, on which they have no idea how to deal with and, what is more, they are not conscious of reading strategies that may support them to read easily (Grabe & Stoller, 2002). This challenge actually seems to result from the fact that many teachers do not actually have an idea about the importance of reading instruction through the use of different reading strategies in terms of facilitating students' reading comprehension (Blakey & Spence, 1990). In this aspect, previous studies widely discuss the role of meta-cognitive reading strategies in addressing the issue of reading comprehension.

Overall, studies point out that learners using metacognitive strategies show a significant success in reading comprehension compared to the learners who do not use these strategies because students having metacognitive awareness understand themselves as learners, knowing which strategies to use, and knowing when and why to use such strategies. At this point, Zulkiply, Kabit and Ghani (2008) (as cited in Keck, 2012) mention that students good at using metacognitive reading strategies can plan their learning, monitor their progress and learning strategies that they use and evaluate their learning strategies during the learning process. In a similar way, in other research with university students who were grouped as good, average or poor readers, according to their metacognitive awareness and study strategies throughout text processing, Fischer and Mandl (1984) (as cited in Palmer & Goetz, 1988) discovered that good readers were aware of not only the task but also troubles that they had while comprehending and they could modify their reading to handle these troubles. Moreover, they highlighted that when poor readers had problems while reading to comprehend, they responded emotionally. Moving on these proofs regarding the significance of metacognitive reading strategies in reading comprehension, this study will pave the way for raising the awareness in regard to using metacognitive reading strategies by proposing the integration of the answers of these questions 'Does the use of metacognitive reading strategies improve the comprehension of the students/readers?, Does the use of a metacognitive methods like expositional note taking, currently used in schools, help improve comprehension levels?' into reading comprehension courses, making a contribution to reading comprehension. Thus,

besides offering perspectives on the use of metacognitive reading strategies for students, as teachers have an essential role in developing these metacognitive strategies in their learners (Zimmerman & Martinez-Pons, 1990), this study may also be light for teachers and educators in terms of integrating metacognitive reading strategies in their reading instruction for promoting reading comprehension.

Additionally, while studying the role of metacognitive reading strategies in the development of reading comprehension, the study used meta-analysis method to combine information from studies previously done on the topic the current study focused on. It is suggested that the researchers from all disciplines of science go beyond the limitations of single studies and do a dependable and valid research synthesis of them searching similar research questions (Davies, 2000). Hence, Glass (1976) (as cited in Torgerson, 2003) emphasizes that it is obvious that meta-analysis is necessary as in education the literature of varied subjects gathers quickly. Dinçer (2014) points out that if we search about the meta-analysis studies in Turkey compared to the world, we can encounter very few studies; despite a significant amount of meta-analysis studies, especially, in health sciences, these studies are quite few in educational sciences. A reason for this scarcity is seemingly the problem of gaining access to relevant resources and examples in Turkey, as a consequence of which the researchers do not prefer meta-analysis. Especially, in ELT, there is a need to establish the niche through meta-analysis studies. Hence, it is thought that this study may be a cornerstone for the researchers who want to do meta-analysis research in ELT.

In brief, it is believed that this study will contribute new perspectives to ELT field; thus, with evidence-based responses to the questions querying the effect of metacognitive reading strategies on reading comprehension, this meta-analysis study would provide all-round aspects regarding the pedagogy of metacognitive reading strategies in text mining for policy makers, educational directors, ELT curriculum developers and textbook writers. Finally, the results of the study are expected to ensure major guidance to the ELT teachers willing to design their instruction by using these strategies to improve their students' reading comprehension in EFL and ESL.

Research Questions

Driven by the gaps in related literature and the raising questions in the research context, this study intends to answer following research questions:

R.Q.1. To what extent is the learners' usage of metacognitive reading strategies effective on the reading comprehension of the learners?

R.Q.2. To what extent is the teachers' implementing the instructions to enhance students' metacognitive reading strategies effective on the reading comprehension of the learners?

R.Q.3. What is the effectiveness of metacognitive reading strategies on the reading comprehension when compared to publication type (doctoral dissertations, master theses and journal articles)?

R.Q.4. Does the effectiveness of metacognitive reading strategies on reading comprehension in English differ between research designs (experimental and causal comparative studies)?

R.Q.5. What is the effectiveness of metacognitive reading strategies on the reading comprehension when compared to school level (primary, secondary and higher education)?

R.Q.6. Does the effectiveness of metacognitive reading strategies on reading comprehension in English differ between the regions where target studies are conducted (Asia, America and other regions)?

R.Q.7. Does the effectiveness of metacognitive reading strategies on reading comprehension in English in experimental studies differ between type, school level, region and the duration of the training of metacognitive reading strategies (1-week, 4-week, 6-week and so on) of the studies?

R.Q.8. For experimental studies, do sample sizes and the years of the studies have any effect on the effectiveness of metacognitive reading strategies on reading comprehension?

R.Q.9. Does the effectiveness of metacognitive reading strategies on reading comprehension in English in causal comparative studies differ between type, school level and region of the studies?

Terminology

The terms which comprise a basis for the scope of this study will be described by enlightening their contents consummately.

Cognition: The cognition means comprehending how a person transfers, regulates, stores and uses knowledge which arises from the concrete data or memory in the world (Bly & Rumelhart, 1999).

Reading comprehension: Comprehending a written material can be defined as taking out the necessary information from it adequately (Grellet, 1981).

Metacognition: Metacognition can be generally described as people's experiences and knowledge related to their cognitive processes (Perfect & Schwartz, 2004). Simply, it can be defined as cognition about cognition. If the memory is examined, it can be concluded that there are good samples of metacognition which are subjective. The sense of a tip-of-the-tongue experience and the decision to finish revising for an exam can be good examples of metacognitive experiences. Yet, these examples are correlated with explicit conscious awareness. Metacognition can go along with 'explicit', conscious metacognition and 'implicit' metacognition (Fleming & Frith, 2014).

Metacognitive Strategies: Metacognitive strategies are the methods which are applied for helping learners comprehend how they learn; namely, it means procedures which are designed for learners to 'think' about their 'thinking' ("https://inclusiveschools.org/metacognitive-strategies/,").

Research Synthesis: According to Last (2001), research synthesis entitled as 'systematic review' or 'research review' is described as applying the strategies which restrict prejudge in the unity, critic valorization and synthesis of all related research studies about one particular topic.

Meta-analysis: It means a process of using the statistical methods to synthesize the results obtained from independent experiments and studies on the same subject, to explain the diversity of these results and obtain more reliable and more accurate results (Hedge & Olkin, 1985; Olkin, 1999).

General Effect Size: It is the analysis data which is obtained by compounding the individual studies done on the same subject. It is calculated with arithmetic means, standard deviations and sample size. Generally, it tries to summarize not the result of one study, but the effect of the determined research questions or the theme about the hypothesis (Dinçer, 2014).

Effect size: Effect size is the most important term for any meta-analysis. In literature, it is also called effect coefficient. This term is used to give information to the readers and research studies about to what extent independent variable affects the depended variable. Effect size means effect coefficients of all the studies included into meta-analysis and defined as an individual study (Dinçer, 2014).

Publication Bias: Researchers are more possibly to publish 'positive' studies which have usually good results on behalf of the hypothesis of the researcher. This selective publication of studies is defined as publication bias (Walker, Hernandez & Kattan, 2008).

Forest Plot: It refers to a graphical representation where the researcher presents the final estimates of a meta-analysis (Hartung, Knapp & Sinha, 2008) and standard errors since they are entered beside the study identifiers (Higgins & Green, 2008).

Funnel Plot: According to Sterne, Becker and Egger (2005), a funnel plot represents a graphical way to evaluate publication bias. Card, 2012 simply defines the funnel plot as a scatter plot of the effect sizes which are ascertained in studies with regard to their sample sizes with some variants on this general pattern.

Thesis Outline

In this first chapter, the keystone premises regarding literature have been highlighted and the gaps in the international research and the relevant research context as a result of which the researcher has established the grounds for the current study have been outlined. Followingly, the study purpose has been indicated in consideration of discussion of these gaps. Next, the research context has been stated to put the expected contributions of the study in this particular context. Later, the raising questions which this study will address have been listed. Finally, this chapter has finished with ensuring the definitions of the terms and outlining the structural scope of the thesis.

In chapter 2, the rounded aspects of literature regarding metacognitive reading strategies will be presented. In the first sub-section of the literature review, teaching reading skill in EFL/ESL will be discussed. Next, the aspects and characteristics of reading comprehension will be presented. Finally, the reading strategies will be discussed and the details of metacognitive reading strategies which constitute the ground of the current study will be detailed with the related literature study examples.

In chapter 3, the readers will be informed about the research questions and the purpose of this work, and accordingly, the reasoning behind the decision for the implementation of the relevant research design. Then, the readers will be informed about the research design of current study, which is called meta-analysis. Followingly, the researcher will systematically report data sources of the study on the basis of literature and explain a line of reasons behind their selection as well as a detailed description of the sampling process. Finally, the specific and sufficient details of data collection and data analysis procedures will be given.

In chapter 4, the researcher will present the findings in relation to the research questions addressed in the study and discuss these findings with the purpose of establishing logical links to the related studies in the literature with further insight into the data. In this

respect, firstly, descriptive data of the research will be handled. Then, test of heterogeneity, subgroup analysis will be presented. Next, this chapter will include meta regression and publication bias which are necessary to complete meta analysis. Finally, experimental studies and causal comparative studies' findings such as heterogeneity and subgroup analysis with the tables and figures will be given separately. This section is very important by having potential implications for practitioners and scholars, as will be discussed in chapter 5.

The last chapter will synthesize the overall findings established in the previous sections and thus report the main conclusions driven from the data about the metacognitive reading strategies and their effect on reading comprehension. On this basis, the implications of the findings discussed in chapter 4 for researchers will be outlined. Followingly, the chapter will come to an end with suggestions for further research based upon the overall limitations of the current study.

CHAPTER TWO

Literature Review

In this chapter, the researcher firstly presents a review of teaching reading skills in ESL/EFL. The importance of reading, the involvement of reading and types of reading will be given as the first sub-section of the chapter.

The second sub-section will introduce reading comprehension and the methods to improve it.

Finally, reading strategies, especially metacognitive reading strategies grounded in the current study will be discussed in detail with the example studies in literature.

Teaching Reading Skill in ESL/EFL

Language skills can be divided into two types: receptive skills entitled as reading and writing in which a learner needs to make sense out of the discourse, productive skills entitled as speaking and writing in which a learner needs to produce language in his/her own. While receptive skills are in some way passive, productive skills are somehow active. However, while reading or listening, the learners need extensive language activation by focusing on the material that they read or listen carefully to be successful at comprehending the material they interact with. It means they have to consider comprehending by applying any or all their language knowledge (Harmer, 2001; Harmer, 2007; Hinkel, 2006; Carter & Nunan, 2001; Hadfield & Hadfield, 2008).

Reynolds, Taylor, Steffensen, Shirey and Anderson (1982); Cain (1999) define reading as a complicated interactive relation of cognitive procedures and strategies which are applied by readers and different kinds of knowledge involved in a written material. Thus, it can be thought that the most important feature of an educated person is having the ability of reading and writing and for pupils it is an essential ability (Jeffcoate, 2003). Unquestionably, if one can read well, reading can help much more which means the learners with necessary reading skills are able to read many different materials and understand all of them (Mikulecky & Jeffries, 1986; Mikulecky & Jeffries, 1996).

Why is reading important?

In one of the studies in the USA, it is stated that in the 21st century, a person is supposed to have some critical skills as using the resources effectively, having interpersonal relationships, using the information, using the technology and system analysis. Reading is considered as one of the crucial skills to be able to improve these skills (The Secretary's Commission on Achieving Necessary Skills [SCANS], 1991). Reading is very important on account of the fact that sophisticated skills like writing and speaking at all levels can be achieved by being absorbed through reading. As the language defines the individual, language is essential in any society. In our world, it is a clear advantage to be able to use language effectively. Thus, it can be concluded that if English teachers teach their students the way to comprehend and to make use of language efficiently, they fulfill their most important duty (Goodwyn & Branson, 2005). Furthermore, Wyse and Jones (2001) highlight that the purpose of reading teaching is to develop enthusiastic and independent readers. Apart from this, as a skill, reading assists improving learners' general language skills in English. Thanks to reading, one can do the following things:

- ✓ Learning to think in English,
- ✓ Enlarging English vocabulary,
- ✓ Improving the skill of writing,
- ✓ Practicing English in a non-English speaking country,
- ✓ Helping learners prepare for studying in an English-speaking country,
- ✓ Learning new opinions, facts and experiences (Mikulecky & Jeffries, 1986; Mikulecky & Jeffries, 1996).

Given the above, according to Goldenberg and Coleman (2010), reading helps learners learn more about the language like vocabulary and narrative skills so it promotes more advanced English speaking skills. As a consequence, children move from learning to read to an emphasis on reading to learn as they progress. The acquisition of knowledge is a main part of learning and much of this can be achieved through the reading of texts (Wyse & Jones, 2001).

What does reading involve?

It is different to read in mother language and in a foreign language. While reading in the mother language, readers know how to focus on their reading to get the main meaning from the text. Before starting to read, the readers generally have an aim in their minds. For example, if readers were reading a text about a tourist lost in a blizzard, they would be reading

to answer some questions like ‘Did somebody rescue him? How did he get lost? How many days was he lost? How was he found?’ and so on. We use different ways while reading in our own language. It depends on what we are reading and why. For instance, while reading a newspaper article, we glance through it to get a general impression of the event. However, while reading a recipe in a cookbook or a guide to using a new gadget, we read in a more detailed way to understand every word and sentence (Hadfield & Hadfield, 2008).

Cremin, Bearne, Dombey and Lewis (2009) remarked that learning to read is essentially a task of learning how to mastermind knowledge in a skillful manner. Reading is a necessary medium of learning. Readers need to get in contact with the written material they read in a way of connecting what they read and staying in their minds later to learn from reading. In other words, they need to read actively to connect, expand and adjust their background information with the new one. However, readers may have different purposes while reading such as identifying specific information, getting a sense of what it was like to live in a specific time and entertaining themselves. The purpose of reading is an effective factor on what and how readers read.

Contrary to mother language reading, second language reading concludes two languages. There must be continual interactions between two languages and perpetual adjustments in coordinating the utterly different demands each language imposes which means the reader needs the dual-language involvement. Thus, L2 reading is cross-linguistic and more complicated than L1 reading (Koda, 2007). It is a fundamental skill for academic students to be able to read in a second language (L2). It also represents a main way for independent language learning (Usó-Juan & Martínez-Flor, 2006).

Types of reading

According to Rosenblatt (1980), there are two types of reading: efferent and aesthetic. In efferent reading, the reader gives his/her attention to what should be retained after reading such as information to be got or a process to be followed. On the other hand, in aesthetic reading, the reader concentrates on what she/he is living through during the reading. She/he gives importance to qualitative of thoughts, images, situations and characters that they evoke under the guidance of the text.

Wyse and Jones (2001) state there are three types of reading: independent reading, shared reading and guided reading.

Independent Reading.

Any approach to reading has the purpose to make students learn to read independently. In other words, they make informed *choices* about their reading material and they become critical and sensitive readers. It is important for teachers to give learners the opportunity to make choices to achieve this aim.

In the first stage, the reading material is matched to the attainment of the children and allows independent reading with adult support where necessary.

In the second stage, the learners are more likely to focus on analyzing texts. The texts should be both challenging and appealing but at the same time adequately understandable for the pupils to be able to work independently of the teacher. Teachers can give independent tasks to children like taking on character roles in play scripts, identifying settings of familiar stories and comparing them with settings within their own experience, discussing what makes a good story and etc.

Shared Reading.

Thanks to shared reading, there occurs a crossover between the teacher who reads to the learners and independent reading by learners. Shared reading means that the whole class including teacher and learners read a text together. The teacher occasionally reads aloud with the children following and sometimes teacher and pupils read aloud together. The texts must be chosen beyond pupils' independent reading levels since the exercise is co-operative and the teacher only demonstrates and supports by allowing all children to access challenging texts. The main characteristics of shared reading are as follows:

- Using high quality enlarged texts,
- Demonstrating a range of reading strategies,
- Developing word recognition skills,
- Encouraging understanding of sentence structure,
- Differentiating through appropriate interaction,
- Discussing the children's response, ideas and understanding of textual features.

Guided Reading.

In the past, for effective teaching of reading it was believed that a mix of work with individual children, small groups of children and the whole class were needed. However, later it is definitely advised to consider both the significance of a small group but also whole class work in reading teaching. Guided reading replaces the individualized teaching of reading. The

teachers should choose high quality texts for this kind of reading. The main features of guided reading are as follows:

- Multiple copies of books in sets are used.
- Books are matched to the achievement levels of the group.
- It occasionally involves introduction to new written materials but sometimes it may include reflections on a chapter which have been read earlier in the week.
- It may create opinions from reading which is shared and will frequently be a step to organize self-reliant group work.
- A teacher needs to back up the learners while making them read independently.
- The other groups study as in an independent group work (Wyse & Jones, 2001).

Furthermore, Haycraft (1986) states that there are two kinds of reading: *intensive reading* and *extensive* reading. There must be a distinction between intensive reading where the student is supposed to read short passages and understand everything and extensive reading where the student is expected to read to understand the main idea of a passage rather than understanding every word. For intensive study, teachers can use reading passages in class to introduce and consolidate structure and vocabulary, to pass other classroom activities for increasing learners' passive vocabulary and for pleasure. In addition, teachers should choose short texts in the class. Like with all classroom activities, teachers need to ask themselves why they are using it: to increase vocabulary, to train students or to answer questions correctly about a passage they can understand. They should also consider in which case the passage should not be too difficult and whether the context of the passage is important to their students. Teachers should keep in their minds that thanks to reading, learners can have the opportunity of the acquisition of new vocabulary and idioms and they can also acknowledge new language forms while reading fast and at the same time with pleasure. They must be encouraged to read as much English as possible, whether newspapers, stories, or novels. In every classroom, there must preferably have a reader at their level, which can be found on the market (Haycraft, 1986).

Reading Comprehension

The skill to understand a written material is one of the most complicated yet essential actions humans do every day. People can face with hundreds of texts like newspapers, advertisements, textbooks, instructions and magazines in a whole day. The processes which underline the chain of activities necessary to understand text are complex in spite of the fact that successful comprehension is generally very easy for proficient readers.

A reader requires to apply a variety of activities including not only decoding skills (Shankweiler et al., 1999) but also integration skills to be successful at comprehending (Magliano, Wiemer-Hastings, Millis, Muñoz & McNamara, 2002). For instance, the letters should be decoded and compounded to constitute words, sentences and paragraphs in order to understand a written text. Moreover, these forms should stay connected to grammar rules and syntax. In addition, the reader should infer the meaning by linking the new information with his/her prior knowledge (Kintsch, 2003). It is possible that comprehension fails at any phase of the reading comprehension procedure. Whereas, there are many attempts to solve reading comprehension problems of poor comprehenders (Fuchs & Fuchs, 2005; Kuhn, 2005), the focal must be also being a guide for proficient readers to improve their abilities; in other words, there occurs that many students are able to appropriately decode yet do not comprehend well (Cain & Oakhill, 1996; Beni, Palladino, Pazzaglia & Cornoldi, 1998; Stothard & Hulme, 1996).

Eagleton and Dobler (2007) indicate reading comprehension refers to a complicated procedure if the readers get this meaning from a printed or a web written material. Fortunately, teachers benefit from years of research on printed text that focuses on defining comprehension and identifying effective instructional strategies.

Reading comprehension difficulties occur because many students cannot read at the basic level, they seldom apply reading strategies to support them understand the written material (Pressley et al., 1992) and, once the learners apply strategies, they generally apply ineffective strategies like repeating (Garner, 1990). In addition, even while pupils are reading a simple passage, they cannot usually comprehend it as they do not have the required depth of figuring out the meaning from it (Best, Rowe, Ozuru & McNamara, 2005; Pressley et al., 1992). Thus, it is very important to make students improve their comprehension in reading (McNamara, 2007).

How to improve reading comprehension?

The most important thing for learners is focusing on their reading but they concentrate on every single word or unnecessary detail as a consequence of which they lose the route to get the necessary meaning from the written material. Thus, teachers must give opportunity to their learners to encounter different texts for different purposes. Moreover, teachers need to assist them to use sub skills to fulfill efficient reading (Meltzer & Hamman, 2005). Furthermore, teachers can encourage readers to compare new and known vocabulary by using

their linguistic information rather than grapheme to phoneme decoding alone (Carter & Nunan, 2001).

It is essential to make learners think about why they are reading and exactly what information they are looking for. Teachers should use tasks and questions to direct learners to read for the main meaning. Comprehension questions to direct learners to read for the main meaning or tasks like 'Read and Match', 'Read and Draw' can be used. Teachers must suit the task to the kind of the text. For example, while the students are reading a story, the attention will be focused on the events that happened in the sequence. 'Read and Order' task will be suitable here as it helps the reader concentrate on the sequence of events. Another example can be 'Read and Draw' task for direction to someone's house as the attention will be on picturing the route to follow.

Teachers improve reading comprehension by planning their lesson phases to apply enough activities to show strategy usage explicitly in a context where the learners complete not only reading but also writing duties. Moreover, teachers should be a guide for learners to speak about texts to make them develop critical thinking skills and as a consequence of which teachers can give feedback for each learner (Meltzer & Hamman, 2005).

Teachers introduce to the learners topic, main idea and supporting details in separate lessons to make them practice and master each of reading skills before processing to the next. To assess the reading, most of the teachers use multiple choice questions about the text however being proficient in reading, students need to write their own interpretations. Thus, to be an active reader, learners require to have the ability of thinking critically about the information presented in the text (Pasternak & Wrangell, 2007).

Not only creative teaching but also creative learning is necessary to achieve this. Teachers should share their teaching acts according to principles which arise from knowledge and understanding about how children learn most richly.

Individual learners' literacy skills and experiences have a powerful effect on successful learning. These classroom experiences include the teaching of not only letter-sound relationships but also comprehension. Furthermore, it is regarded to encourage children's imaginative engagement in meaning making.

Texts are also essential since some of them are concentrated on the form only, but the others both the form and the meaning. Moreover, there must be certain reader skills as linked to the focus on specific textual features. For instance, phonemic awareness called **phonics** is one of these skills while revealed by susceptibility to the sound components of words thanks

to which a reader can lead a road from letters to words with an equivalence of sound. The traditional methods for this skill are **look-and-say** or **whole-word** methods in which learners are supposed to acquire a sight for vocabulary, generally by memorizing. According to Stubbs (1980) (as cited in Carter & Nunan, 2001), written English has a semantic-grammatical base and he remarks it can be conferred not only the semantic area of words but also their structure referring to grammar as they pertain to their systematic visual modeling instead of the relationship between symbol and sound. For example, the word *writer* in which *wr* indicates a semantic connection with cognate words like *write* and *writing;* likewise, *er* represents a cue for its grammatical class as a noun.

Reading Strategies

There are six kinds of language learning strategies: mnemonic, compensatory (for speaking and writing), effective, social, cognitive and metacognitive. There can be some discussions between them but as students sometimes apply more than one strategy at a given time, the boundaries are ambiguous (Hadfield & Hadfield, 2008).

Mnemonic Strategies: With the help of these strategies, students have a link between new information and what they already know, they are essential to memorize knowledge respectively like by sounds (e.g. rhyming), by body movement (e.g. Total Physical Response where learners are commanded in English to do something physically) or by position on pages or blackboard (the locus technique). Alike cognitive strategies, mnemonic strategies connects two things in an easy response way instead of supporting deep associations. These strategies are assumed as the initial pace to acquire grammar rules and vocabulary (Carter & Nunan, 2001).

Compensatory Strategies (Communication Strategies): With these strategies, while using English in spoken or written communication, students make up for missing knowledge. While listening and reading, they use the strategy of guessing from the context to compensate for a knowledge gap (Carter & Nunan, 2001).

Affective Strategies: Affective strategies involve recognizing a person's emotions like apprehension, furor or delightedness but also improving the awareness of learning situations or duties which attract them. 'Emotional checklists' and having a language learning diary to write down emotions about this process may be fruitful (Carter & Nunan, 2001).

Social Strategies: Social strategies assist both the progress of learning in a whole group and understanding language culture that students learn. Asking questions when a reader needs clarification or confirmation, asking for help, learning about cultural or social facts and

values and studying cooperatively outside of class are some of social strategy examples (Carter & Nunan, 2001).

Cognitive Strategies (Higher Thinking Skills): Since English teachers deal completely with language and with thinking, it is essential to focus on the relationship between language and thinking skills. It is broadly expected that language and thought are connected despite of the fact that there are contrasting ideas as to how far one has an effect on the other.

It is crucial that students do not just do but also think while studying on language. For instance, there is a lesson where pupils are asked to read a text and then answer a set of questions by finding in the text. They are using reading skill here and it is easy to find relevant lines and answer. However, if we change the task to ask their own questions about the text to their partners after reading, they will be forced to connect with the text on a deeper level.

Hartman and Sternberg (1993) indicate that cognitive skills are like intellectual 'workers' that perform the cognitive processes which are composed by metacognition. Acquiring and processing information are two main kinds of cognitive actions. Almost in every content area, a variety of cognitive skills can be used. Numerous factors such as the task, subject, contextual variables and attitudes may affect their specific operations. Thus, even if the students are not fond of thinking, teachers should plan their lessons with the opportunities to get them think (Goodwyn & Branson, 2005).

Since the recent research studies focus on not only the debate but also production of passages, the activities for improving content-area literacy and learning are getting more importance. For pupils, this provides chances to compose, debate, share, revise and regulate a different kind of written material with the help of which they can improve their content-area comprehending and so they can recognize and be familiar with different types of written materials which are came across in specific context fields (Boscolo & Mason, 2001; Latta & Chan, 2011; Vásquez, Hansen, & Smith, 2010).

Thanks to cognitive strategies, pupils associate the new information with their background knowledge and simplify cognitive reconstruction of knowledge. Predicting from the content, analyzing, making inferences in a deductive or indeductive way, taking notes systematically and recomposing the data are some of the examples of cognitive strategies (Carter & Nunan, 2001).

These strategies include hypothesis testing like looking for tips in general of material and known information of a reader, making sense out of from this new item, designating

whether concluded meaning is meaningful or only repeated information finally. To sum up, these strategies are analyzing, synthesizing and reasoning (Carter & Nunan, 2001). In a similar manner, Hartman and Sternberg (1993) remark that these strategies require inferring, analyzing, synthesizing and connecting skills.

Gajria, Jitendra, Sood and Sacks (2007) highlighted that many single-component cognitive strategies can be applied in most classrooms in a short amount of time. These extensively researched strategies like main idea identification, summarization, imagination, grammar storage, question formation and answering strategies have effects on students' comprehension of a text (Wallace, 2001).

According to Wallace (2001), reading can be considered as having the stages of practice, product or process. Anthropologists and social psychologists are interested in the feature of practice since their interest is with reading and writing actions as connected to their usages in everyday life, not only within schooling. Product can be thought about the form and meaning of passages and their component parts. Process is not only about the role of the reader in the ongoing processing of written language but also the strategies used to construct the meaning from text.

While reading, a reader carries a lot of varied entities. These are *aims* for reading like for survival, information/learning, or pleasure, *background* which can be described as the effects of family, school, and culture, *attitudes* to reading and literacy broadly that might be formed not only purposely but also background, and *prior knowledge* which may be linguistic, content, and rhetorical and which is linked with the data in the passage. Moreover, a reader also carries *individual differences, learning styles and strategies, reading strategies* and *life experience*. Hence, the readers who encounter the same written material simultaneously cannot live the same experiences with it, the same responses to it and the same interpretations of it. Additionally, even an identical reader who interacts with a written material which was read by him/her before at diversified times can have a different experience since he/she has undergone change in time (Hedgcock & Ferris, 2009). In this sense, for comprehending and commenting the things that the readers read more accurately, strategies mentioned above will be not adequate so here metacognitive strategies which are going to be presented later come into prominence as they combine all the strategies.

How to teach reading strategies.

According to Baker (2002) (as cited in Klinger et al., 2011), teachers are supposed to provide explicit instruction, model how to use strategies and give learners sufficient practice in benefiting from the strategies.

In their meta-analysis study, Swanson, Hoskyn and Lee (1999) found out that direct strategy instruction had topmost effect size on reading comprehension. Duffy (2002) assumes that when providing explicit instruction, teachers are supposed to explain what the meaning of strategy is, why it is essential, and how it is used. Moreover, they should guarantee to connect the strategy with its applications to reading text in different contexts. Both explicit strategy instruction and teachers' abilities to communicate the thinking processes behind the strategies improve comprehension (Block & Pressley, 2002) (as cited in Cummins, Stewart & Block, 2005). Teachers need to have the ability to make their thinking visible (or audible) while they show how to use strategies and build a framework for using a common language in the classroom. Thanks to a common language for applying strategies, students can both discuss their strategies actively and also learn from their pairs (Pintrich, 2002). Thus, they have the opportunity to see how other students use the strategies. Certain generic teaching steps can be implemented regardless of which strategy students are learning (Klinger et al., 2011).

Teachers can apply following procedures which are adapted from Swanson and De La Paz (1998) to give strategy training in the classroom:

1. Teachers can start with reading material which is easy for the students to read. Firstly, they are supposed to teach learners how to use the strategy, thus the text is a tool to that end.
2. Teachers should explain the target strategy step-by-step.
3. Teachers should activate background knowledge.
4. Teachers should provide information about learners' current performance levels and emphasize the potential advantages of applying the strategy.
5. Teachers should pattern the strategy for the learners by repeating the steps they explained to learners in step 2 and applying a think-aloud process.
6. Teachers should supply a variety of chances to practice the strategy by using pair-work, group-work or whole-class activities. They can help by encouraging students to accomplish phases they may miss or by affording assistance them to

finalize all the phases. If it is necessary, they should explain steps of the strategy again.

7. Teachers should give a chance to learners to implement the strategy on their own hook, with feedback and aid if necessary. Until learners can apply the strategy on their own, they gradually fade assistance.
8. Teachers should help learners generalize the use of the strategy. They should increase the difficulty level of the reading material students are using, and provide different types of reading materials. They are also supposed to remind learners when it can be appropriate to use a strategy.
9. Teachers should provide learners to have figure or table for each step of any strategies in case they need a reminder. They can post charts on the wall.
10. In the end, when learners have used a strategy, teachers should guide them to self-evaluate how well it worked for them (Mason, 2004) (as cited in Klinger et al., 2011).

Metacognition and reading.

Metacognition is an essential feature of person cognition. Both a person has cognitive activities and the competence of implementing to themselves, in that he/she has cognition about cognition (Yzerbyt, Lories & Dardenne, 1998). Metacognitive strategies are specified by choosing thinking and problem-solving strategies to fit specific learning situations, clarifying aims for learning, monitoring personal comprehension through self-questioning and taking compensation action once comprehending breaks down (Dermody and speaker, 1995 as quoted in Echevarria, Voght and Short, 2000) (as cited in Bouchard, 2005). Despite the fact that Flavell (1978) (as cited in Gourgey, 2002) described metacognition as a person's information which concerns a person's own cognitive procedures and outcomes, firstly, Baker and Brown (1984) clarified the interrelated concepts of awareness and control as being critical to understanding the influence on reading theory and instruction (see Figure 1).

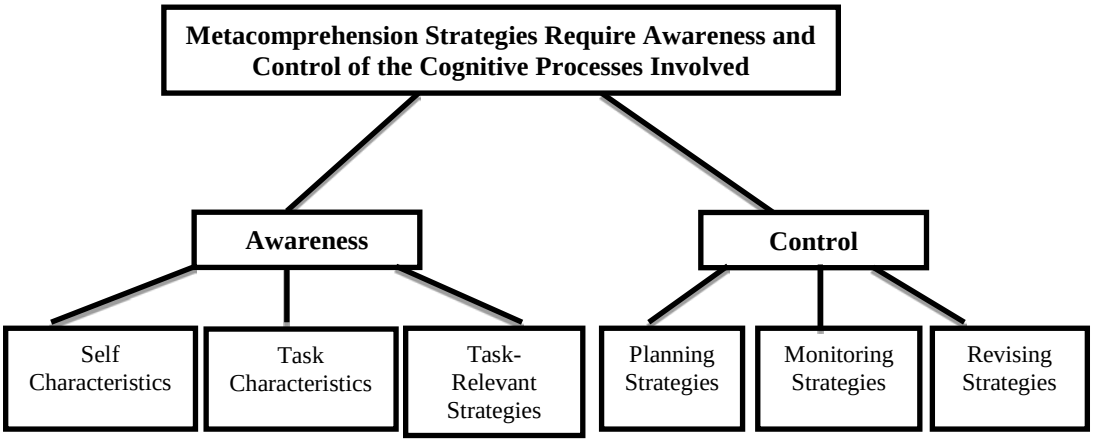


Figure 1. Metacognitive theory and reading comprehension (Baker & Brown, 1984).

Thanks to these strategies, learners direct themselves in overall learning procedure and for particular tasks. There are a lot of different metacognitive strategies. For example, if a learner identifies what he/she is interested in, what he/she requires and which learning style he/she prefers, it means he/she uses self-knowledge strategies, one of the metacognitive strategies, with the help of which individuals know themselves better as language learners. While learning, each learner brings their learning styles to learning process. Some of them are visual vs. auditory vs. kinesthetic, global vs. analytic, concrete sequential vs. intuitive-random and ambiguity-tolerant vs. ambiguity intolerant. On the condition that a learner knows her/his learning style, he/she has the opportunity to decide to use the strategies that matches with their learning styles (Carter & Nunan, 2001).

If a learner directs the learning procedure, identifies existing source, decides which of these sources are important for a given duty, sets a program for studying, finds or creates an appropriate studying area, establishes general goals for language learning, it means he/she uses another group of metacognitive strategies (Carter & Nunan, 2001).

For teachers, it is important to guide learners to make them decide on task-related aims for their learning, take in consideration for the current task, plan their paces of the task, review related grammar and vocabulary, find material or sources related to the task, decide on and apply another useful strategy, choose other strategies on condition that current ones are useless and monitor their errors while performing the task. Thanks to these metacognitive strategies, students can cope efficiently with the current task not just the general language learning procedure (Carter & Nunan, 2001).

Quirk (2006) remarks that learners with strong metacognitive skills are probably more able to achieve expertise and prepare to learn during the whole of their lives. Reading is very important to succeed this. Since metacognitively capable learners perform *executive* functions

like budgeting and regulating reading time, they can be considered as the most effective readers (Baker, 1989). Moreover, they are supposed to apply metacognitive strategies including visualizing, self-questioning and reflective thinking to obtain better reading comprehension. From Hartman (2001)'s point of view (as cited in Gourgey, 2002), skimming, activating related background information, configuring intellectual pictures, guessing, self-questioning, observing the steps of understanding, summarizing and correlating new information with known data are some of the specific metacognitive reading skills which can be learned (Hartman & Sternberg, 1993). Apart from this, Quirk (2006) points out students who are metacognitively more capable are not only more effective problem solvers but also great communicators. In Figure 2, Quirk (2006) shows the place of metacognition.

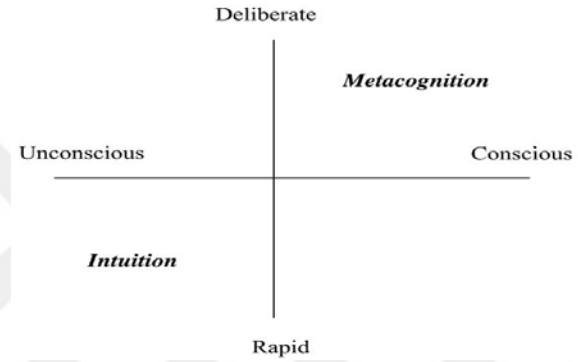


Figure 2. The place of metacognition (Quirk, 2006).

To be able to form metacognition, correct curriculum planning and teaching are necessary. In Figure 3, he summarizes teaching styles and metacognition.

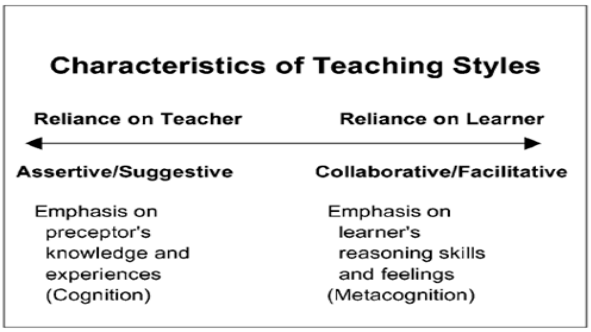


Figure 3. Teaching styles and metacognition (Quirk, 2006).

Lawrence, Lindemann and Gottlieb (1999) clarify that metacognition can be developed within a learning context encouraging self-directed learning and independence. There are proofs in the literature to affirm that learners give importance to clinical learning experiences which depend on independence. Sanson-Fisher, Rolfe, Jones, Ringland and Agrez (2002) remark that successful teaching programs focused on self-directed learning outcomes put emphasis on the importance of strategic thinking, directing learners to implementation

methods such as diaries, practice, role play, and modeling and providing them with reminders for strategic actions. In these programs, there is usually a progression from shared-direction to self-directed learning. Furthermore, engagement in self-directed learning can pave the way for achievement of critical capabilities of expertise like making independent judgments.

According to Hartman and Sternberg (1993), if a learner manages functions which make possible consciousness of thinking procedures and directs them, it means he/she uses metacognitive knowledge with skills. Learners control intelligent behavior before, during and after task performance.

There are two main types of metacognition. First, managing includes Sternberg's constituents of planning, monitoring and evaluating/revising. Meijer, Veenman and Van Hout-Wolters (2006) also point out that these components of metacognition process are fundamental and they are applied before commencing a task, during execution of the task and upon completion of the task, respectively. Second, strategic knowledge is necessary for the learners to support them to apply their knowledge and skills intellectively (Paris, Lipson & Wixon, 1983) (as cited in Hartman & Sternberg, 1993).

Walczyk (1994) notes in his article that there are three complexions of reading skill. The first one deals with sub-constituent procedures that indicate to the lexical procedures of word recognition, and the post-lexical procedures of word, sentence and text comprehension. The second one concerns the restricted sources of caution and short-term memory which may be assigned to reading procedures, and the last one refers to the propelling metacognitive constituent of reading.

Most researchers in the area of metacognition concur that the metacognitive constituent concludes metacognitive information about reading relating to people's information about their own reading, the varied kinds of reading tasks and reading strategies (Baker & Brown, 1984).

According to Efklides and Misailidi (2010), metacognitive knowledge of strategies provides a consciousness of the methods to achieve a learning aim. Furthermore, the conscious use of these strategies while reading affords assistance to describe the related knowledge in a written material by taking back the related prior information from long-term memory, and observing and managing these strategies, in order to improve conditional example of the text which backs up understanding.

Anyhow, there is not a clear consensus when the subject is about the metacognitive activities. Some researchers assume that it is related to setting proper reading aims by

choosing a strategy to achieve the aims, observing to find out whether the aim is achieved and changing strategy by an alternate one if it does not work (Baker & Brown, 1984). Conversely, other researchers assume that monitoring metacognitively means checking understanding in every phase with the aim of improving comprehension (Winne, 1996). Therefore, Meijer et al. (2006) point out that using metacognitive strategies is urgently important in the regulation of reading behavior. The research studies of Beni et al. (1998); Roeschl-Heils, Schneider and van Kraayenoord (2003) have showed that differences in metacognitive information related to reading and in strategy use were permanently ascertained between good and poor readers. They revealed that poor comprehenders did not have enough awareness of the necessary strategies in various reading conditions like for reading for fun or studying. Anderson and Armbruster (1984) (as cited in Kolić-Vehovec, Bajšanski & Zubković, 2010) cleared up that weak readers are in tendency to skim, re-read, consummate knowledge, plan for forward and deduce with a less level than proficient readers. It can be considered that proficient and weak readers differentiate into their applying of metacognitive strategies like mental imaging, self-questioning, skimming, observing whether they understand or not while reading and summarizing. Proficient readers are familiar with the time, the reason and the way to apply these strategies.

There has been made a variety of experimental studies about the role of metacognition in reading comprehension to distinguish cognitive from metacognitive processes. The research done by Van Kraayenoord and Schneider (1999) was implemented with third and fourth-year students. Its aim was to determine the predictors of reading comprehension. Motivation, grade (third or fourth), decoding skills and metacognition were selected as main independent variables. They found out that reading comprehension was guessed by not only using skills of decoding but also by metacognition. They tried to measure metacognition with the Index of Reading Awareness questionnaire improved by Jacobs and Paris (1987) (as cited in McLain, Gridley & Mcintosh, 1991). It was found that motivation and grade affected reading comprehension indirectly.

The study by Meneghetti, Carretti and De Beni (2006) had the purpose of grouping ten complexions of reading comprehension into sub-constituents. The study was composed of 9-13-year-old students. They used confirmatory factor analysis and it was found out that a model which contained two higher-order factors accounted for the data most properly. The two factors in this model may be considered as standing for procedures at the reading skill level and procedures at the strategy level of reading, in return. Metacognitive control processes are the latter factor.

According to Duffy (2009), a strategy is a plan. The learner reasons when to do it, and often adjusts the plan as he/she goes along. Luthfiyyah and Perdani (2014) point out that it means the strategy is the manner or management control when doing something thus the aim can be reached.

Metacognitive strategies.

There are a variety of reading strategies related to metacognitive strategies. For example, Luthfiyyah and Perdani (2014) emphasize KWL Chart method. Donna Ogle created the K-W-L chart in 1986 (Ogle, 1986). It is a comprehension technique which is applied for activating prior information before reading and it is learner-centered. K-W-L chart, a graphical organizer, was constituted in order to support learning. The letters K-W-L represents for ‘what we know’, ‘what we want to know’ and ‘what we learned’. It is separated into three columns which are termed as know, want and learn. The first column ‘K’ refers to what the learners already know related to the subject. This step is supposed to be finished prior to reading. The second column ‘W’ refers to for learners to write down what they want to learn related to the subject during reading; like the first step ‘K’, this step is ended prior to reading, too. The last column ‘L’ refers to for what learners have learned from reading; this step is completed after reading.

Mokhtari and Reichard (2002) identified three sets of metacognitive reading strategies: global reading strategies, problem solving strategies and support strategies by using exploratory factor analysis. Global reading strategies conclude general strategies which are intended for setting the phase for reading. These strategies are frequently used before reading in which learners plan for their reading duty. Problem solving strategies are applied to improve comprehending once the written material is riddling or complex. Thanks to these strategies, readers can observe their reading during task. Support strategies are implemented to help with the reading procedures. Furthermore, they are important as they create an opportunity for readers to revise what they have read not only during but also after reading. The particular strategies which are concluded in each of these three categories are outlined in Table 1.

Table 1. *Metacognitive Reading Strategies (Mokhtari and Reichard, 2002)*

Metacognitive Reading Strategies		
Global reading strategies	**Problem solving strategies**	**Support strategies**
• Establishing aim for reading • Activating background information • Previewing the text • Determining whether context matches the aim • Skimming the text • Deciding what to read closely • Using text features (tables, pictures, etc.) • Using content tips • Using typographical aids (boldface and italics font) • Analyzing and evaluating knowledge • Checking comprehension while reading contradictory knowledge • Making guesses • Checking trueness of guesses	• Reading slowly • Adjusting reading rate • Paying attention • Reflecting on reading • Rereading • Visualizing • Getting back on track on condition of losing concentration • Predicting meaning of unknown words	• Taking notes while reading • Paraphrasing • Reading out loud • Revisiting knowledge read in advance • Asking self-questions • Using reference materials • Underlining text • Discussing with others • Summarizing

Many different studies related to our thesis have been done so far. Some researchers preferred causal comparative studies and the others applied experimental studies. In causal comparative studies, it has been intended to find out to what extent metacognitive reading strategies are used and how they affect the reading comprehension.

Maasum and Maarof (2012); Pammu, Amir and Maasum (2014); Roohani, Sabzeali and Mirzaei (2016); and Rajab et al. (2017) made studies by using causal comparative studies of Metacognitive Awareness of Reading Strategies Inventory (MARSI) which was composed by Mokhtari and Reichard (2002) to gauge the implementation of metacognitive strategies classified as Global Reading Strategies (GLOB), Support Reading Strategies (SUP) and Problem Solving Strategies (PROB). They studied with the university students and found out that learners apply more PROB compared to GLOB and SUP. Hou (2013) and Nam (2014) applied the same study to high school students and similarly Fitrisia, Tan and Yusuf (2015) to secondary school students and they also found out the same result which means the students use more PROB. On the contrary, Vural (2011), Beşkardeşler and Kocaman (2016) did the same study but they reached the result that learners use more GLOB compared to PROB and SUP. Another study was done by Munro (2011) who applied MARSI to two different groups which consist of English or Reading classrooms. He found out that there was no difference

between these two groups about using PROB but GLOB and SUP were used less by English classroom students.

Ilustre (2011); Hong-nam and Page (2014); Meniado (2016); Mukhlif and Amir (2017); and Suharni (2017) did the same study with another instrument, Survey of Reading Strategies (SORS) (Mokhtari & Sheorey, 2002). It includes all items from the MARSI except for summarizing item and discussing with others and they were substituted with translating from English to mother language while reading and thinking in both mother language and English. Moreover, the common items were changed with simpler words to be understood by L2 students easily. They all received the same result which refers that learners use more PROB compared to GLOB and SUP. Similarly, Omar (2014) searched about the implementation of metacognitive reading strategies among postgraduate students and he used Survey of Online Reading Strategies (OSORS) (Anderson, 2003), online version of SORS. He revealed that learners use more PROB. Nevertheless, İnceçay (2013) used OSORS and did the same study with university students but she found out that students applied GLOB the most, then they used PROB and SUP.

Generally, in causal comparative studies, researchers tried to uncover whether applying metacognitive reading strategies affects reading comprehension positively or not. Zare-ee (2007); Ronzano (2010); Ofodu and Adedipe (2011); Omar (2014); and Rastegar, Mehrabi Kermani and Khabir (2017) uncovered that there is a strong and positive relation between metacognitive reading strategies and reading comprehension. However, Negari and Askani (2014) found out that there did not occur any important relation between metacognitive reading strategies and reading comprehension.

There can be found many different experimental studies about the subject related to our thesis. Chellamani (2013); and Sari, Raja and Nurweni (2016) studied with one group and tried to find out whether there is an effect of teaching metacognitive reading strategies on learners' reading comprehension. They all found out that there was a significant effect of students' reading comprehension before and after metacognitive reading strategies training.

Wang (2009), Taj and Bhatti (2013); and Talebi, Maghsoudi, Mahmoudi and Samadi (2014) applied an experimental study with two different groups as a control group and an experimental group with high school students. The control group did not get any education of metacognitive reading strategies but the experimental group got this education. At the end of studies, they compared pre-test and post-test results of students. They all received the same result as teaching metacognitive reading strategies have a positive effect on learners' reading comprehension. Similarly, Boulware-Gooden, Carreker, Thornhill and Joshi (2007), Tabar

(2012) did the same study with primary school students; Dabarera, Renandya and Zhang (2014) did with secondary school students. They also uncovered a positive relation between metacognitive reading strategy training and students' reading comprehension.

With university students, a lot of researchers conducted similar studies. Some of them are Fan (2009); Nosratinia and Mardi (2013); Razı and Çubukçu (2014); Habibian (2015); Al-Ghazo (2016). In a similar manner, they all received the same conclusion which refers that metacognitive reading strategies training improves students' reading comprehension.

Conversely, in their experimental studies, Cephe and Muhtar (2008); Durgun (2010) and McCown (2013) found out that training of metacognitive reading strategies had no effect on reading comprehension.

To conclude, although, as observed, a huge body of research has been completed by researchers and scholars from various school levels (primary, secondary, and so on) and contexts (The USA, India, Iran, Turkey, so on) under quantitative study lines, an important question seems remained unanswered. More precisely, there comes a niche in literature about the synthesis of these studies via meta-analysis.

Conclusion

In this chapter, the researcher has reviewed the literature, related to this thesis in a way. Researcher firstly presented an overall discussion of teaching reading skill by pointing out the importance of reading, what reading involves and types of reading. In the second part, reading comprehension was introduced with the explanation of how to improve it. Followingly, researcher presented reading strategies by introducing the relationship between metacognitive reading strategies and reading comprehension and by attracting a great deal of attention to metacognitive reading strategies. In the last part, research on metacognitive reading strategies and its relationship with reading comprehension introduced by scholars were put by establishing the lack of combination of them via meta-analysis.

In this respect, this chapter takes on a task of preparing the readers for the following methodology section by presenting the logic behind the relevant phenomena of interest for results and forthcoming sections.

CHAPTER THREE

Methodology

In this chapter, the researcher will present the research paradigm followed in this study by giving the main research purpose and research questions guiding the study and the relevant methodological sources and procedure shaping data collection and analysis process.

Statement of Research Purpose and Research Questions

The aim of this research study is to uncover metacognitive reading strategies and their effect on reading comprehension. What this study especially intends is to analyze the world research about metacognitive reading strategies and see whether they are important or necessary for reading comprehension in second language. Moreover, this study aims to find out to what extent students are aware of metacognitive reading strategies. Also, it attempts to shed light on how the students comprehend what they read. Finally, this study intends to find an overall (summary) effect size by synthesizing the primary studies investigating the effect of metacognitive reading strategies on the reading comprehension.

Accordingly, the study addressed the following research questions:

R.Q.1. To what extent is the learners' usage of metacognitive reading strategies effective on the reading comprehension of the learners?

R.Q.2. To what extent is the teachers' implementing the instructions to enhance students' metacognitive reading strategies effective on the reading comprehension of the learners?

R.Q.3. What is the effectiveness of metacognitive reading strategies on the reading comprehension when compared to publication type (doctoral dissertations, master theses and journal articles)?

R.Q.4. Does the effectiveness of metacognitive reading strategies on reading comprehension in English differ between research designs (experimental and causal comparative studies)?

R.Q.5. What is the effectiveness of metacognitive reading strategies on the reading comprehension when compared to school level (primary, secondary and higher education)?

R.Q.6. Does the effectiveness of metacognitive reading strategies on reading comprehension in English differ between the regions where target studies are conducted (Asia, America and other regions)?

R.Q.7. Does the effectiveness of metacognitive reading strategies on reading comprehension in English in experimental studies differ between type, school level, region and the duration of the training of metacognitive reading strategies (1-week, 4-week, 6-week and so on) of the studies?

R.Q.8. For experimental studies, do sample sizes and the years of the studies have any effect on the effectiveness of metacognitive reading strategies on reading comprehension?

R.Q.9. Does the effectiveness of metacognitive reading strategies on reading comprehension in English in causal comparative studies differ between type, school level and region of the studies?

Research Design

This work is a kind of quantitative research. According to Aliaga and Gunderson (2002), quantitative research can be described as representing phenomena by gathering numeric data which are analyzed with mathematical methods especially in statistics. In all research, the keystone is coming up with an explanation for phenomena. Once a researcher initiates to do some research, he/she has an aim to clarify phenomena. The next part of the definition can be thought as the specificity of quantitative research. In quantitative research, if the final part of the definition related to methods based on mathematics is taken into consideration, it can be inferred that the researcher collects numeric data to analyze it. In other words, to be able to use these methods, the researcher's findings must be in numeric forms. For qualitative research, it is different as it is not necessarily or usually numerical, and as a consequence of that a researcher cannot analyze via statistics (as cited in Muijs, 2004).

Moreover, Creswell (2014/ 2017) clarified the advantages of quantitative research as following:

- It produces results from very large masses.
- It analyses the data efficiently.
- It searches the relationships among the data.
- It examines possible reason result relationships.
- It checks bias.
- It addresses the numerical preferences of people.

Apart from this, Creswell (2009) states that the researcher uses quantitative research as a kind of tool to test objective theories and he/she examines the relation between variables. From his definition, one more advantage of quantitative research can be concluded as it supplies an objective research process.

Additionally, the people's attitudes and beliefs can be examined via qualitative research but with the help of numerical data we can also research them by using quantitative research (Muijs, 2004) as a result of which we can reach more concrete, more valid and more objective results. In the light of the advantages of quantitative research mentioned above, it can be concluded that as in our current study we intend to find out to what extent the learners use metacognitive reading strategies and how effective metacognitive strategies are on reading comprehension, it can be examined via quantitative research to reach more concrete, more valid and more objective results. Most of the studies all around the world related to our thesis represent the data attained with quantitative research. To sum up, since meta analysis, one of the quantitative research, is designed to combine the results of these studies, quantitative research has been preferred in this study.

Meta Analysis

Today, it is widely accepted that with the help of research syntheses, a researcher can create connections between old and new academic information as a result of that he/she can show a complete picture of current paradigm. It can also be helpful to broad the content of the existent information (Card, 2012; Hunter & Schmidt, 2004). As scientific process is accretionary which is essential, thanks to meta-analysis, science can be grown cumulatively, too. Nearly 300 years ago, Isaac Newton indicated that one can have the chance of seeing forward on condition that he/she stands on the shoulders of giants. Although his statement was clear enough, in history of science, it could not be understood or interiorized. However, in recent years, the scientists have taken the responsibility to synthesize academic information asserted before and compound with the new one which shows that scientists have realized the importance of cumulative scientific process. The idea has been obvious and almost noncontroversial throughout the history of science but it has been very recent that the responsibility of scientists in synthesizing old scientific knowledge to integrate into new ones has been acknowledged (Chalmers, Hedges & Cooper, 2002).

There have always existed several early individual attempts to combine statistically results from multiple studies. Olkin (1990) points out Karl Pearson's work in 1904 to synthesize associations between inoculation and typhoid fever, and several similar approaches

were described from the 1930s. In the 1940s and 1950s, methods of combining probabilities advanced (including the method that became famous as Stouffer's method; Rosenthal, 1991). However, until the 1970s, these approaches saw little application in the social sciences (with some exceptions like work by Rosenthal in the 1960s; Rosenthal, 1991). Scientists searching social sciences gave a place to meta-analysis in the late 1970s. Some researchers worked up a new technique that time (Rosenthal & Rubin, 1978; Schmidt & Hunter, 1977) (as cited in Card, 2012). Glass (1976) first defined meta-analysis in annual meeting of the American Education Research Association. He clarified that meta-analysis is a combining science with the help of which one can combine quantitative data statistically by collecting from varied studies done before (Stangl & Berry, 2000). Shortly, if one researcher wants to do meta-analysis study, he/she collects the estimates of each study done on the same topic to integrate the results (Cooper et al., 2009).

Other disciplines indigenized 'meta-analysis' term and it became well-liked especially in clinic studies in spite of the fact that Glass was involved in social science research. The researchers have used some meta-analysis techniques for many years. For instance, Pearson (1904) made a research related to typhoid vaccination and he summarized the correlation coefficients. Combining p-values, another technique of meta-analysis, was introduced by Tippet (1931) and Fisher (1932). Moreover, Yates and Cochran (1938) combined the findings of varied agricultural studies which were implemented in the laboratories (Whitehead, 2002). In social work, Fischer (1973) drew attention to the research synthesis with his controversial review, 'Is Casework Effective?'. Among social work researchers, meta-analysis started to become center of their interest in 1980s and 1990s. After 2000s, there have been more international interdisciplinary organizations where researchers have developed standards for meta-analysis and they have opened a new era to revise the experimental studies not only in social and behavioral sciences but also in health sciences (Littell, Corcoran & Pillai, 2008).

The Bayesian approach takes account of whole interference or exposing effect and heterogeneity levels between studies. Thus, this approach assumes that a researcher can conclude related prior knowledge into the analysis. These techniques can be implemented to dual outcome scaling factors which include odds ratios, relative risks and perpetual outcome scales (directly or standardized). These methods mentioned above are general ones. There are also some special techniques for particular study designs and the researchers can apply different sorts of data. Furthermore, the researchers have implemented many methods with graphics to combine the results of a meta-analysis. For example, they use forest plots for

showing the research and pooled gauge; and the radial plot which is an elective presentation of the treatment estimates (Stangl & Berry, 2000).

Meta-analysis indicates to the statistical combining of findings from various studies. Only if the studies have been collected systematically, the synthesis will be meaningful although statistical processes which are applied to a meta-analysis can be connected to any arrangement of data. This may be with regards to a systematic review which includes the procedure of efficiently finding, assessing and after that synthesizing information from many resources. As an alternative, it may be with regard to combining information from selected research studies, for instance a pharmaceutical company conducts meta-analyses to evaluate the viability of another medicine. In the event that effect size is constant over many studies, these methodologies let us notify that the effect is strong over the sorts of populaces inspected. Moreover, thanks to these methodologies, we have the opportunity to evaluate the extent of the effect more exactly than we can if we try to investigate only one individual study. Provided that the effect size differs over many studies, these strategies let us give an account of the scope of effects and also they empower us to recognize factors which are related to the size of treatment effect (Borenstein, Hedges, Higgins & Rothstein, 2009).

Not only research synthesis has commitments to combined academic information and is the direction to policy makers and experts, it can also possibly evaluate the coherency of connections and clarify any information irregularities or clashes in the literature (Borenstein et al., 2009; Hunter & Schmidt, 2004; Pettricrew & Roberts, 2006). It is not exceptional to discover opposing outcomes from studies conducted with the same research designs and about a similar subject, regardless of the fact that they are in social sciences, educational sciences, health sciences or physical sciences (Rosenthal & DiMatteo, 2001). Yet, the circumstance turns out to be more perplexing in educational and social sciences as human's behaviors are more entangled and hard to clarify so internal validity cannot be ensured entirely. As a result of that, researchers in educational research field ought to be profoundly supported to do research synthesis since with the help of it; they can practically sum up the whole results of the studies and clarify the explanations behind any heterogeneity or inconsistencies in those results (Üstün & Eryılmaz, 2014).

According to Hedges and Olkin (1985), meta-analysis is the rubric which is utilized to portray quantitative strategies for consolidating proof along with research studies done before. Since meta-analysis generally depends on 'data' as outline statistics which are gotten from the essential analyses of studies, it can be inferred that meta-analysis is exactly an analysis of the consequences of statistical analyses. Crombie and Davies (2009) emphasized that the type of

quantitative research synthesis is considered as ‘meta-analysis’ in general (Glass, 2000). They defined meta-analysis as a statistical method for compounding the results from distanced research studies (Crombie & Davies, 2009). To put forward this fact more forcefully again, Borenstein et al. (2009) points out that meta-analysis indicates to the statistical synthesis of findings from a group of research studies. More simply, meta-analysis is a kind of review which utilizes a particular statistical procedure for integrating the consequences of a few research studies into a sole quantitative gauge (i.e., a summary effect size) (Pettricrew & Roberts, 2006).

Meta-analysis includes the statistical analysis of the findings from different studies. The findings of research studies can be considered as the combination of analysis and particularly results in the form of effect sizes. So, we can summarize that meta-analysis is the analysis of findings from various research studies where singular research studies are the unity of analysis. The researcher can use from two to hundred research studies done before to implement meta-analysis but the study can be conducted with the studies which are available. Thus, he/she can make inferences from a scope of research studies via meta-analysis (Card, 2012).

Meta-analysis became a method on which researchers started to work seriously from 1930s. In 1931, Tippett suggested using minimum p value to obtain a single p value in all of his studies. In 1932, Fisher improved a method which can synthesize all the probability results obtained from different studies. From 1937 to 1950 in the articles written by Willliam, different methods for combining the results were discussed. In 1954, Cochran developed a common comparing method by combining the research studies which were implemented in different places, time and units to estimate parameter variables. Firstly, Gene Glass termed ‘meta-analysis’ as ‘the analysis of the results of the statistical analyzes to obtain general results’ in 1976. At the present time, meta-analysis is generally utilized in psychology, medicine, biomedical sciences, education and various fields (Çarkungöz & Ediz, 2009).

According to Card (2012), as the first step of any research endeavor, the first step of meta-analysis is to identify the goals and research questions. He highlights that he often hears beginning meta-analysts say something like ‘I would like to meta-analyze the field of *X*.’. Although he approves of the ambition of such a statement, he thinks that there are nearly limitless numbers of research questions that a researcher can derive and potentially answer through meta-analysis within any particular field. A researcher would not have adequate guidance for searching the literature and deciding which studies are relevant for his/her meta-analysis, knowing what characteristics of the studies or effect sizes to code or how to proceed with the statistical analyses, without more specific goals and research questions. Accordingly,

the goals and specific research questions of a meta-analytic review need to be more focused than ‘to meta-analyze’ a particular set of studies.

A lot of analysts experience issues in arranging and evaluating meta-analyses as a component of systematic review. The researchers have to follow some phases in arranging and carrying out a meta-analysis: (1) As a first step, they should decide on what data ought to be taken up from a research which can be utilized in meta-analysis. (2) Then, they should choose whether to use fixed, random or mixed models for conducting analysis. (3) Next, they investigate potential perplexing of mediators in the analyses. (4) After that, they carry out the findings. (5) Finally, they comment on the outcomes. While the researchers are conducting these steps, they must keep in their minds that each of these phases is reciprocal; and moreover they all rely upon the degree and nature of the research question for the review. Even if meta-analysis is considered as a small one, like any data analysis project, it ensures complicated data which a scientist should interpret. Hence, although the researcher spend a great deal of time for literature review and coding stage to finish a systematic review, he/she needs to be careful while analyzing the data to be able to comprehend the patterns which can exist (Pigott, 2012).

Rosenthal and DiMatteo (2001) point out that meta-analysis is a philosophy to direct methodical research combination cautiously by implementing the phases like the ones for essential research studies as opposed to being only a statistical strategy. Later, they make clear main phases of conducting meta-analysis as following:

- Characterize the independent and depended factors of the study like the effects of issue which is grounded learning on learners’ accomplishment, attitudes towards science and motivation in science.
- Gather and choose the essential research studies efficiently and after that read each article painstakingly.
- Examine the heterogeneity among the taken effect sizes with the help of diagrams and graphs or chi-square examination of significance, which ought to be commented precisely in the light of the fact that it is, as other significance tests, contingent upon the sample size; for example number of studies which is incorporated into the meta-analysis. To add an idea additionally, the effect of moderator variables on the variability among the effect sizes must be investigated.
- Compound the effect sizes which are taken from the essential research studies by utilizing the proportions of central tendency like weighted means.
- Investigate the significance level of the index of central tendency.

- Assess the significance of the taken mean effect size.

In a similar manner, Glass (2006) sums up some principal phases in a meta-analysis like characterizing issue, literature review, coding the research studies, changing results to a typical scale and analyzing the results statistically (as cited in Üstün & Eryılmaz, 2014).

Similarly, Tekdal and Şahin (2005) define the six stages of the meta-analysis like that:

1-Set forth the research question clearly and certainly: To understand greatly, reading the previous studies related to research field carefully is very important. Despite the fact that all the meta analysis studies do not start with the formal hypothesis, the reliability of the obtained results of the former hypothesis is much more. In addition to this, developing a hypothesis provides the researcher to create structures to carry out clearly and to give shape to the literature included the analysis.

2- Literature Review: Computer research, manual searching, and reference lists of all the studies done independently are the common resources used for literature review. Reaching all the research studies about the certain subject is almost impossible but systematic reviewing increases the possibility of collecting material widely. Relation of meta-analysis to other types of literature review is shown in Figure 4.

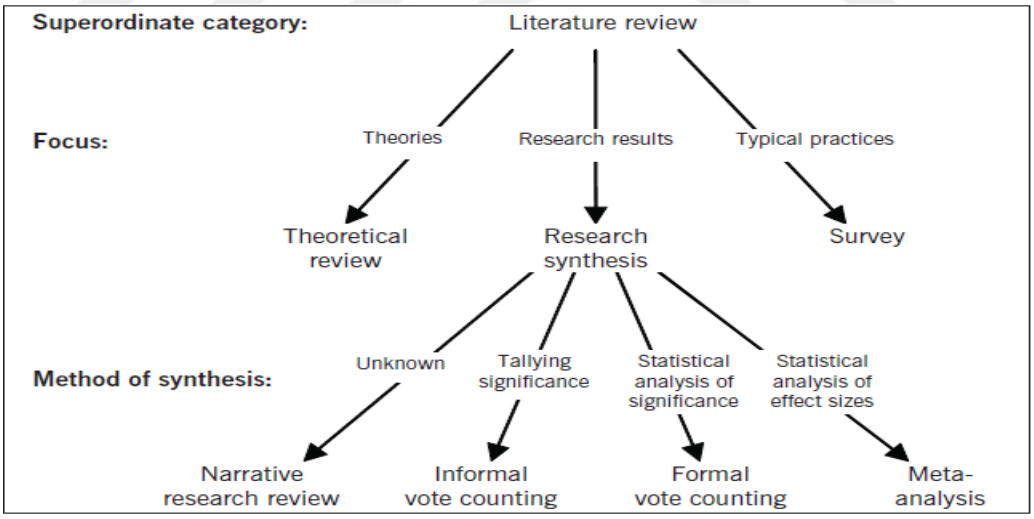


Figure 4. Relation of meta-analysis to other types of literature reviews (Card, 2012).

3- Coding the study: Coding methods are used to transform the definer information collected from each research to numeric data. These methods must be both general and specific enough to show the unique aspects of the studies.

4. Effect Index/ Analysis Unit: Depending upon the kind of the meta-analysis, a variety of effect size form (i.e.: d or p) or another measuring system can be used. Apart from

this, analysis unit can be effect size for each depended measuring, for instance the study itself or different structures at each research.

5- Statistical Analysis: the kind of the meta-analysis affects how to carry out the statistical analysis and also how to interpret the results. Common meta-analysis processes occurred later are like that: tests of homogeneity, correction for study weight and systematic exploration of sources of heterogeneity.

6- Conclusion and Interpretation: the results must reflect the literature analyzed and the borders of this literature. As in the single/normal studies, to enhance the future research, the researchers must give some advice or indicate the potential current problems to be solved by the following researchers (Tekdal & Şahin, 2005).

Akgöz, Ercan and Kan (2004) summarize the phases of the meta-analysis like that:

1. Problem identification,
2. Determining the inclusion criteria of the independent studies to the meta-analysis,
3. Obtaining the individual research,
4. Coding and categorizing each study according to characteristics related to meta-analysis,
5. Combining the findings of the individual research studies,
6. Familiarizing the findings combined with the characteristics of the meta-analysis,
7. Reporting the findings of the meta-analysis.

Dinçer (2014) clarifies the phases of the meta-analysis in Figure 5 like following:

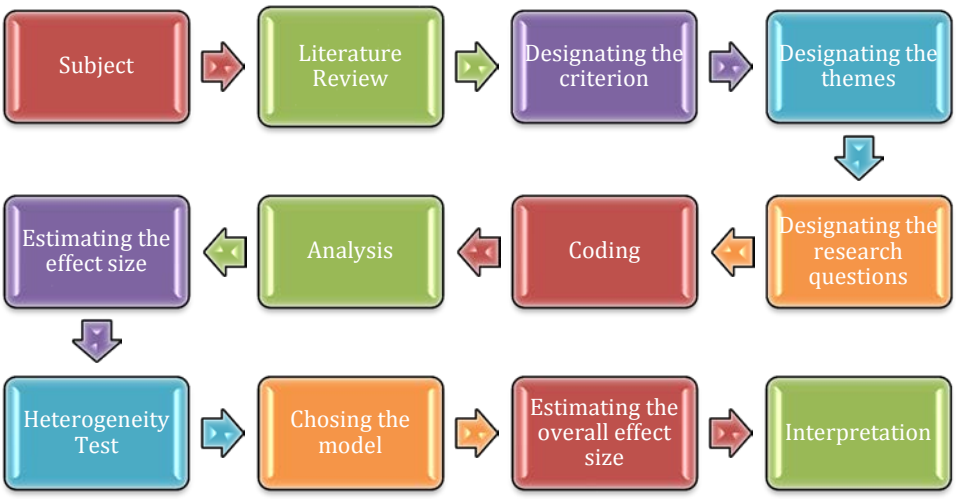


Figure 5. The phases of the meta-analysis (Dinçer, 2014).

Terminology in meta-analysis.

Effect size: In meta-analysis, the first step is to find the average effect size. While laying out a research synthesis, researchers can be concerned with comprehending the mean effect for an intervenience or the mean effect area ratio among studies. In every research area, a researcher must own a great comprehending of the effect size which is assumed significant. Later, he/she may calculate the minimum number of research studies which is necessary to designate the effect size with certain strength. Preferably, he/she may own a sketchy opinion of the number of research studies which are available, maybe due to the findings of literature review. This data may be helpful for the researcher to calculate the effect size so he/she can detect it with a certain strength (Pigott, 2012). Alternatively, Petitti (2000) highlights that the main aim of a researcher who conducts a meta-analysis is to combine the findings of research studies done before to come up with precise results related to a scope of study. He points out that meta-analysis is used for calculating a precise result of effect size, exploring the causes for distinctness in size effects of research studies and identifying heterogeneity in the effects of the intervenience in varied subgroups. Historically, meta-analysis has been beneficial in outlining earlier study which depends on randomized preliminaries once singular research studies are not big enough to arrive at a verdict result.

In statistics, a meta-analysis joins the findings of many research studies which are addressed to an arrangement of related research speculations. The researcher usually does this by identifying of a common effect size that is displayed by applying a type of meta-regression. While checking investigation qualities, resulting overall averages are to be viewed as meta-effect sizes that are the strongest predictions of the true effect size when comparing with those inferred in a solitary research under a given single arrangement of hypothesis and situations (Chen & Peace, 2013).

Smith, Givens and Tweedie (2000) indicated that meta-analysis research studies, gathers and combines singular example studies to gauge a general effect size.

Fixed-Effects and Random-Effects Models in Meta-Analysis: From the point of statistical models, there are two predominant methodologies with various suppositions that may be utilized inside meta-analysis: fixed-effects and random-effects models. They have been produced for implication of mean effect size from a set of research studies (Borenstein et al., 2009; Hunter & Schmidt, 2004).

The simplest techniques for compounding the findings of research studies incorporate vote counting system in which the number of research studies which show useful and destructive effects are counted. Preferably, the assembly of accounts of effect sizes of every

single research can be utilized too. These methods are insufficient to yield a pooled gauge of effect size and thus, both are advised as a final application once different strategies are impractical on account of restrictions in data accessible from research publications. A researcher takes a mean of main research values and then weights every single research's statistical data by the reverse of its variance as a result of which he/she uses the fixed-effects method model which produces a pooled treatment estimate. In this method, it is assumed that each of the research studies gauges the equivalent hidden effect size and there is not any heterogeneity among the studies. The acknowledgment of no heterogeneity may not be practical in light of the fact that formal tests for its essence come into existence with lower strength.

One of the prominent options to the fixed-effects method is random-effects model which can incorporate some aspects of heterogeneity. The confidence interval which is gotten with random-effects method can be more extensive than that for the fixed-effects model in general although these two methodologies might supply comparable findings. Study-level covariates can be incorporated into the model in order to clarify heterogeneity between and among studies as opposed to just embody it into the analysis which is also done by random-effects models. In the event that they are incorporated into a fixed-effects model, the subsequent analysis is named as meta-regression, though provided that a random-effects term is incorporated to represent lingering heterogeneity which cannot be clarified by covariates, this analysis is alluded to as a mixed model. Notwithstanding these traditionally determined techniques, there are also Bayesian methods to meta-analysis (Stangl & Berry, 2000).

Fixed-effects Models: Fixed-effects models for meta-analysis presume that the research studies being demonstrated are homogeneous. It means there are no distinctions in hidden research populaces, no distinctions in criteria. Fixed-effects models proceed to be the most widely recognized strategy for meta-analysis. Conceding something admittedly, the supposition of homogeneity is generally improbable, given heterogeneity among studies as well as research and evaluation conventions. Equally significant, the fixed effects model reduces heterogeneity and thus can cause fallacious results of statistical significance. We can say that in the random effects model, the research demonstrate samples from a populace (Stangl & Berry, 2000).

Analyses of Random‐Effects Models: Card (2012) describes four general estimated steps in random effect models in meta-analysis as following: (1) estimating the heterogeneity among effect sizes, (2) estimating population variability in effect sizes, (3) using this estimate of population variability to provide random-effects weights of study effect sizes, and (4) using

these random-effects weights to estimate a random-effects mean effect size and standard errors of this estimate (for significance testing and confidence intervals) (Card, 2012). In Figure 6 an example of fixed effects models, in Figure 7 an example of random effects models are illustrated.

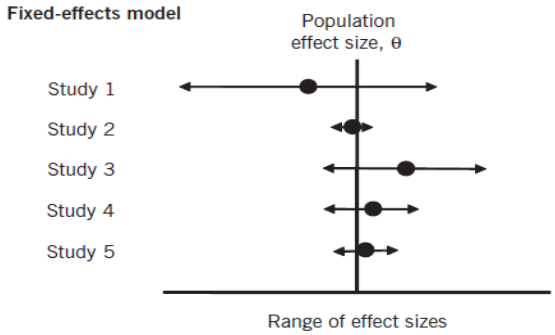


Figure 6. An example for fixed-effects models .

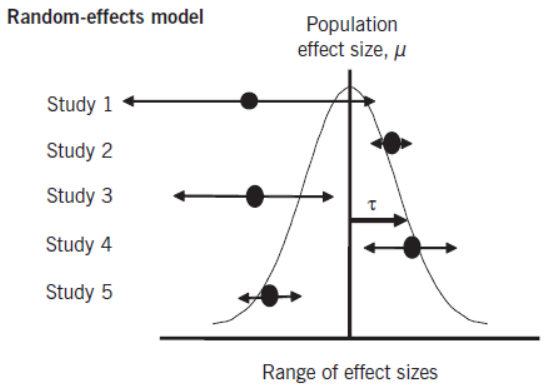


Figure 7. An example for random‐effects models.

Mixed‐Effects Models: Mixed-effects models which are sometimes called conditionally random models combine the (fixed-effects) moderator analyses with the estimation of variance in population effect sizes (random-effects). These models are useful when the researcher wants to evaluate moderators in meta-analysis and he/she (1) either wants the generalizability provided by random-effects models, or (2) fixed-effects moderator analyses indicate significant residual heterogeneity (i.e., *Q* within in ANOVA framework or *Q* residual in regression framework).

Mixed-effects models have the logic of moderator analyses within a general regression framework. Clearly though, these models conclude additional terms which represent population variability in effect sizes, exceedingly systematic variability accounted for by moderators as well as sampling fluctuations (Card, 2012).

Heterogeneity: To describe the problem of pooling studies which are dissimilar in some ways, ‘combining apples and oranges’ has been commonly used as a metaphor. There is a potential to ignore important differences between studies and this can cause invalidity for

meta-analysis. Thus, some researchers think that meta-analysis should not even be the ultimate goal of a systematic review. If effects are not robust or consistent across studies, pooling may be inappropriate (Esterhuizen & Thabane, 2016).

Significance Test of Heterogeneity: Card (2012) points out that the heterogeneity (vs. homogeneity) of effect sizes is often evaluated by calculating a statistic *Q*. This test is named either a homogeneity test or, rarely, a heterogeneity test; other terms used conclude simply a *Q* test or Hedges's test for homogeneity (or Hedges's *Q* test). He prefers the term 'heterogeneity test' given that the alternate hypothesis is of heterogeneity, and so a statistically significant result implies heterogeneity. This test involves computing a value (*Q*) which represents the amount of heterogeneity in effect sizes among studies (Hedges & Olkin, 1985; Lipsey & Wilson, 2001).

It is crucial to compare the pretest and posttest standard deviations. If they are equal, it means the researcher has 'homogeneity of variance'; otherwise, he/she has 'heterogeneity of variance' by subjects' interaction. Therefore, a finding of heterogeneity of variance is a very significant finding for substantive reasons. Particularly, the mean difference is solely the *mean* treatment effect, and the treatment effects for different individuals can be quite different if there is heterogeneity of variance. A statistical test for heterogeneity of variance is a preliminary test for a treatment by subjects' interaction if the independent-groups design is used. If the pretest and posttest variances are different, there is absolutely an interaction. If there is homogeneity of variance, it would be nice as it can be concluded that there is no interaction. Yet, it is simple to create hypothetical data in which there is a large interaction but no difference between variances (Hunter & Schmidt, 2004). Studies which are united in a systematic review will definitely show an alteration. Any sort of variability among research studies in a systematic review can be named as heterogeneity (Higgins & Green, 2008).

With the help of heterogeneity, the researcher has the opportunity to find out why effects vary (Glasziou, Irwig, Bain, & Colditz, 2003). According to Allen, Preiss, Gayle and Burrell (2002) heterogeneity indicates the possibility of moderator variables which need further investigation.

Meta-Regression: In the event of existing heterogeneity among research studies, potential reasons of the heterogeneity must be investigated. A researcher can do this via covariates on the level of study which can clarify the distinctness among research studies or covariates on the level of subject within the context of meta-analysis. Nevertheless, when individual data are available, the second approach is only possible. Due to the fact that

regularly just data on the research level is accessible, clarifying and researching heterogeneity via covariates on the research level have attracted much consideration in applied sciences. By Bashore, Osman, and Heffley (1989); Jones (1992); Greenland (1994); Berlin and Antman (1994) the term meta-regression was utilized for describing that such analysis returns to papers (Hartung et al., 2008).

It is conceivable to investigate, and possibly clarify, the causes behind heterogeneity; this is often done via meta-analysis by combining covariates in meta-analysis models. However, a researcher can integrate categorical covariates via subgroup analyses. These methodologies recognize that effect sizes are related with covariate esteems (Welton, Sutton, Cooper, Abrams & Ades, 2012).

Publication Bias: If any researchers probably publish 'positive studies' rather than 'negative ones', conventional or systematic causal comparative studies of literature which is published must be one-sided towards a 'positive' conclusion. This is the core of publication bias which can be explained as the positive relationship between the consequences of the research (Glasziou et al., 2003).

Card (2012) remarks that we can cite publication bias if there occurs a probability of publishing research studies with positive effects which have statically significance effects in direction of hypothesis of a researcher rather than studies with null or negative results which means there is no statistically significant effect. This bias is likely because of not only researchers being less motivated to submit null or negative results for publication but also to journals (editors and reviewers) being less likely to accept manuscripts which report these results.

In the light of the facts mentioned above, it can be concluded that although a meta-analysis can provide a scientifically precise combination of research studies which are incorporated into the study, the average effect figured by the meta-analysis will mirror this bias if the research studies are a one-sided test of every single pertinent research. If we look at the several lines of evidence, we can conclude that it demonstrates that research studies which report comparatively high effect sizes will be probably published than research studies which report low effect sizes. Due to the fact that published studies probably contrive in a meta-analysis, the meta-analysis will be probably affected by any bias in the literature, too. This situation is mostly assumed as publication bias (Borenstein et al., 2009).

There are two common methods to get through publication bias: sampling methods and analytic methods. The main goal of sampling methods is to remove publication bias as far

as possible. This can be done by precisely dispatching the way where the research studies are chosen to be included into the meta-analysis and taking steps in the direction of acceptable means to connect related but unpublished research studies done about the same subject. Peto and his colleagues at Oxford have supported this method (Collins et al.,1987) and this method is acutely implemented searching published abstracts on the specific subject matter and familiarizing pathbreaking studies in the area for related studies which are done all around the world by having the desire, which can ascertain several unimportant articles that have not been published until the present time. However, this strategy is criticized because both accuracy of these at a premium research studies might be interrogable and the quality of some of these research studies might not be satisfactory. The latter method, which is assumed as file-drawer method (Rosenthal, 1979), is applied to ensure a simple qualification on a summary P-value from a meta-analysis (Hartung et al., 2008).

Solutions to the Problem of Publication Bias: Only when investigators submit and editors accept all well-conducted studies of important questions irrespective of the statistical significance of their results, the problem of publication bias can be solved totally. Changes in journal policies which cause lag in publication of negative results must also take place. There are three choices until the time that this ideal is achieved: ignoring the problem; attempting to retrieve all study results, whether published or unpublished; or using statistical or quasi statistical methods to assess or overcome it. There are some funnel plots which follow the statistical convention of plotting the sample size (or the precision) on the horizontal (x) axis and the effect size on the vertical (y) axis. In this case, the data will lie within a funnel which is laid on its side, with the mouth of the funnel to the left and the tip of the funnel to the right.

As a method for detecting the existence of publication bias, the sensitivity of funnel plots has not been evaluated systematically. Publication bias must be suspected if a funnel plot is distorted. However, this possibility cannot be ruled out even once a funnel plot does not supply clear-cut proof of publication bias (Petitti, 2000).

Whitehead (2002) notes that the ‘funnel plot’ can be applied to the graphic identification of publication bias. Light and Pillemer (1984) introduced this term for the graphic proof of publication bias. The funnel plot can be defined as a bivariate scatter plot (*x, y*) of the study sample size against the study estimate of treatment difference. It is hung on the processor which the accuracy in speculating the treatment difference will stimulate as the sample size of the study increases. Collaterally, Welton et al. (2012) remark that the term ‘funnel plot’ hinges upon the reality which the accuracy in the prediction of the basis effect size increases as the sample size of the research studies in the review goes up. Hence, results

of small research studies will be dispersed extensively at the bottom of the graphic, with the spread narrowing among bigger research studies when a measure of study size is plotted on the vertical axis. The plot will be like a symmetrical inverted funnel if there takes place no bias and once research studies calculate the similar basis effect.

Higgins and Green (2008) summarize that 'funnel plot' arising from the reality that accuracy of the predicted intervention effect goes up while the size of the research goes up. On the other hand, they highlighted that thus effect estimates from small research studies scatter at the bottom of the graphic widely, with the spread narrowing among bigger research studies. If there exists no bias, the plot must nearly simulate a symmetrical (inverted) funnel. According to them firstly, the researchers in educational research and psychology used funnel plots with effect estimates plotted against total sample size (Light, 1984) (as cited in Higgins & Green, 2008). It is generally suggested at present that the standard error of the intervention effect estimate can be plotted, rather than the total sample size, on the vertical axis (Sterne, 2001) (as cited in Higgins & Green, 2008). The reason for this can be explained like that: statistical power of a study is determined by factors with sample size like the number of subjects who experience the incident for dichotomous results and the standard deviation of responses for continuous outcomes. For instance, if we compare a study with 100,000 participants and 10 events, we can assume that is less likely to illustrate a statistically significant intervention effect than a study with 1000 participants and 100 events. With the help of the standard error, these other factors can be summarized. Plotting standard errors on a reversed scale places the larger conversely the strongest studies towards the top of the plot. The researcher who uses standard errors can have the advantage that a simple triangular region can be plotted, within which 95% of studies would be expected to lie in the absence of not only biases but also heterogeneity.

Welton et al. (2012) clarified the Hypothetical funnel plot with graphs as in Figure 8, 9 and 10.

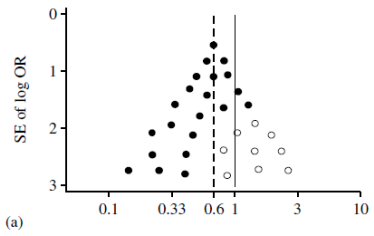


Figure 8. Symmetrical plot in the absence of bias (open circles indicate smaller studies showing no beneficial effects).

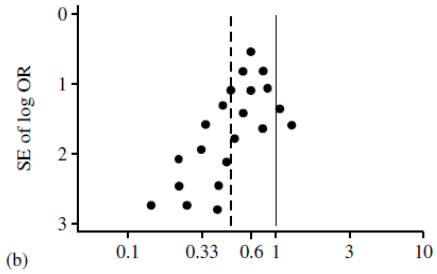


Figure 9. Asymmetrical plot in the presence of publication bias (smaller studies showing no beneficial effects are missing).

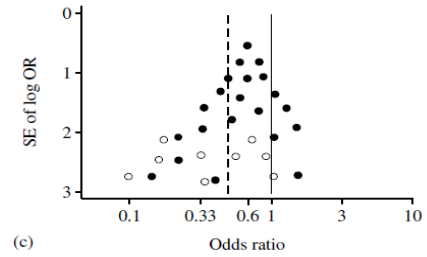


Figure 10. Asymmetrical plot in the presence of bias due to low methodological quality of smaller studies. Open circles indicate small studies of inadequate quality whose results are biased towards larger beneficial effects.

Purposes of meta-analysis.

Simon (2000) summarizes the aims of meta-analysis as follows:

- Coping with existing publication bias and incessantly and neutrally all related studies,
- Resolving definite conflictions in findings of many studies,
- Coping with insufficient size of independent studies,
- Examining end points which require bigger samples than independent studies which are collected,
- Assessing subset effects,
- Examining generalizability of the results,
- Determining if new studies are necessary and predicting potential effect sizes,
- Constituting hypotheses for new studies.

Advantages of meta-analysis.

Conceptually, meta-analysis uses a statistical approach to compound the findings from varied research studies to be able to ensure the strength on independent research studies, to develop values of the size of the effect and to solve uncertainness ones' reports having

conflicts. Meta-analysis can be defined as a statistical overview of the findings from one or more systematic review. Fundamentally, it generates a weighted average of the research findings which are concluded to meta-analysis ("https://en.wikipedia.org/wiki/Meta-analysis/Advantages").

Meta-analysis which is a research technique has advantages which must be accepted in its implementation. This approach has several advantages:

- The advantages of meta-analysis not only contain the skill to ensure the strength of small or unconvincing research studies to reply to questions but also the skill to define resources of variety among different kinds of research studies ("https://www.ncbi.nlm.nih.gov/pubmed/10481815").
- Findings obtained from target studies may be generalized to a bigger population.
- Since more data is applied, the certainty and trueness of predictions can be improved. As a result, this might raise the statistical strength to designate the effect.
- Inconsistence of findings among research studies can be quantified and analyzed. For example, it can be examined whether inconsistence increases from sampling error or whether research findings are partly affected by heterogeneity between the studies.
- Hypothesis testing can be implemented on summary estimates.
- Moderators, which are qualitative like sex, race, and class or quantitative like the level of reinforcer variables that affect the direction and/or strength of the relationships between an independent or predictor variable and a dependent or criterion variable can be incorporated to clarify variation between research studies.

The existence of publication bias can be examined via ("https://en.wikipedia.org/wiki/Meta-analysis/Advantages") publication bias and 'Tower of Babel' bias, as well as deficiencies in the design, conduct, analysis and construal of research ("https://www.ncbi.nlm.nih.gov/pubmed/10481815").

Moreover, meta-analysis is a good method to decrease the complication and extent of study as it allows resources to be transformed elsewhere. Since this technique is becoming more widespread, thanks to database programs, the procedure is much simpler, with professionals who work correspondingly and are able to enter their findings and obtain the data. This lets fixed qualification evaluations and reduces the opportunities of redundant repeat research because studies can be frequently published in several months, and the computer records assure that a scholar realizes the recent aspects and conculusions. When

meta-study is used with the databases, it lets a much wider net to be cast than by the conventional literature review. Furthermore, it is perfect for emphasizing correlations and connections between research studies. In brief, meta-analysis is a priceless means for research and with researchers who straddle between statisticians and librarians, it is quickly gaining momentum as a stand-alone discipline (“https://explorable.com/meta-analysis”).

Limitations of meta-analysis.

This approach has several significant limitations. One limitation is the subjectivity in this approach which is coupled with the lack of transparency. For instance, different researchers may apply varied criteria to decide which research studies to conclude in the analysis. One researcher may give more credence to bigger research studies when a group of research studies has been chosen, whereas another gives more credence to ‘quality’ of research studies and however another allocates a similar weight to all research studies. Before finalizing that a treatment is effective, one researcher might need a significant body of proof while another implements a lower threshold.

Actually, there exist some samples in the literature in which two narrative reviews conclude conflict results, in other words one researcher reports that a treatment is effective whereas the other states that it is not. As a rule, the narrative researcher may not articulate and the decision-making process which is applied to combine the data and come up with a conclusion and moreover he/she may not even be fully aware of this situation.

A second limitation of meta-analysis is that since more information becomes available, they become less useful. The thought process which is necessary for a synthesis, needs the researcher to obtain the result given in every single research, to designate a suitable weight to that result, and after that to combine these results across all research studies into analysis. The procedure turns into be hard and finally indefensible as the number of research studies goes up although a scholar can combine data from several research studies which have been obtained. Even when the treatment effect (or effect size) is coherent from study to study, this is true (Borenstein et al., 2009).

Data Source

This section will inform about the source of data selected for the current study with the justification and techniques used for data source selection.

Primary Studies.

The corpus of the study was compiled from research into the role of the metacognitive reading strategies between the years 2007 and 2016 selected from the MA and PhD theses at different universities around the world, articles and the books associated with the keywords 'English language teaching', 'English language learning', 'Teaching Reading', 'Reading strategies', 'Metacognitive reading strategies', 'Teaching Reading Strategies' and 'Teaching Metacognitive Reading Strategies' using a variety of electronic databases like 'ProQuest Dissertation and Theses' database that has the world's most comprehensive collection related to dissertations and theses, Google Academic, Science Direct, Web of Science, Wiley Online Library, YOK Theses Centre and ULAKBIM (National Academic Network and Information Center). When the keyword was limited with 'Metacognitive reading strategies', from these data bases 1446 results were found related to our subject but only 52 studies were taken to apply into meta-analysis according to criteria for inclusion.

Criteria for inclusion.

The criteria for inclusion of a study in meta-analysis has to be related to the research topic and the studies should have the necessary statistical data for analysis (Lipsey & Wilson, 2001).

Additionally, the selection criteria for the studies used in this meta-analysis study are as following:

- Studies done in English or Turkish.
- Studies done about the effect of metacognitive reading strategies on reading comprehension in ESL/EFL.
- Studies done between the years 2007 and 2016 all around the world.
- MA theses, PhD theses and articles.
- Studies done with experimental and causal comparative studies which consist of quantitative research.
- Studies having statistical data as sample sizes, standard deviation and arithmetic mean.

In the light of the criteria mentioned above, study universe was comprised for coding process.

Criteria for exclusion.

As the years (2007-2016) were restricted while researching the databases, results excluding those years were not reflected in the results. Although 1394 were among these 1446 studies reflected in the results, they were not included in the study due to the following reasons.

- Studies done in different languages except for English and Turkish.
- Studies done with qualitative research.
- Studies not having statistical data as sample sizes, standard deviation and arithmetic mean.
- Studies except for MA theses, PhD theses and articles.
- Studies restricted by their writers.
- Studies reached with paid membership.

Data Collection Procedure

In this section, the details about the data collection procedure and ethical considerations for all the processes will be specified.

The data collection procedure involves two phases consisting of the selection process of PhD dissertations, MA theses and journals in regard to English language teaching and learning for reading skill with the help of metacognitive reading strategies. Firstly, the relevant studies were chosen in years between 2007 and 2016 and as a second a phase they were tested whether they had necessary data for meta-analysis. A population of research studies need to be identified and in a representative manner, on condition that it is not thoroughly sampled, before gathering data for meta-analysis (Lipsey & Wilson, 2001). The criteria defining the scope of research to be meta-analyzed need to be extensive enough to generate valid results across a series of research studies valiancy of meta-analysis, but conceptually (on condition of not being functional) narrow enough to abstain from inconvenient gathering of results (Plonsky, 2011). By considering these principles, this meta-analysis have concluded all research studies which met the following inclusion criteria: (a) participants who study English as a second or foreign language, (b) for experimental studies treatment which involves instruction on one or more L2 reading metacognitive strategies, (c) data such as mean, standard deviation and frequency of the subjects collected statistically. In line with abovementioned research questions, the present study gauged their data from several of databases.

Coding.

For coding process, all primary studies were printed out and firstly coding was performed in the coding sheet generated in the Microsoft Word file which was shown in Appendix 1. Moreover, coding manual (Appendix 2) covering corresponding explanations for each item were constructed to measure inter-coder reliability. Then, all studies were read in detail and necessary information of the studies were highlighted by taking small notes to make it easier to verify coding, when necessary. Finally, they were transferred to Microsoft Excel file.

Coding Reliability.

Coding reliability is very important to be established in a meta-analysis as how to code the items in the coding sheet may demonstrate some variability while coding primary studies. There are two ways to measure coding reliability. First one is the consistency of coding by a single coder from study to study like coder reliability and the second one is the consistency between different coders like inter-coder reliability (Lipsey & Wilson, 2001).

In this study, subsample of 14 studies was coded by another researcher to establish inter-coder reliability. 'Agreement rate' (AR) was calculated for each pair of coding sheets. An average AR was calculated, then, by averaging 14 ARs yielding from 14 pairs of coding sheets, which represented the coefficient of inter-coder reliability. The AR simply was calculated by the following formula (Orwin & Vevea, 2009):

$$AR = \frac{\text{number of observations agreed upon}}{\text{total number of observations}}$$

An average AR of 0.936 was obtained with a range from 0.777 to 1.00. An AR of .85 or greater is to be considered as sufficient (Bayraktar, 2002). So it can be assumed high enough to feel safe about reliability issues. The details of calculations are presented in the table in Appendix 3.

Data Analysis

In this part, the researcher will outline the details about the data analysis programs and techniques used for quantitative data and the reasoning for the use of these means.

Softwares for meta-analyses and comprehensive meta-analysis (CMA).

To perform meta-analysis, three types of software can be used. One option can be using a spreadsheet like Microsoft Excel. A second can be using an overall aim statistical

package like SPSS, SAS, R or Stata. A third option is to use a program which is created especially for meta-analysis. On account of the fact that a spreadsheet such as Excel allows the researcher to enhance an appreciation for the formulas, performing a meta-analysis is a perfect setup for learning (or teaching) meta-analysis. Notwithstanding, spreadsheets must not usually be applied for real analyses since this technique can restrict the usage of essential choices (e.g. forest plots) and is inclined to mistake. Statistical packages like SPSS, SAS, R and Stata have no internal backing for meta-analysis. These packages are contemplated principally for analysis of essential research studies and do not propose a simple choice for designating degrees which are necessary for meta-analysis (particularly for random-effects models). Apart from this, if the researcher does subgroup analysis (analysis of variance) or meta-regression, the rules for designating weights of freedom are diversified for meta-analysis then for essential research studies, and thus applying these procedures will cause erroneous p-values. In spite of the fact that the main procedures in these packages ought not to be implemented for meta-analysis, it is likely to write code (macros) which can be incorporated to the programs and applier carrying out a meta-analysis. Meta-analysis algorithms have been programmed for most major packages and the code have made available for others to use it (Borenstein et al., 2009). (In mathematics and computer science, an algorithm is a self-sustained phase by phase group of procedures to be carried out. Algorithms perform calculation, data processing, and/or automated reasoning tasks) (“https://en.wikipedia.org/wiki/Algorithm”)

Furthermore, there are smaller computer software packages with programs which are dedicated to meta-analysis. These packages conclude DSTAT, True Epistat, and Fast*Pro (Normand, 1995). It is usually thought that these programs are not as flexible as the big software packages. They frequently have restricted capacity about the effect size metrics they process if they let input of raw data solely or also let the access of effect sizes, how many moderator variables can be concluded in the same analysis, if databases can be processed after the researcher enter them and if they can perform not only fixed but also random effects models. If one of these aims matches the purposes of the meta-analyst, in contrast, it can be simpler to utilize the bigger statistical packages then. The context and flexibility of these programs are generally being upgraded, for this reason the users must find the most recent documentation to explore the certain capabilities of each (Cooper, 1998).

Bax, Yu, Ikeda, Tsuruta and Moons (2006) note in their article that they ascertained 10 meta-analysis packages which were available for downloading or purchasing via the internet. Several of them were no longer updated or had remained in their DOS level and were

excluded from their study. They concluded six programs in their comparison: Comprehensive Meta-analysis (CMA) Version 2, MetAnalysis, MetaWin 2.1, MIX 1.5, RevMan 4.2.8 and WEasyMA 2.5. Using less compeller inclusion/exclusion criteria did not differentiate between their software choices. Using more compeller criteria would exclude WEasyMA as several signals signify that it might no longer be improved and backed up. At first, their search did not choose the still comparatively unknown program which is called MetAnalysis. This software comes with a book and cannot be bought independently and moreover neither the software nor the book is backed up by a website.

Comprehensive Meta-Analysis (CMA) which is a commercial product is one of the computer programs for meta-analysis (Rothstein, Sutton & Borenstein, 2005). CMA can be implemented for validation of the Fail-safe N output and to double check the findings of the other tests (Bax et al., 2006). In the Internet search engines of all concluded programs Comprehensive Meta-Analysis (commercial software) has the highest profile. It dissevers itself from other programs by the option to enter effect sizes of different formats and the scope of the analytic choices and output. Data can be accessed by copying and pasting in the CMA spreadsheet or manually or as direct import of text or other data files is impossible. The program presents all significant graphic illustrations. The tutorial and manual are appropriate and extensive. The program is actively renewed and the website is contemporary and routinely updated (Bax et al., 2006).

CMA can approve the data in close to 100 formats which include the number of incidents and sample size in every group, means and standard deviations, correlations or point estimates and confidence intervals (Rothstein et al., 2005).

CMA, Windows-based program, has lately been showed up. The user has an opportunity to compose a database of research studies which include abstracts and references. One can enter the data in a spreadsheet, or can import it directly from Microsoft Excel. In this program, varied outcome measures, and groups of research studies for analysis, may be designated. By using a series of weighting schemes, the program does fixed and random effects meta-analyses. Researcher can group meta-analyses according to covariates like kind of intervention or methodological quality of component research studies. Moreover, forest plots and funnel plots can be illustrated and exported to other Windows programs. In short, Comprehensive Meta-Analysis provides help in all context of a systematic review (Egger, Smith & Altman, 2001).

Comprehensive Meta-Analysis (CMA) is a self-reliant program for meta-analysis. CMA was enhanced in cooperation with researchers who work in medicine, epidemiology,

and the social sciences. This program has the capacity to constitute a forest plot and a funnel plot, to calculate the rank correlation test, Egger's test, the failsafe N and Orwin's variant, trim and fill, and to illustrate a cumulative forest plot sorted by precision (Rothstein et al., 2005).

Data entry and conversion.

Analyses were run with the Comprehensive Meta-Analysis (CMA 3) program. There is a huge debate in the meta-analytic inquiry about two basic concepts, which are random and fixed effect models. The main discrepancy between these two models is the null hypothesis. The null hypothesis of the fixed effect model is 'There is zero effect in every study'. In other words, the observed dispersion among effect sizes is merely due to the play of chance. On the other hand, 'The mean effect is zero' is valid for the random effect model (Borenstein et al., 2009). The primary argument to choose between one of these models hinge on the level of heterogeneity across studies for some of the scholars (Rosenthal, 1991). However, Borenstein et al. (2009) recommend that researchers should employ fixed or random effect model based on their expectations.

The methodologies of the research studies incorporated in this meta-analysis are not identical, and there is basic scientific and methodological diversities among the studies. The main differences between these studies are having an experimental design or a causal comparative study design. Moreover, they were conducted in different countries of the world, in different education levels and with different sample sizes. Thus, random effect model was determined to be used in this meta-analysis.

There are two groups of studies in this meta-analysis: the studies that have experimental design and the studies that have causal comparative designs. Effect sizes are computed on the basis of pre and post data for intervention and control groups for the studies that have an experimental design. For the studies that have causal comparative designs, effect sizes were calculated based on correlation or regression analysis data. Most of the studies provided means and standard deviations in the first group. Some of the studies only provided mean changes and p values for the change, and these data are employed to compute effect sizes, namely the Cohen's d. Thus, these data are used to compute effect sizes. For the second group, Pearson r, or the results of t-statistics are used to calculate effect sizes. The effect sizes are interpreted as follows according to Cohen (1988) rule of thumb;

- 0.20 as small effect size,
- equal or greater than 0.50 as moderate and

- equal to or higher than 0.80 as large (Pahlke, Hyde & Allison, 2014).

Cohen, Manion and Morrison (2007) elaborated these rule of thumbs as follows:

- 0 to 0.10 as very weak,
- 0.10 to 0.30 as weak,
- 0.30 to 0.50 as moderate,
- 0.50 to 0.80 as strong and
- above 0.80 as a very strong effect.

The minus sign before the effect sizes reflects that the effect is in favor of negative effect. When the sign is positive, it means that the effect is in favor of the positive effect. In this meta-analysis study, while evaluating effect sizes of primary studies, Cohen, Manion and Morrison (2007)'s rule of thumbs were used.

Forest plot.

A forest plot which is also termed as a blobbogram, is a graphic illustration of estimated findings from a series of scientific research studies which address the same question, along with the overall conclusions. Firstly, as a tool of graphically illustrating a meta-analysis of the findings of randomized controlled experiments, it was developed for using in medical research. In the last twenty years, the same methods have been implemented in observational study and forest plots are usually used to present the findings of such research studies, too. They are generally presented with two columns despite the fact that forest plots can take many forms. In the left-hand column, we can see the names of the research studies generally in chronological order from the top downwards. In the right-hand column, there is a plot of the measure of effect (e.g. an odds ratio) for each of these research studies (usually illustrated by a square) including confidence intervals which are shown by horizontal lines. While using odds ratios or other ratio-based effect measures, the graph can be plotted on a natural logarithmic scale. Therefore, the confidence intervals are symmetrical about the means from each study. In the meta-analysis, the field of each square is in proportion to the study's weight. The overall meta-analyzed measure of effect is generally symbolized on the plot as a dashed vertical line. This meta-analyzed measure of effect is usually plotted as a symbol of diamond, the lateral points of which signify confidence intervals for this estimate. A vertical line which shows no effect is plotted, too. It shows that at the given level of confidence their effect sizes do not differentiate from no effect for the independent research if the confidence intervals for individual studies overlap with this line. If the points of the diamond lap over the line of no effect, the overall meta-analyzed finding

cannot be assumed to be different from no effect at the given level of confidence so the same meta-analyzed measure of effect can be seen. Forest plots predate to the 1970s. One plot was demonstrated in a 1985 book which was about meta-analysis. The term was firstly used in an abstract for a poster at the Pittsburgh (US) meeting of the Society for Clinical Trials in May 1996. An explanatory research about forest plot was published in 2001. The name represents to the forest of lines which are produced ("https://en.wikipedia.org/wiki/Forest_plot").

Rothstein et al. (2005) explain the forest plot with the example in Figure 11 which was produced by CMA. By using either the *log* relative risk or the relative risk, the program can illustrate the data. The graphic part of the plot (the point estimate and confidence interval) is presented toward the center of the screen, with points to the right of 1.0 which indicate an increased risk for persons exposed to passive smoking. The ecraseur majority of researchers indicate an increased risk; nevertheless the 95% confidence intervals for most researchers conclude the null value of 1.0, and so fail to meet the 0.05 criterion for statistical significance. In the spreadsheet, the last row demonstrates the summary data for the fixed effects model. The risk ratio is 1.204 and moreover the 95% confidence interval is from 1.120 to 1.295. The program displays the name and additional detail for every single research toward the left and it displays the relative weight designated to every single research toward the right. The researchers have been listed from most precise to least precise in this plot. Consequently, bigger researchers are shown toward the top and smaller studies are shown toward the bottom. Actually, this has no effect on the analysis; however it helps us comprehend the relation between sample size and effect size.

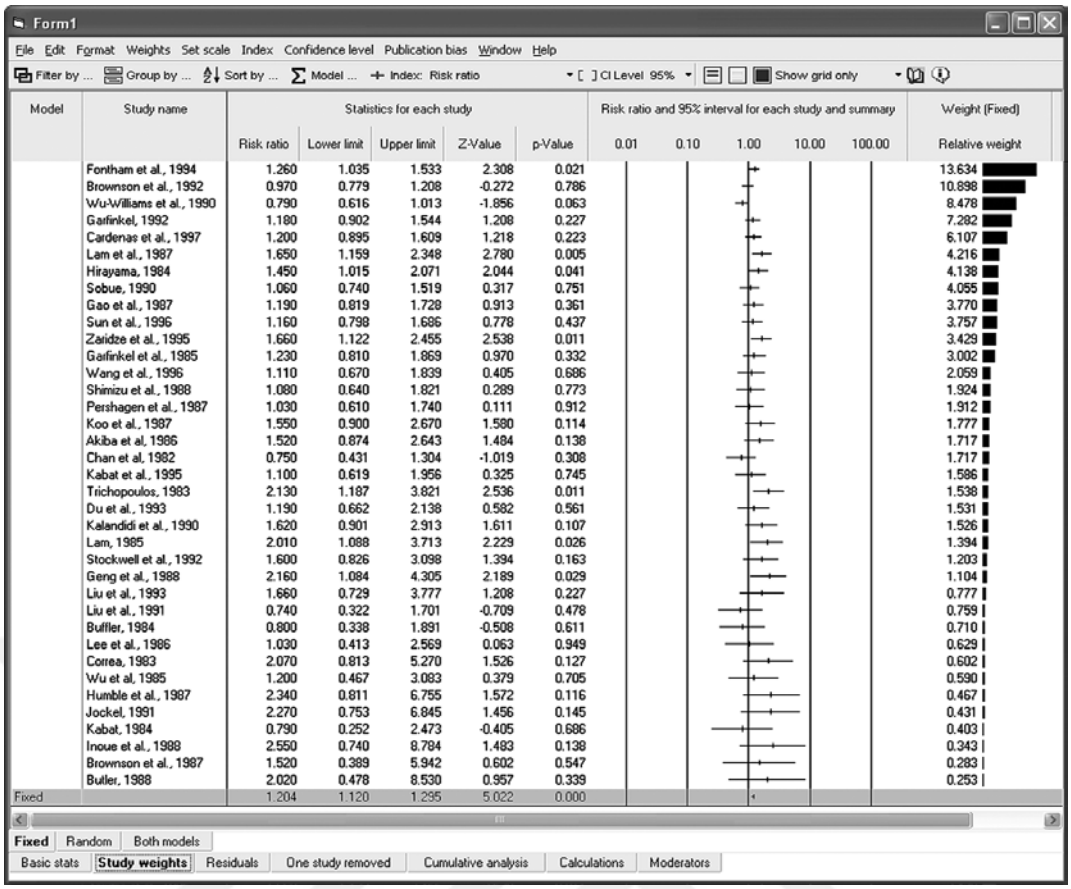


Figure 11. An example of forest plot.

Funnel plot.

CMA has the capacity to constitute a funnel plot of any effect size index on the X-axis by either the standard error (Figure 12) or precision (not shown) on the Y -axis. With the help of the program, the researcher has the opportunity to conclude a vertical line at the summary effect, and guidelines for the 95% confidence interval. Studies at the bottom are illustrated in this example.

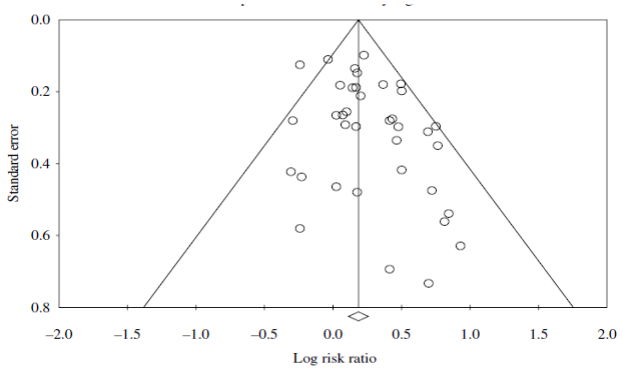


Figure 12. Example of Funnel plot (CMA) (Funnel plot of standard error by log risk ratio).

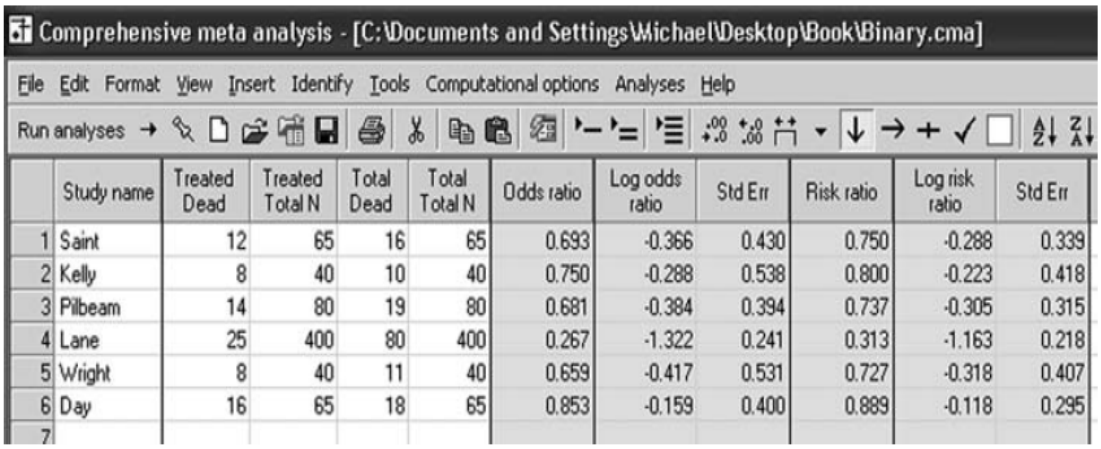
This asymmetry suggests the probability of publication bias, toward the right-hand side of the graph.

Statistical tests.

Results for the different statistical tests can be illustrated in tabular form by the program (Rothstein et al., 2005).

In Comprehensive Meta-Analysis (CMA) firstly, the researcher accesses summary data into a spreadsheet, and after that clicks 'Run' button to show the findings of the meta-analysis. Its flexibility in working with many varied sorts of data, its simple usage, its ability to customize and export forest plots and its Windows look and feel are the program's strengths. The program also includes a lot of qualifications for educational aims like the choice to illustrate the formulas which are implemented for computing effect sizes and the choice to show a spreadsheet which represents how the summary effects were calculated. The program can be found in many versions. The entry-level version incorporates nearly 50 formats for data entry, all of the main computational choices and high-resolution forest plots. Via advanced versions, the researcher can add 50 additional formats for data access, and advanced computational choices like subgroup analysis, meta-regression and processes to evaluate publication bias in addition to additional forest plot options.

The data access sheet is like Excel (see Figure 13). The researcher accesses the data into the white columns. The program estimates the effect size and variance, and shows these in the shaded columns. In Figure 13, the researcher has accessed the incidents and total *n* for every single research. So, the program has calculated the odds ratio, log odds ratio, risk ratio, log risk ratio and risk difference. The data were events and sample size in this example, but this is only one of more than 100 formats available. For instance, the program can illustrate the corresponding set of columns for data entry if the researcher wants to access means, standard deviations and sample size for every single research. In this figure, purposely the screenshot has been cropped for clarity normally and additional columns are illustrated, too. The program accepts data for varied research designs like self-reliant groups, matched groups and cross-over designs. The program accepts data in different formats and lets the researcher mix and match formats within the same analysis. For instance, the researcher can supply means, standard deviations, sample size for some research studies, the p-value and sample size for others.



	Study name	Treated Dead	Treated Total N	Total Dead	Total Total N	Odds ratio	Log odds ratio	Std Err	Risk ratio	Log risk ratio	Std Err
1	Saint	12	65	16	65	0.693	-0.366	0.430	0.750	-0.288	0.339
2	Kelly	8	40	10	40	0.750	-0.288	0.538	0.800	-0.223	0.418
3	Pilbeam	14	80	19	80	0.681	-0.384	0.394	0.737	-0.305	0.315
4	Lane	25	400	80	400	0.267	-1.322	0.241	0.313	-1.163	0.218
5	Wright	8	40	11	40	0.659	-0.417	0.531	0.727	-0.318	0.407
6	Day	16	65	18	65	0.853	-0.159	0.400	0.889	-0.118	0.295
7											

Figure 13. CMA – data entry screen (Borenstein et al., 2009).

Moreover, the researcher can provide a lot of events and non-events for some research studies, the odds ratio and its confidence interval for others, and the log odds ratio and its standard error for others. Furthermore, the program shows the formula which are implemented to calculate the effect size and variance. The program works with these effect sizes: raw mean difference, standardized mean difference (d and g), odds ratio (and log odds ratio), risk ratio (and log risk ratio), risk difference, correlation (and Fisher's z), rate ratio and hazard ratio. Additionally, it also works with point estimates in single group designs like the mean, proportion or rate in a single group. Lastly, the program works with a general effect size.

Analysis.

In the light of the above mentioned, data were entered to CMA (3) program and analysis was started by pressing the 'Run' button as shown in the Figure 13. Menus and toolbars were used to customize several factors of the computational model and display, such as the following,

- Demonstrate findings for fixed and/or random-effects models.
- Demonstrate weights for the two models at the same time.
- Demonstrate a table of statistics such as effect size, variance, standard error, confidence limits, Q, T^2, T and I^2.

Moreover, test of heterogeneity, subgroup analysis, meta regression and publication bias of studies were analyzed with the help of this program.

Finally, experimental and causal comparative studies' analysis were done separately to see their effect sizes and other results in their own group.

Create a forest plot.

The central analysis is illustrated as a forest plot (Figure 14). Moreover, the program gives the opportunity to the researcher to designate a high-resolution plot, customize the plot by indicating what columns to display, what symbols to use, and such like (Figure 15). The program has the characteristics of a one-click export to Word and PowerPoint, and in addition the plots can also be placed into any other program.

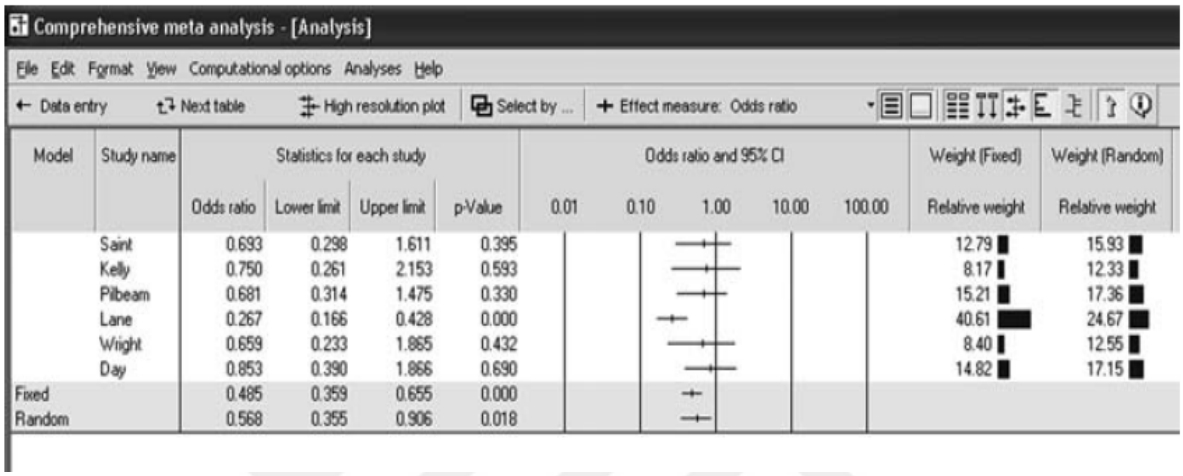


Figure 14. CMA – analysis screen (Borenstein et al., 2009)

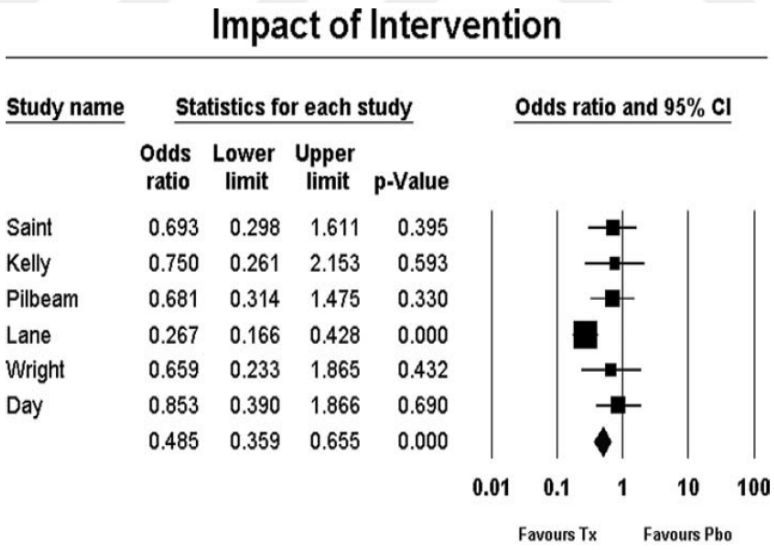


Figure 15. A high-resolution plot (Borenstein et al., 2009).

Conclusion

In this chapter, the researcher established the methodological aspects and relevant premises of the thesis and presented data collection, analysis procedures and sources in detail by discussing meta analysis and its software CMA. The methodology design of the study is justified with not only a line of reasoning and literature support but also how this system is the best way to address the research problem of the thesis. The following section which

consists of findings and discussion will present the findings and their interpretation extracted from the quantitative data which were collected after a detailed analysis procedure. In this regard, the researcher assumes that findings and discussion section will clearly and graphically set the outcomes of the data collection and analysis processes handled in the current work.

CHAPTER FOUR

Results and Discussion

This chapter will outline research findings which attend to the research questions in relation to meta analysis of the effect of metacognitive reading strategies on reading comprehension. First, descriptive information on meta-analysis is given, and then the calculated effect size values and their interpretations are given. Prior to calculation of effect size values, an analysis of publication bias will be conducted for the studies included in the study.

Descriptive Data

A total of 52 studies is listed in the analysis. Table 2 shows the descriptive statistics of the categorical moderator variables: school level, design of study, year of study and type of study.

Table 2. *Descriptive Statistics of the Categorical Moderator Variables*

School level	**Frequency**	**Percent**
ELT college	4	7.7
High School	6	11.5
Primary	2	3.8
Secondary	9	17.3
University	31	59.6
Total	52	100.0
Design of the study	**Frequency**	**Percent**
Experimental	29	55.8
Causal Comparative Studies	23	44.2
Total	52	100.0
Year	**Frequency**	**Percent**
2007	2	3.8
2008	2	3.8
2009	5	9.6
2010	4	7.7
2011	4	7.7
2012	2	3.8
2013	5	9.6
2014	14	26.9
2015	6	11.5
2016	8	15.4
Total	52	100.0
Type of the Study	**Frequency**	**Percent**
Article	40	76.9
Dissertation	10	19.2
Thesis	2	3.8
Total	52	100.0

School level indicates the level of the school where the experiment or the causal comparative studies were conducted. There are five types of schools and the most employed schools in the studies are the universities (%59.6). The next one is secondary schools (%17.3).

The studies are designed in two types; the experimental design and the causal comparative design. Over half (%55.8) of the studies included in the meta analysis have both quasi experimental or experimental design. Studies with causal comparative design are 44.2 percent of the studies.

Year of the study reflects the publication year of the studies. This meta analysis comprises studies published in between 2007 and 2016. With a 26.9 percent, 2014 is the year that the most studies were published.

There are three types of studies included in the meta analysis which are articles, dissertations and thesis. Almost 4 of the 5 studies (%76.9) included in the analysis are in the article format. There are ten dissertations (%19.2) and only 2 theses (%3.8).

The other descriptive statistics for the other categorical variables are listed in Table 3 below. The meta analysis comprises studies from a wide variety of the countries. Most of the studies (%30.8) are from Iran. There are eight studies from both Turkey and the USA (%15.4). Since the studies are very scattered among the countries, a new categorical moderator variable is created based on the region of these countries. The new variable called region is included in the meta analysis instead of the scattered country variable. Based on the regions, the Middle East is the region that most of the studies come from. There are 13 studies (%25) from Asia and 10 studies (%19.2) from Europe.

Table 3. *Descriptive Statistics of the Categorical Moderator Variables*

Country	**Frequency**	**Percent**
China	3	5,8
Greece	1	1,9
India	1	1,9
Indonesia	1	1,9
Iran	16	30,8
Italy	1	1,9
Jordan	1	1,9
Malaysia	2	3,8
Morocco	1	1,9
Nigeria	1	1,9
Pakistan	1	1,9
Philippines	1	1,9
Saudi Arabia	1	1,9

Table 3. *(Continuation)*

Singapore	1	1,9
Taiwan	2	3,8
Turkey	8	15,4
United Arab E.	1	1,9
USA	8	15,4
Vietnam	1	1,9
Total	52	100,0
Region	**Frequency**	**Percent**
Africa	2	3,8
America	8	15,4
Asia	13	25,0
Europe	10	19,2
Middle East	19	36,5
Total	52	100,0
Duration of the education	**Frequency**	**Percent**
1-week	1	1,9
10-session	1	1,9
10-week	2	3,8
12-week	4	7,7
16-session	1	1,9
16-week	3	5,8
4-week	5	9,6
5-week	4	7,7
6-week	4	7,7
7-week	1	1,9
8-week	2	3,8
Na	24	46,2
Total	52	100,0
Duration of the education-Week	**Frequency**	**Percent**
0	24	46,2
1	1	1,9
2	1	1,9
4	6	11,5
5	4	7,7
6	4	7,7
7	1	1,9
8	2	3,8
10	2	3,8
12	4	7,7
16	3	5,8
Total	52	100,0

The duration of the education is about the studies with experimental design. These studies implemented pre and post tests after a kind of education about reading activities performed with metacognitive strategies instructions. The duration of the education refers to the length of these educations in experimental designs. The 'na' stands for 'not applicable' meaning that 23 of these studies are not experimental but causal comparative studies and one experimental study does not give information about time frame of education. Among the experimental studies, which have such a kind of education, the longest education is 16-week and only 3 studies (%5.8) have such a long education. This moderator is created as a categorical variable to conduct subgroup analysis. It includes also two cases with sessions but not week. In another words, these are two studies mentioned the quantity of the sessions but not the duration of the educations.

The last but not the least moderator variable is duration of the education-week. This variable is created as integer variable to include in the meta regression for experimental studies. This variable is created based on the previous duration of the education variable. The sessions in two variables are converted to week.

The Cohen's d, the effect size, ranges from -1.235 to 3.657. The mean sample size in the studies included in the meta-analysis is 120.02, while the minimum is 10 and the maximum is 454. The effect sizes of the primary studies with subgroups and integer variables can be seen in Appendix 4.

Test of Heterogeneity

Cochran's Q statistics is used to verify the heterogeneity across studies included in the meta-analysis. The results of this test are presented in Table 4 below. The results of Q statistical data lead us to determine the significance level of the dispersion in the effect sizes. The forest plot in Figure 16 below also visualizes this dispersion among the effect sizes of the studies.

Table 4. *Overall Effects and Test of Heterogeneity*

	Effect Size estimate						
Model	**k**	**Cohen's d**	**S.E.**	**95% CI**		**Z**	**P**
Fixed	52	0.344	0.026	0.293	0.395	13.208	0.000
Random	52	0.550	0.087	0.379	0.721	6.300	0.000
	Test of Heterogeneity				**Tau Squared**		
	Q-Value	df(Q)	P-value	I^2	Tau Squared	S.E.	Tau
	523.844	51	0.000	90.264	0.332	0.093	0.576

Note: k=number of studies, d=Cohens D effect size, S.E.= Standard Error, CI= Confidence Interval, Z=Z-Score, P= Significance level, Q= Variance, I^2= Percentage of total variance

The overall mean effect size under fixed effect model is 0.344 with a standard error of 0.026. Under random effect model, the overall mean effect size is 0.550 with a standard error of 0.087.

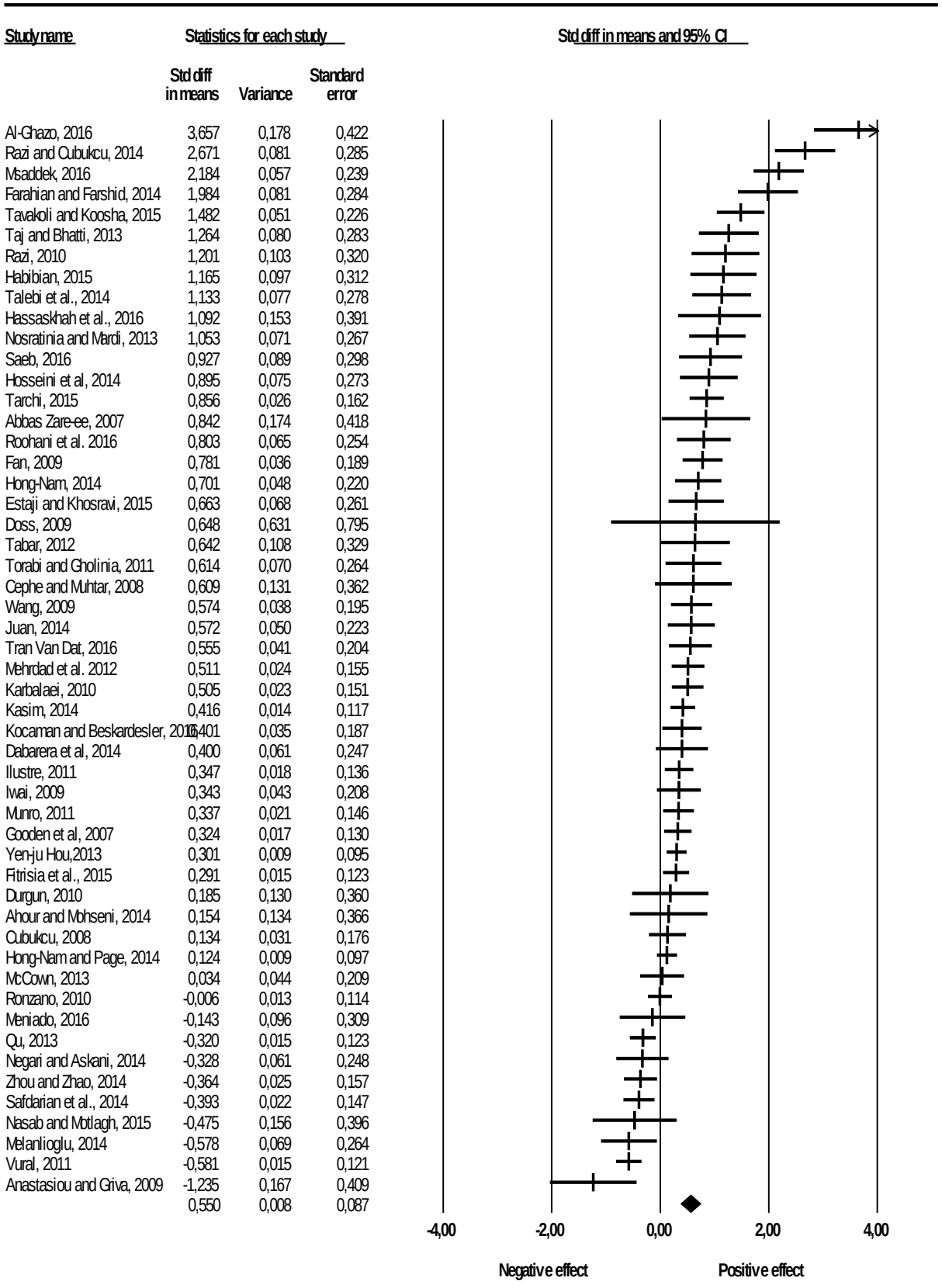


Figure 16. The forest plot (The effect sizes of the studies).

Test of overall heterogeneity is found to be significant within the strong range (I^2 = 90.264%; Q = 523.844, df = 51, p < .000). These results suggest that significant dispersion (90%) exist between studies that are not due to chance alone. Heterogeneity points out that variance can be explained by moderator variables.

Although there are some effect sizes in the left side of the 0-point meaning that the experiment or the causal comparative studies' results have negative effect, most of the studies are on the right side of the 0-point indicating that the experiment or the causal comparative studies' results have positive effect. Ten of the studies have negative effect sizes indicating that the experimental or the causal comparative studies' results have negative effect. The negative effect sizes for these ten studies refer that the effects of metacognitive reading strategies on reading skills is negative. Metacognitive reading strategies are affecting students reading skills in a negative way.

There are also some other studies on or very close to 0-point, which indicates that the results of the experimental or causal comparative studies have neither negative nor positive effect. Simply the experimental or causal comparative studies' results show no effect at all. Metacognitive reading strategies are not affecting students' reading skills.

Based on Cohen et al.'s (2007) rule of thumb: two of the studies have very weak effect sizes, between zero and 0.10. The number of studies that fall into a weak category between 0.10 and 0.30 is six. Thirteen studies have moderate effect sizes between 0.30 and 0.50. Fourteen studies have strong effect sizes, between 0.50 and 0.80. Finally, seventeen studies have very strong effect sizes above 0.80. All of these studies reflect that metacognitive reading strategies are affecting students reading skills in a positive manner.

Subgroup Analysis

In this part, the researcher will address the research questions aiming to elicit a total of 4 categorical moderators defined in the meta-analysis. These are the type of the study, design of the study, school level and context (region). These categorical moderators are employed in subgroup analysis to examine the potential for differences in the overall effect sizes of the studies.

Effectiveness of metacognitive reading strategies to the publication type of studies.

Subgroup analysis of the type of the study indicates a significant effect on the variation of the effect sizes. The result of these subgroup ANOVA analyses is presented in Table 5. There is a major difference between the effect sizes of the studies that are articles,

dissertations and theses (Q_B=7.482, df=2, p=0,024). Thesis type studies demonstrate a significantly larger effects (d=0.434) than article type studies (d=0.385) and dissertation type studies (d=0.222). However, there are only 2 thesis studies and these two studies are not heterogeneous (p=0.350). Article type and dissertation type studies show a significant heterogeneity within their groups (p=0.000 for both of them).

Table 5. *Subgroup Analysis- Type of the Study*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
Type of the Study	**k**	**d**	**Q**	**I^2**	**p**	**Q_W Df=49**	**p**	**Q_B Df=2**	**p**
Article	40	0.385	466.047	91.632	0.000				
Dissertation	10	0.222	49.440	81.796	0.000	516.362	0.000	7.482	0.024
Thesis	2	0.434	0.875	0.000	0.350				

These results imply that article type studies have moderate effect size, dissertation type studies have weak effect size and the thesis type studies have moderate effect size.

The forest plot in Figure 17 below also visualizes the dispersion among the effect sizes of the studies according to type of the studies.

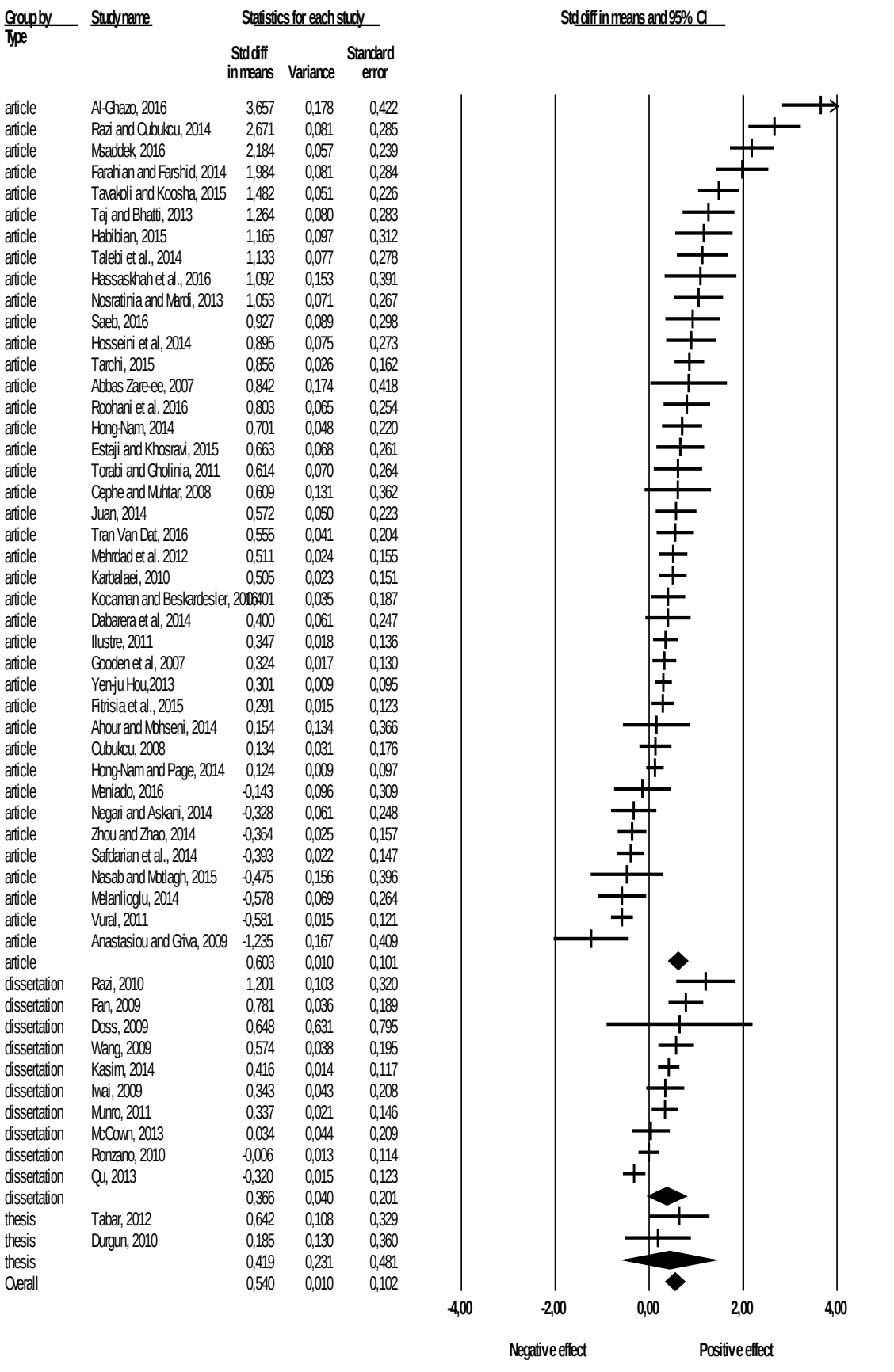


Figure 17. The forest plot according to type of studies (The effect sizes of the studies).

Effectiveness of metacognitive reading strategies to the research design of studies.

Table 6 below shows the results of subgroup analysis for the design of the study. This meta-analysis comprises only two designs of studies: experimental and causal comparative. Both groups contribute significantly to the variance found between effect sizes for the design of the study (Q_B=140.746, df=1, p=0,000).

The overall mean effect size for studies with experimental design is 0.744 and it is larger than the overall mean effect size for the studies with causal comparative design (d=0.106).

Table 6. *Subgroup Analysis- Design of the Study*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
Design of the Study	**k**	**d**	**Q**	**I^2**	**p**	**$Q_{W\ Df=50}$**	**p**	**$Q_{B\ Df=1}$**	**p**
Experimental	29	0.744	247.909	88.706	0.000	383.098	0.000	140.746	0.000
Causal Comparative Studies	23	0.106	135.189	83.726	0.000				

Studies with experimental design have strong effect size and the effect size for the studies with causal comparative design is weak.

The forest plot in Figure 18 below also visualizes the dispersion among the effect sizes of the studies according to design of the studies.

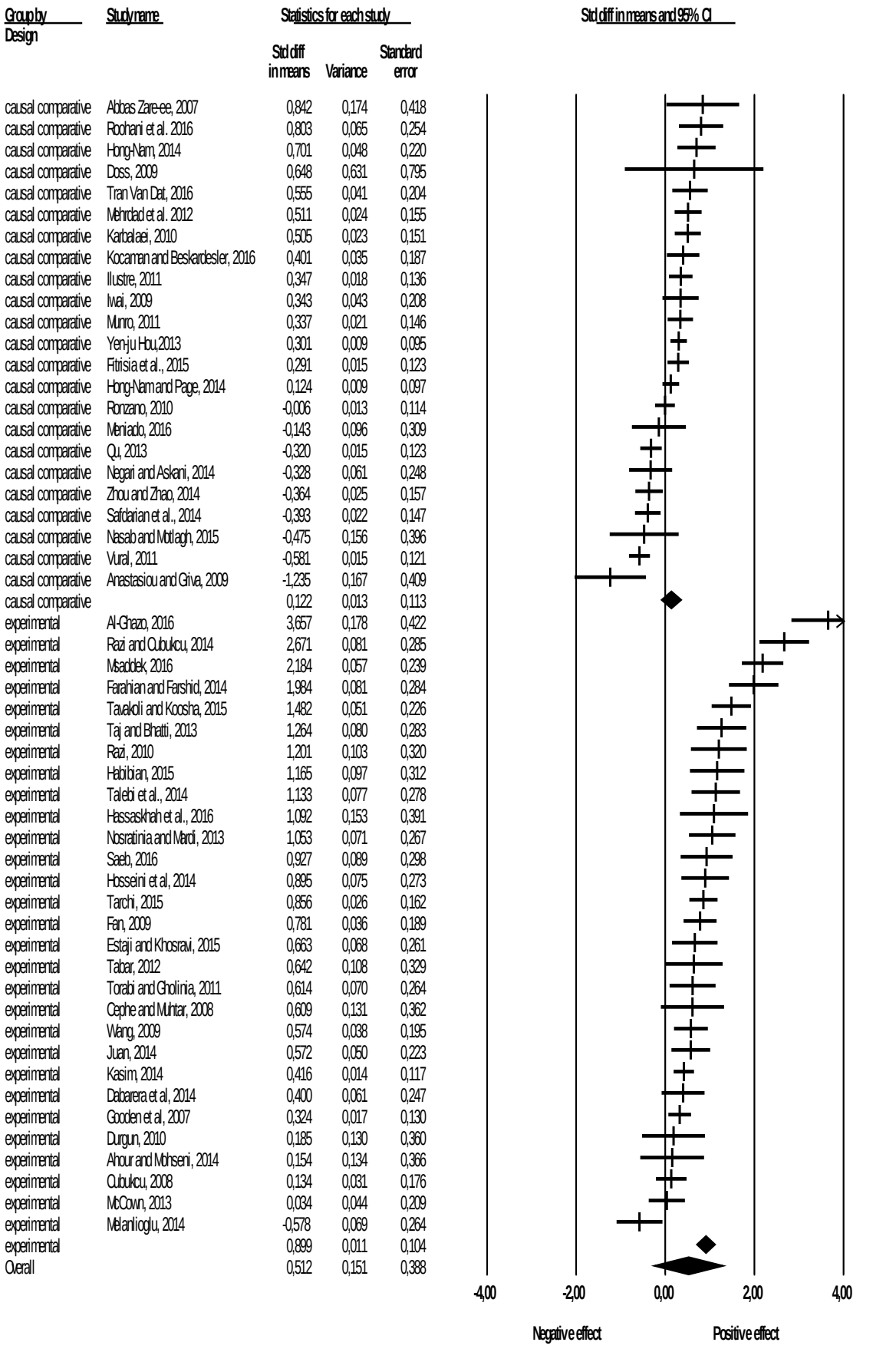


Figure 18. The forest plot according to design of studies (The effect sizes of the studies).

Effectiveness of metacognitive reading strategies to the educational stage (school level) studies focused on.

The school level groups (see Table 7) except for the primary group contribute significantly to the variance found between effect sizes for the school level of the study (Q_B=10.377, df=4, p=0,035). The primary school group (d=0.367, p=0.370) does not account for variance within the outcome of the study, but the others do. The ELT College group (d=0.439, p=0.002), and university group (d=0.411, p=0.000) demonstrate significantly larger effect than the other groups.

Table 7. *Subgroup Analysis- School Level*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
School Level	**k**	**d**	**Q**	**I^2**	**p**	**$Q_{W\ Df=47}$**	**p**	**$Q_{B\ Df=4}$**	**p**
ELT College	4	0.439	14.908	79.877	0.002				
High School	6	0.272	27.739	81.975	0.000				
Primary	2	0.367	0.802	0.000	0.370	513.468	0.000	10.377	0.035
Secondary	9	0.218	74.431	89.252	0.000				
University	31	0.411	395.587	92.416	0.000				

Studies conducted in ELT Colleges, universities and primary schools have moderate effect sizes. Studies conducted in high schools and secondary schools have weak effect sizes.

The forest plot in Figure 19 below also visualizes the dispersion among the effect sizes of the studies according to school level of the studies.

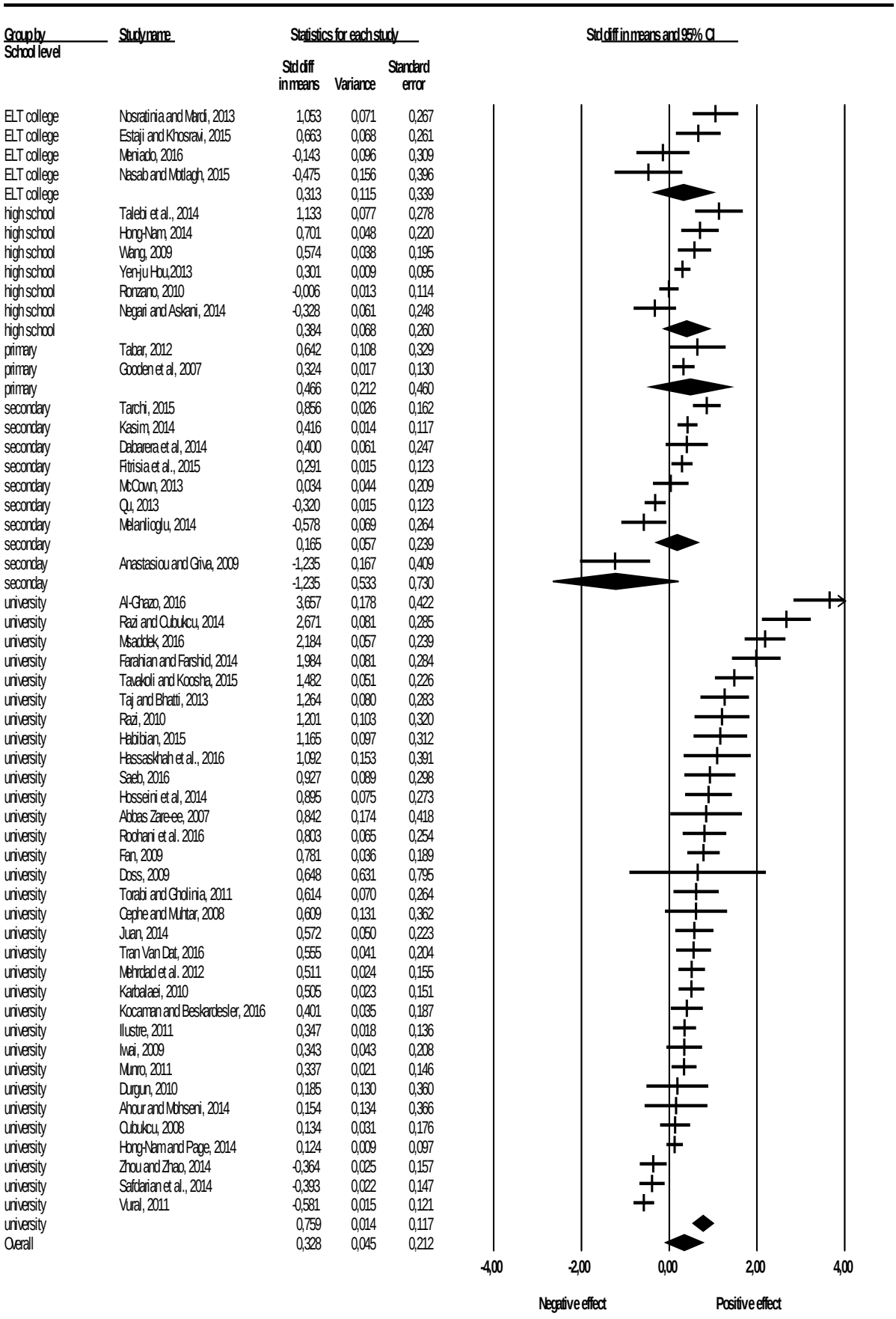


Figure 19. The forest plot according to school level of studies (The effect sizes of the studies).

Effectiveness of metacognitive reading strategies to the context (region) studies were done in.

Subgroup analysis of the region of the study indicates a significant effect on the variation of the effect sizes. The result of these subgroup ANOVA analyses is presented in Table 8.

Table 8. *Subgroup Analysis- Region*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
Region	**k**	**d**	**Q**	**I^2**	**p**	**$Q_{W\ Df=47}$**	**p**	**$Q_{B\ Df=4}$**	**p**
Africa	2	0.757	44.284	97.742	0.000	477.695	0.000	46.149	0.000
America	8	0.225	15.446	54.682	0.031				
Asia	13	0.283	74.032	83.791	0.000				
Europe	10	0.193	166.499	94.595	0.000				
Middle East	19	0.598	177.434	89.855	0.000				

There is a major difference between the effect sizes of the studies based on the regions (Q_B=46.149, df=4, p=0,000). Studies in Africa region demonstrate a significantly larger effects (d=0.757) than the other regions. However, there are only two studies included in this region. There are 19 studies in Middle East region and these studies demonstrate a significantly larger effects (d=0.598, p=0.000). Moreover, the forest plot in Figure 20 below also visualizes the dispersion among the effect sizes of the studies according to region of the studies.

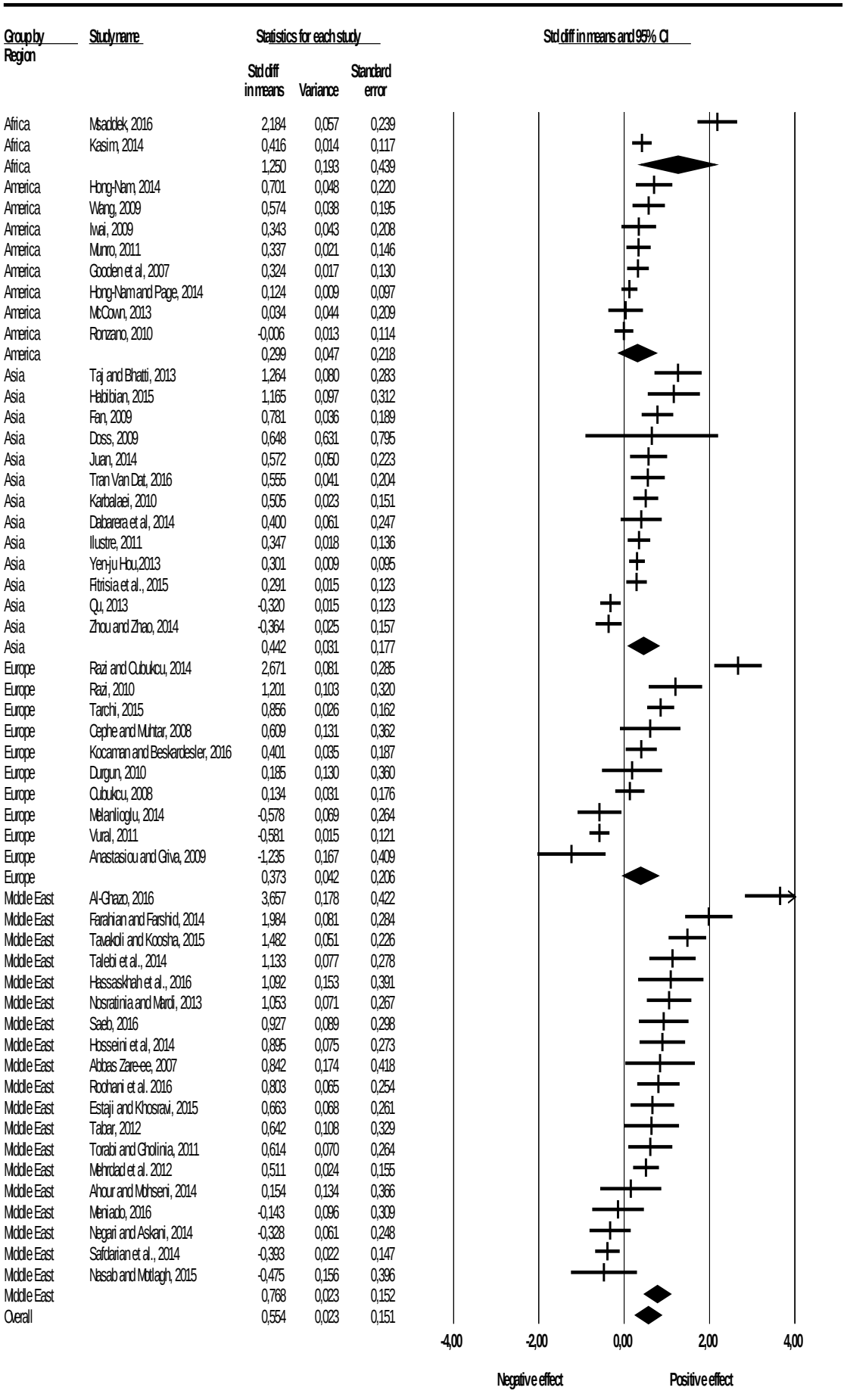


Figure 20. The forest plot according to region of studies (The effect sizes of the studies).

Publication Bias

Fail safe N analysis (see Figure 21) reveals that 3463 studies are needed to nullify the significant effect at p>0.05.

Classic fail-safe N

Z-value for observed studies	16.11417
P-value for observed studies	0.00000
Alpha	0.05000
Tails	2.00000
Z for alpha	1.95996
Number of observed studies	52.00000
Number of missing studies that would bring p-value to > alpha	3463.00000

Figure 21. Classic fail-safe N.

Figure 22 shows the funnel plot constructed upon random effect model by considering each study in the sample of studies as unit of analysis. The "funnel" shape of the plot seems to be asymmetric indicating the potential for missing studies which means there occurs publication bias. Furthermore, TFM imputes 14 additional studies for left of the mean and adjusted effect size is calculated as 0.185.

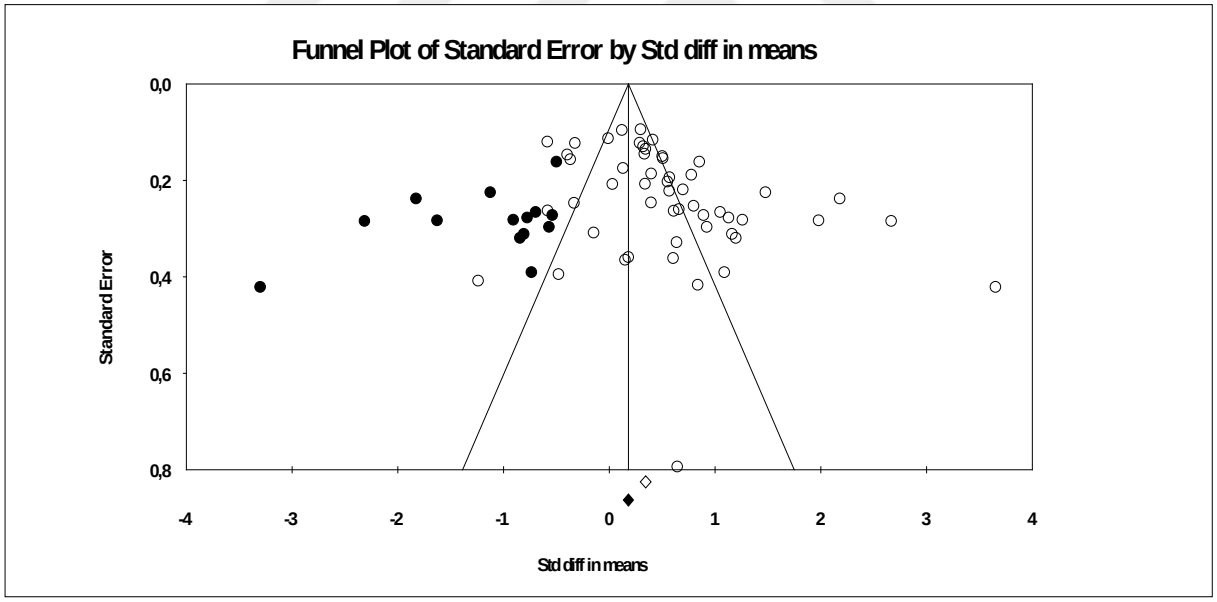


Figure 22. Funnel plot with the studies imputed by TFM, resulting in an adjusted effect size.

Orwin's fail safe N (see Figure 23), with a trivial d set at 0.01, indicates that 1736 missing studies with 0-effect size would be needed to take the overall effect size down to a trivial level.

Orwin's fail-safe N

Std diff in means in observed studies	0.34384
Criterion for a 'trivial' std diff in means	0.01000
Mean std diff in means in missing studies	0.00000
Number missing studies needed to bring std diff in means under 0.0	1736.00000

Figure 23. Orwin's Fail- Safe N.

Test of Heterogeneity for Experimental Studies

Cochran's Q statistics is used to verify the heterogeneity across experimental studies included in the meta-analysis. The results of this test are presented in Table 9 below. With the help of the results of Q statistical data, we can have a chance to determine the significance level of the dispersion in the effect sizes. The forest plot in Figure 24 below also visualizes this dispersion among the effect sizes of the experimental studies.

Table 9. *Overall Effects and Test of Heterogeneity for Experimental Studies*

	Effect Size estimate						
Model	**k**	**Cohen's d**	**S.E.**	**95% CI**		**Z**	**P**
Fixed	29	0.744	0.043	0.661	0.828	17.460	0.000
Random	29	0.911	0.131	0.655	1.168	6.960	0.000
	Test of Heterogeneity				**Tau Squared**		
	Q-Value	df(Q)	P-value	I^2	Tau Squared	S.E.	Tau
	247.909	28	0.000	88.706	0.424	0.153	0.651

Note: k=number of studies, d=Cohens D effect size, S.E.= Standard Error, CI= Confidence Interval, Z=Z-Score, P= Significance level, Q= Variance, I^2= Percentage of total variance

The overall mean effect size under fixed effect model is 0.744 with a standard error of 0.043. Under random effect model, the overall mean effect size is 0.911 with a standard error of 0.131.

Test of overall heterogeneity is found to be significant within the strong range (I^2 = 88.706%; Q = 247.909, df = 28, p < .000). These results suggest that significant dispersion (88%) exist between studies that are not due to chance alone. Heterogeneity points out that variance can be explained by moderator variables.

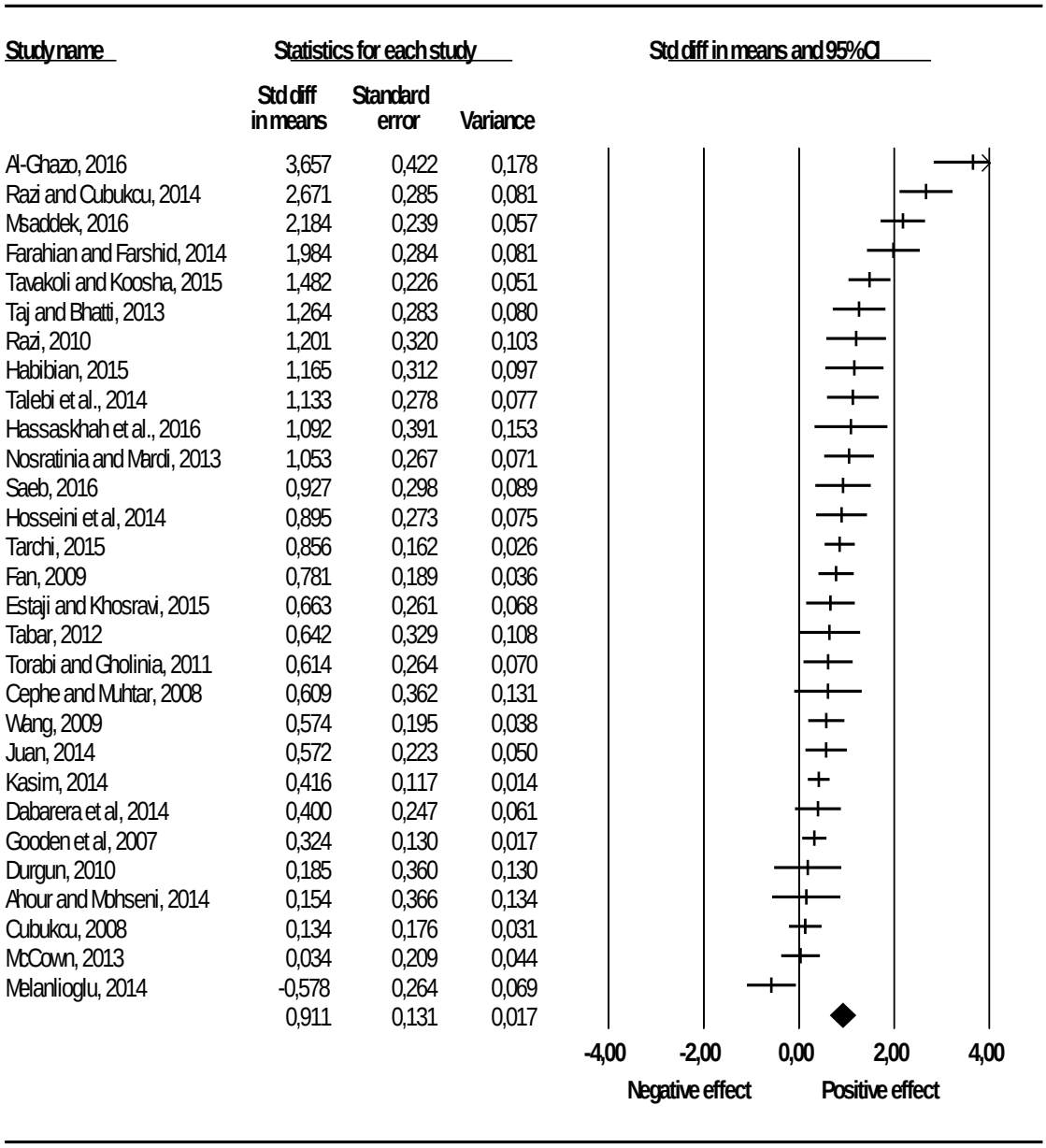


Figure 24. The forest plot of experimental studies (The effect sizes of the studies).

There is only one study in the left side of the 0-point meaning that it has negative effect which means metacognitive reading strategies are affecting students reading skills in a negative manner. Except for this study, most of the studies are on the right side of the 0-point indicating that the experimental studies' results have positive effect.

Based on Cohen et al.'s (2007) rule of thumb: one study has very weak effect size, between zero and 0.10. The number of studies that fall into a weak category between 0.10 and 0.30 is three. Three studies have moderate effect sizes between 0.30 and 0.50. Seven studies have strong effect sizes, between 0.50 and 0.80. Finally, fourteen studies have very strong effect sizes above 0.80. All of these studies reflect that metacognitive reading strategies are affecting students reading skills in a positive manner.

Subgroup Analysis for Experimental Studies

In this part, the researcher will address the research questions aiming to elicit a total of 4 categorical moderators defined in the meta-analysis. These are the type of the study, school level, context (region) and education-week. These categorical moderators are employed in subgroup analysis to examine the potential for differences in the overall effect sizes of the experimental studies.

Effectiveness of metacognitive reading strategies to the publication type of experimental studies.

Subgroup analysis of the type of the study indicates a significant effect on the variation of the effect sizes. The result of these subgroup ANOVA analyses is presented in Table 10. There is a major difference between the effect sizes of the studies that are articles, dissertations and theses (Q_B=16.712, df=2, p=0,000). Article type studies demonstrate a significantly larger effects (d=0.864) than dissertation type studies (d=0.498) and thesis type studies (d=0.434).

Table 10. *Subgroup Analysis- Type of the Experimental Studies*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
Type of the Study	**k**	**d**	**Q**	**I^2**	**p**	**Q_W Df=26**	**p**	**Q_B Df=2**	**p**
Article	22	0.864	214.676	90.353	0.000				
Dissertation	5	0.498	12.646	68.370	0.000	231.197	0.000	16.712	0.000
Thesis	2	0.434	0.875	0.000	0.350				

These results imply that article type studies have very strong effect size, dissertation type studies and the thesis type studies have moderate effect size.

The forest plot in Figure 25 below also visualizes the dispersion among the effect sizes of the studies according to type of the experimental studies.

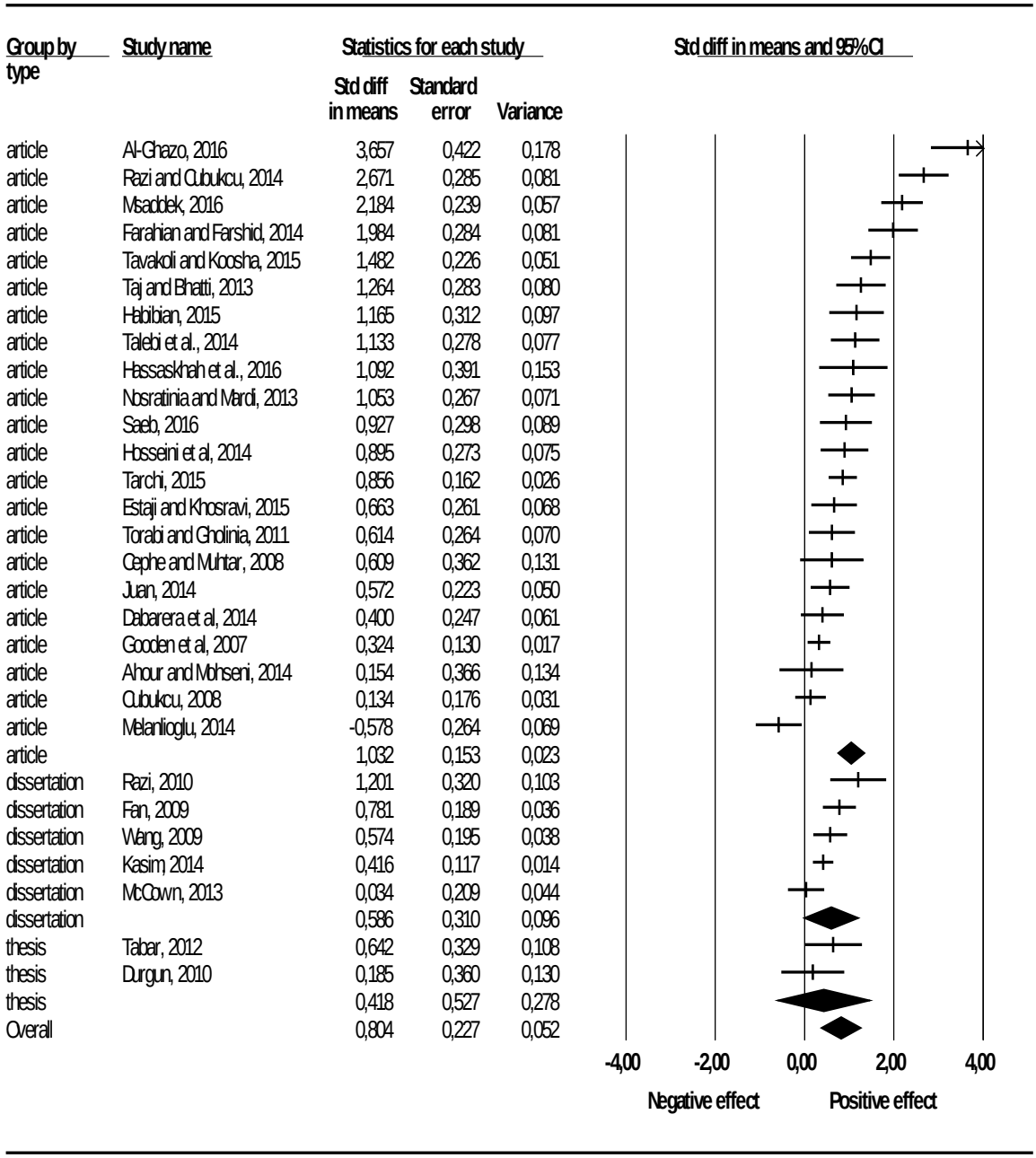


Figure 25. The forest plot of experimental studies according to type of the studies (The effect sizes of the studies).

Effectiveness of metacognitive reading strategies to the educational stage (school level) experimental studies focused on.

The school level groups (see Table 11) except for ELT college, high school and the primary school group contribute significantly to the variance found between effect sizes for the school level of the study (Q_B=51.333, df=4, p=0,000). The primary school group (d=0.367, p=0.370), the ELT College group (d=0.853, p=0.296) and high school (d=0.758, p=0.100) do not account for variance within the outcome of the study, but the others do. The

secondary school group (d=0.438, p=0.000), and university group (d=1.068, p=0.000) demonstrate significantly larger effect than the other groups.

Table 11. *Subgroup Analysis- School Level of Experimental Studies*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
School Level	**k**	**d**	**Q**	**I^2**	**p**	**$Q_{W\ Df=24}$**	**p**	**$Q_{B\ Df=4}$**	**p**
ELT College	2	0.853	1.094	8.565	0.296				
High School	2	0.758	2.709	63.080	0.100				
Primary	2	0.367	0.802	0.000	0.370	196.576	0.000	51.333	0.000
Secondary	6	0.438	33.857	85.232	0.000				
University	17	1.068	158.115	89.881	0.000				

Studies conducted in universities and ELT Colleges have very strong effect sizes. Studies conducted in high schools have strong effect sizes, primary schools and secondary schools have moderate effect sizes.

The forest plot in Figure 26 below also visualizes the dispersion among the effect sizes of the experimental studies according to school level of the studies.

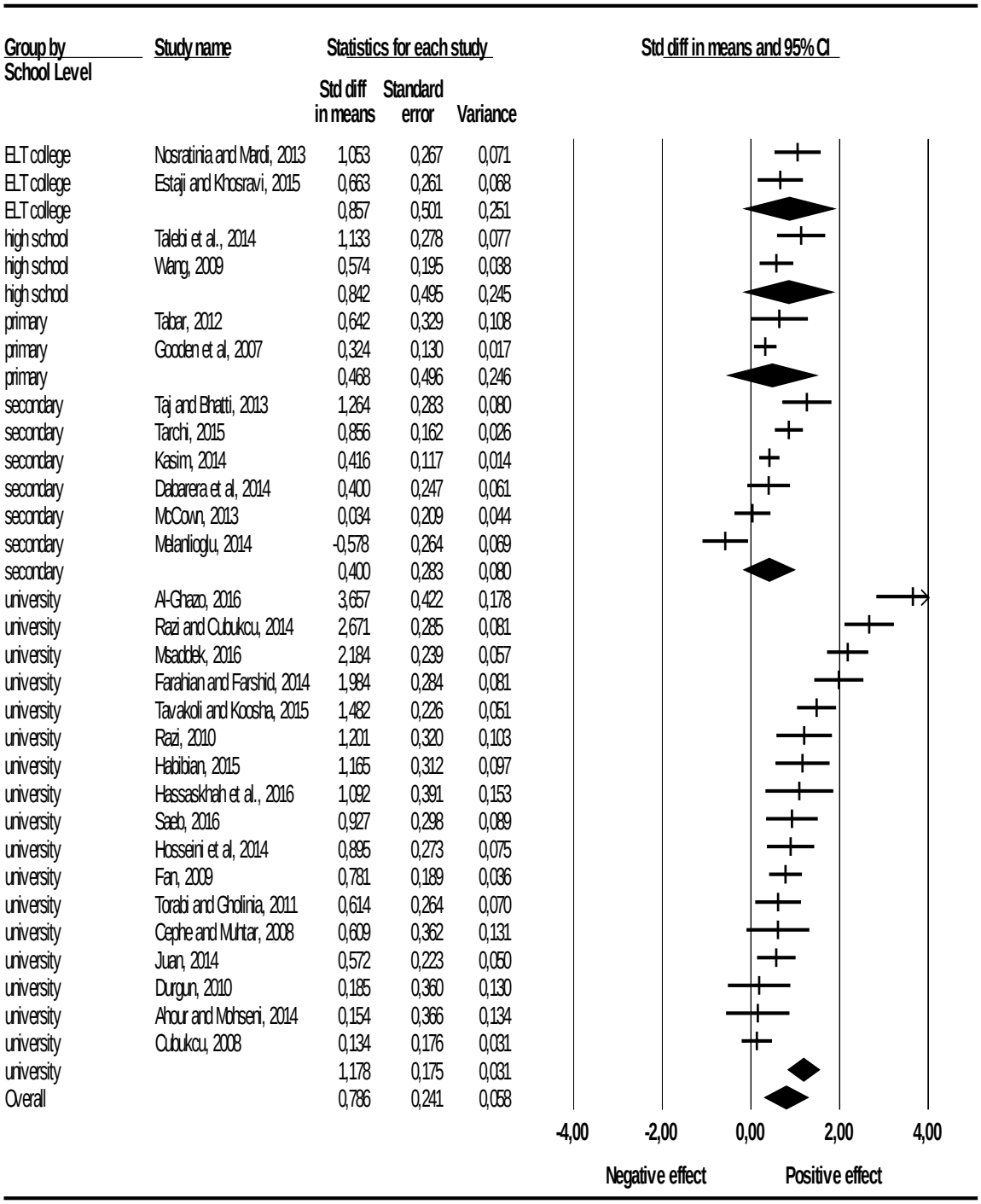


Figure 26. The forest plot of experimental studies according to school level of the studies (The effect sizes of the studies).

Effectiveness of metacognitive reading strategies to the context (region) experimental studies were done in.

Subgroup analysis of the region of the study except for America and Asia contribute significantly to the variance found between effect sizes for the region of the study (Q_B=40.566, df=4, p=0,000). The result of these subgroup ANOVA analyses is presented in Table 12.

Table 12. *Subgroup Analysis- Region of Experimental Studies*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
Region	**k**	**d**	**Q**	**I^2**	**p**	**$Q_{W\ Df=24}$**	**p**	**$Q_{B\ Df=4}$**	**p**
Africa	2	0.757	44.284	97.742	0.000	207.343	0.000	40.566	0.000
America	3	0.324	15.446	3.581	0.167				
Asia	5	0.775	74.032	7.692	0.104				
Europe	7	0.648	166.499	86.817	0.000				
Middle East	12	1.122	177.434	64.968	0.000				

Studies in Middle East region demonstrate a significantly larger effects (d=1.122) than the other regions. Studies conducted in Africa, Asia and Europe have strong effect sizes and studies done in America have moderate effect sizes.

The forest plot in Figure 27 below also visualizes the dispersion among the effect sizes of the studies according to region of the experimental studies.

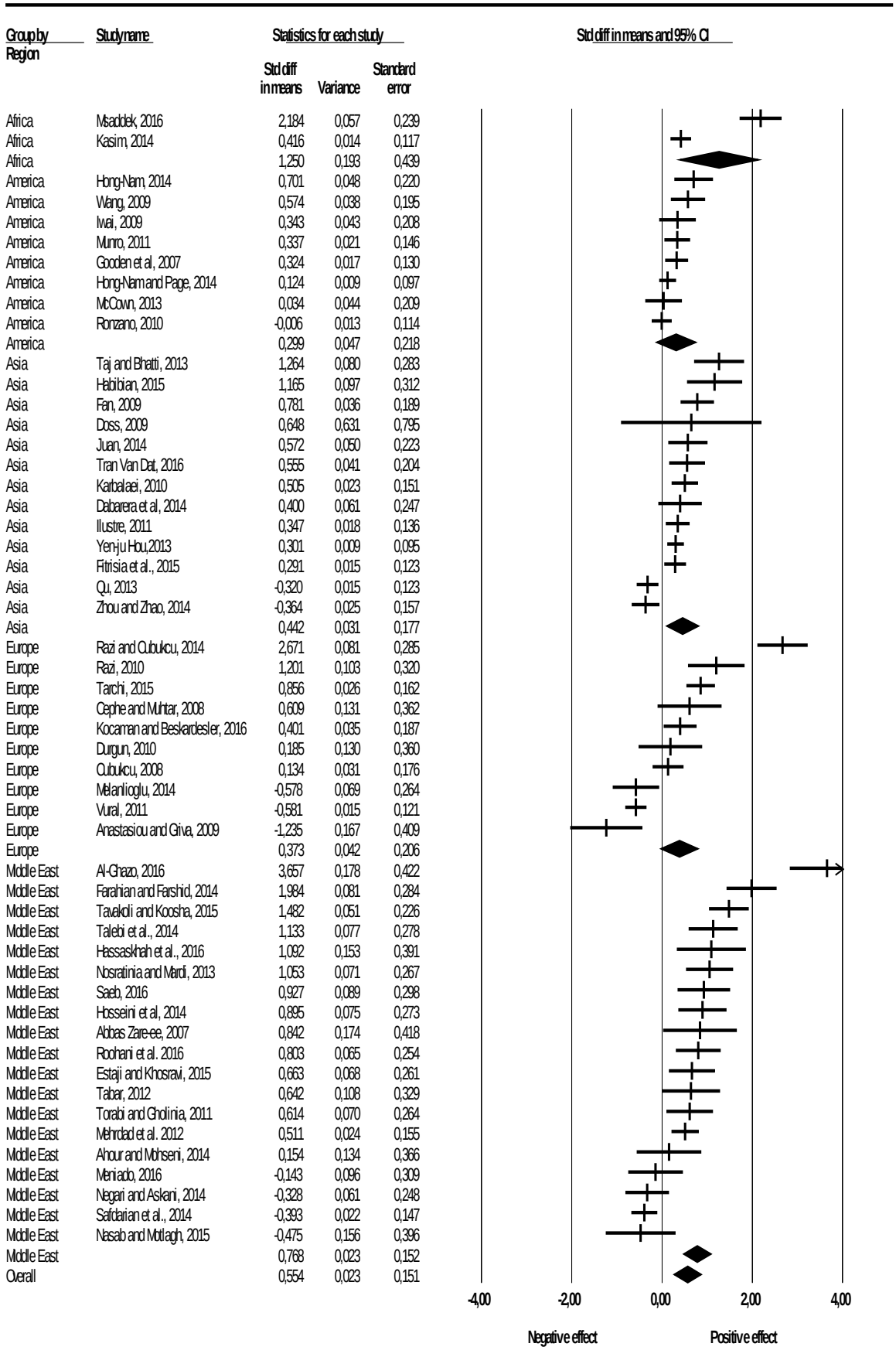


Figure 27. The forest plot of experimental studies according to region of the studies (The effect sizes of the studies).

Effectiveness of metacognitive reading strategies to the time frame of data collection (duration of week) in experimental studies.

There is significant differences between the duration of the weeks (see Table 13) (Q_B=23.837, df=3, p=0.000) which means that all the groups contribute significantly. 13-16 week group (d=1.375, p=0.000) and 1-4 week group (d=0.855, p=0.000) demonstrate the largest effects.

Table 13. *Subgroup Analysis- Duration of Week*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
Region	**k**	**d**	**Q**	**I^2**	**p**	**$Q_{W\ Df=22}$**	**p**	**$Q_{B\ Df=3}$**	**p**
1-4 week	6	0.855	34.214	85.386	0.000				
5-8 week	11	0.551	93.061	89.254	0.000				
9-12 week	6	0.764	69.345	92.790	0.000	221.518	0.000	23.837	0.000
13-16 week	3	1.375	24.899	91.967	0.000				

Studies conducted 1-4 week and 13-16 week education on metacognitive reading skills have very strong effect sizes. Studies conducted 9-12 week education on metacognitive reading skills have strong effect sizes. Studies conducted 5-8 week education on metacognitive reading skills have strong effect size.

The forest plot in Figure 28 below also visualizes the dispersion among the effect sizes of the studies according to duration of week for experimental studies.

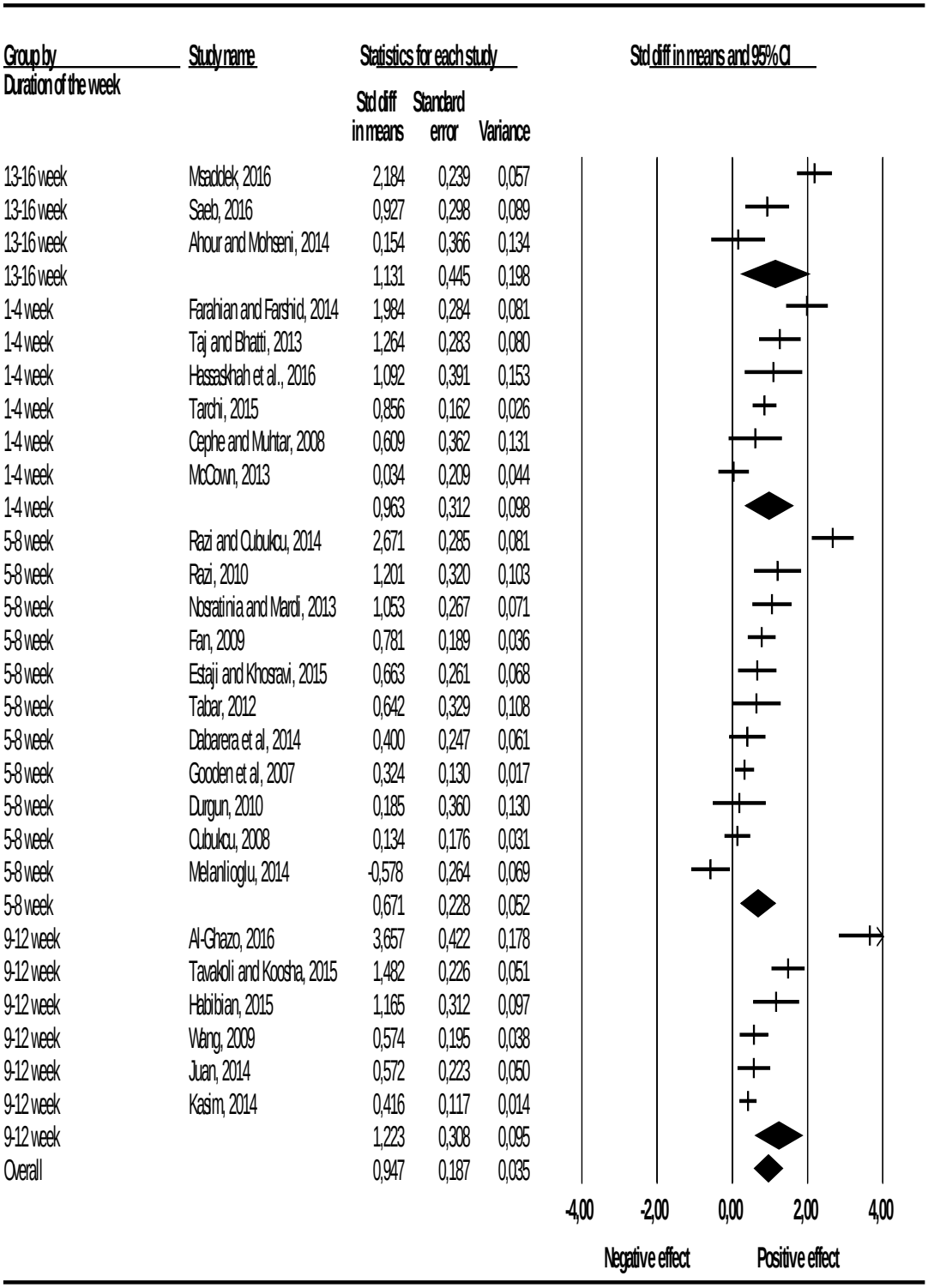


Figure 28. The forest plot of experimental studies according to duration of week (The effect sizes of the studies).

Meta Regression for Experimental Studies

The integer variables year of the study, sample size and education duration-week for the experimental studies are subjected to meta-regression analysis. The results of meta-regression are presented in Table 14.

Table 14. *Meta Regression, Random Effects, Z-Distribution, Std difference in means*

Covariate	B	S.E.	C.I. 95%		Z-value	P-value
Intercept	-245,1491	110,5753	-461,8727	-28,4255	-2,22	0,0266
Year	0,1223	0,0550	0,0146	0,2300	2,22	0,0261
Sample Size	-0,0005	0,0022	-0,0047	0,0038	-0,23	0,8215
EducDurationWeek	-0,0019	0,0333	-0,0671	0,0633	-0,06	0,9551

B = regression coefficient; SE = standard error; CI = confidence interval;

As is evident from the overall effect size estimates, sample size and education-week are not significantly related to the effect size. Year is a significant predictor, recent years are associated with higher effect sizes for metacognitive reading skills ($B = 0.1223$, $z = 2,22$, $p < 0.05$). In other words, as the year of the study approaches to today, the effect size also increases.

Furthermore, the adjusted R^2 index of this model (year, sample size and education-week) is like as following:

R^2 for Model 1, Random effects (MM), Z-Distribution, Std diff in means

Total variance in true effects (a)
0,4236

Not explained by model (b)
0,4180

Explained by model (c)
0,0056

$$R^2 = \frac{\text{Explained (c)}}{\text{Total (a)}} = \frac{0,0056}{0,4236} = 0,01$$

(a) To compute the total variance (of all studies about the grand mean) we run the regression with no covariates.
(b) To compute the variance not explained by the model (of all studies about the regression line) we run the regression with the covariates.
(c) The difference between these values gives us the variance explained by the model.

Thus, the model of year, sample size and education-week is responsible for 10% of the between study variance, which shows that this model variable moderates the results of the study significantly.

Publication Bias for Experimental Studies

Fail safe N analysis (see Figure 29) reveals that 2608 studies are needed to nullify the significant effect at p>0.05.

Classic fail-safe N

Z-value for observed studies	18,68740
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	29,00000
Number of missing studies that would bring p-value to > alpha	2608,00000

Figure 29. Classic fail-safe N for experimental studies.

Figure 30 shows the funnel plot constructed upon random effect model by considering each study in the sample of studies as unit of analysis. The "funnel" shape of the plot seems to be asymmetric indicating the potential for missing studies which means there occurs publication bias. Furthermore, TFM imputes 9 additional studies for left of the mean and adjusted effect size is calculated as 0.480.

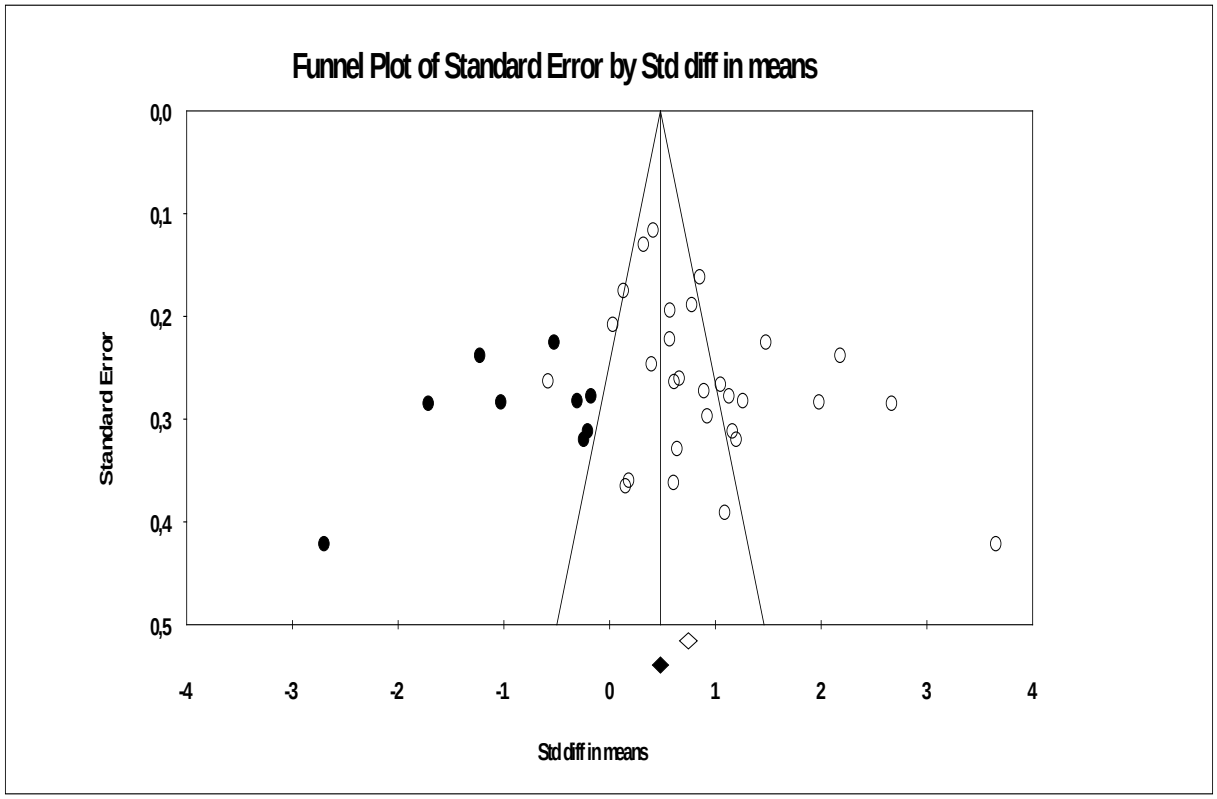


Figure 30. Funnel plot with the experimental studies imputed by TFM, resulting in an adjusted effect size.

Orwin's fail safe N (see Figure 31), with a trivial d set at 0.01, indicates that 2130 missing studies with 0-effect size would be needed to take the overall effect size down to a trivial level.

Orwin's fail-safe N

Std diff in means in observed studies	0,74447
Criterion for a 'trivial' std diff in means	0,01000
Mean std diff in means in missing studies	0,00000
Number missing studies needed to bring std diff in means under 0,01	2130,00000

Figure 31. Orwin's Fail- Safe N for experimental studies.

Test of Heterogeneity for Causal Comparative Studies

Cochran's Q statistics is used to verify the heterogeneity across causal comparative studies included in the meta-analysis. The results of this test are presented in Table 15 below.

Thanks to Q statistical data, we can determine the significance level of the dispersion in the effect sizes. The forest plot in Figure 32 below also visualizes this dispersion among the effect sizes of the experimental studies.

Table 15. *Overall Effects and Test of Heterogeneity for Causal Comparative Studies*

	Effect Size estimate						
Model	**k**	**Cohen's d**	**S.E.**	**95% CI**		**Z**	**P**
Fixed	23	0.106	0.033	0.041	0.170	3.218	0.000
Random	23	0.124	0.088	-0.048	0.296	1.410	0.000
	Test of Heterogeneity				**Tau Squared**		
	Q-Value	df(Q)	P-value	I^2	Tau Squared	S.E.	Tau
	135.189	22	0.000	83.726	0.131	0.056	0.362

Note: k=number of studies, d=Cohens D effect size, S.E.= Standard Error, CI= Confidence Interval, Z=Z-Score, P= Significance level, Q= Variance, I^2= Percentage of total variance

The overall mean effect size under fixed effect model is 0.106 with a standard error of 0.033. Under random effect model, the overall mean effect size is 0.124 with a standard error of 0.088.

Test of overall heterogeneity is found to be significant within the strong range (I^2 = 83.726%; Q = 135.189, df = 22, p < .000). These results suggest that significant dispersion (83%) exist between studies that are not due to chance alone. Heterogeneity points out that variance can be explained by moderator variables.

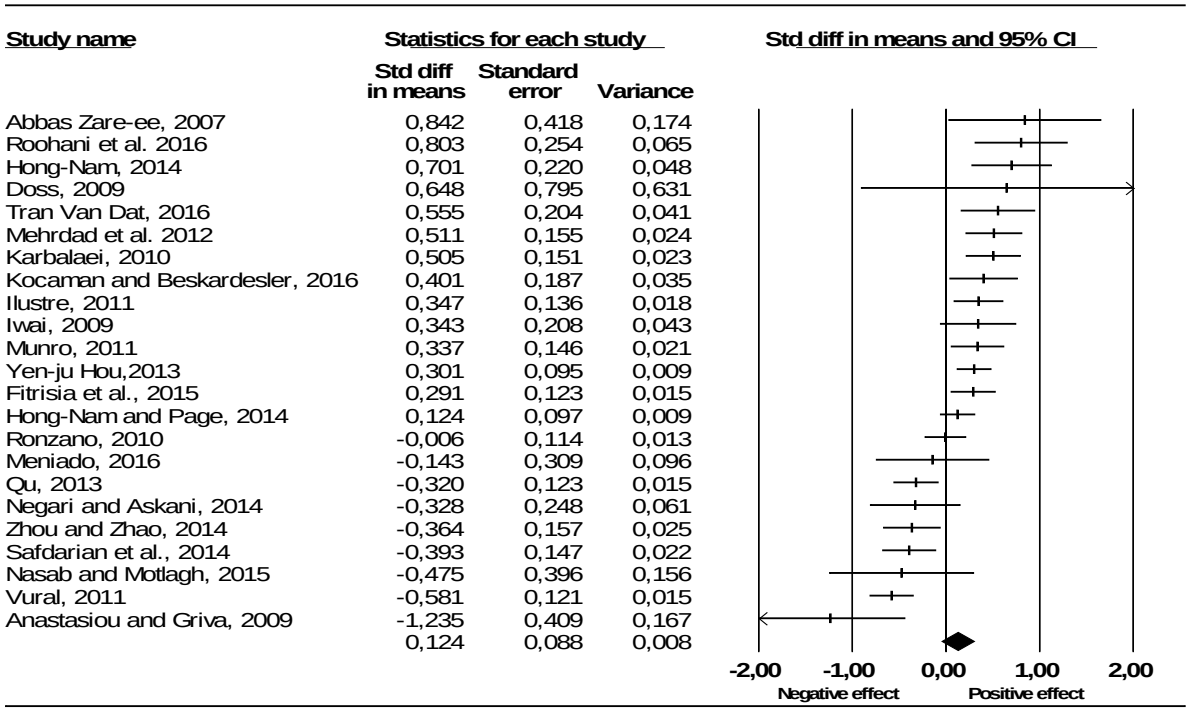


Figure 32. The forest plot of causal comparative studies (The effect sizes of the studies).

There are nine studies in the left side of the 0-point meaning that it has negative effect which means using metacognitive reading strategies by learners are affecting students reading skills in a negative manner. Fourteen studies are on the right side of the 0-point indicating that the causal comparative studies' results have positive effect.

Based on Cohen et al.'s (2007) rule of thumb: two studies have weak effect sizes, between 0.10 and 0.30. Five studies have moderate effect sizes between 0.30 and 0.50. Five studies have strong effect sizes, between 0.50 and 0.80. Finally, two studies have very strong effect sizes above 0.80. All of these studies reflect that usage of metacognitive reading strategies are affecting students reading skills in a positive manner.

Subgroup Analysis for Causal Comparative Studies

In this part, the researcher will address the research questions aiming to elicit a total of 3 categorical moderators defined in the meta-analysis. These are the type of the study, school level and context (region). These categorical moderators are employed in subgroup analysis to examine the potential for differences in the overall effect sizes of the experimental studies.

Effectiveness of metacognitive reading strategies to the publication type of causal comparative studies.

Subgroup analysis of the type of the study indicates a significant effect on the variation of the effect sizes. The result of these subgroup ANOVA analyses is presented in Table 16. There is not a major difference between the effect sizes of the studies that are articles and dissertations. (Q_B=2.281, df=1, p=0,131). Article type studies demonstrate a significantly larger effects (d=0.133) than dissertation type studies (d=0.015).

Table 16. *Subgroup Analysis- Type of the Causal Comparative Studies*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
Type of the Study	**k**	**d**	**Q**	**I^2**	**p**	**Q_W** Df=21	**p**	**Q_B** Df=1	**p**
Article	18	0.133	117.534	85.536	0.000	132.908	0.000	2.281	0.131
Dissertation	5	0.015	15.374	73.981	0.004				

These results imply that article type studies have weak effect size and dissertation type studies have very weak effect size.

The forest plot in Figure 33 below also visualizes the dispersion among the effect sizes of the causal comparative studies according to type of studies.

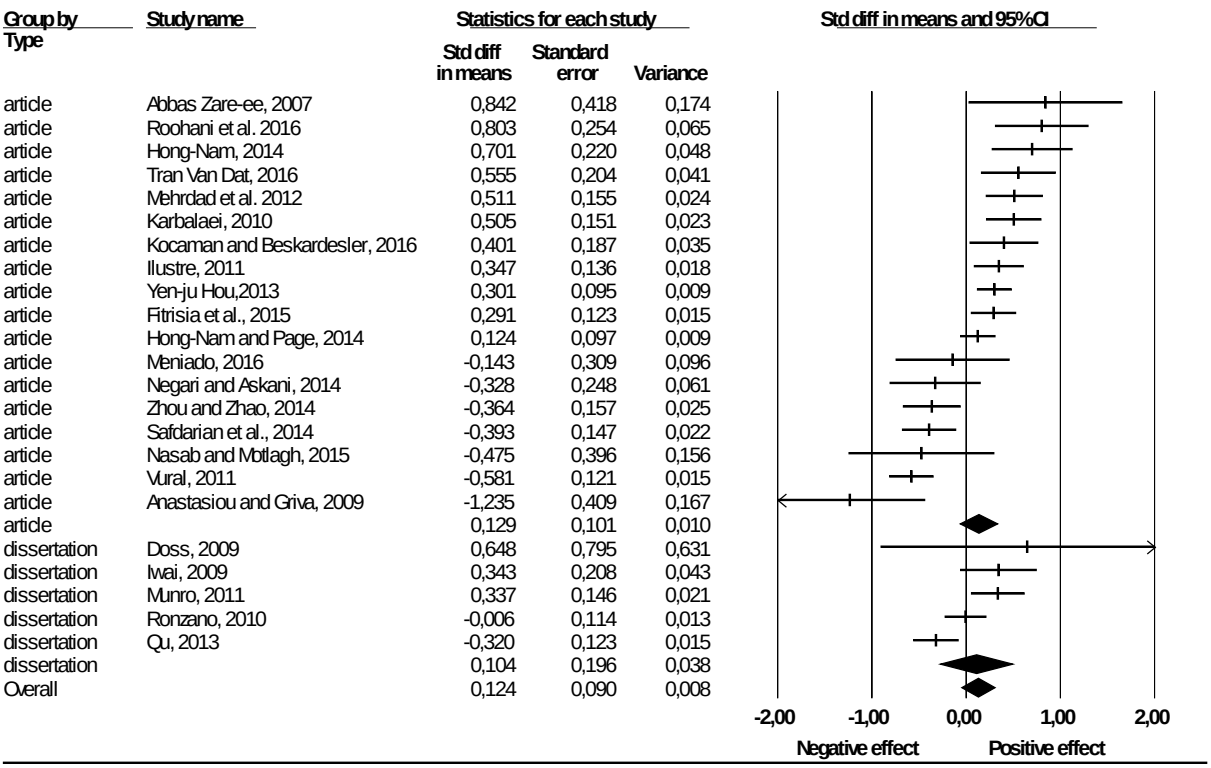


Figure 33. The forest plot of causal comparative studies according to type of the studies (The effect sizes of the studies).

Effectiveness of metacognitive reading strategies to the educational stage (school level) causal comparative studies focused on.

The school level groups (see Table 17) except for ELT college (d=-0.269, p=0.509) contribute significantly to the variance found between effect sizes for the school level of the study (Q_B=8.185, df=3, p=0,042). The high school group (d=0.186, p=0.003), the secondary school group (d=-0.067, p=0.000), and university group (d=0.128, p=0.000) demonstrate significantly larger effect than ELT college group.

Table 17. *Subgroup Analysis- School Level of Causal Comparative Studies*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
School Level	**k**	**d**	**Q**	**I^2**	**p**	**$Q_{W\ Df=19}$**	**p**	**$Q_{B\ Df=3}$**	**p**
ELT College	2	-0.269	0.436	0.000	0.509				
High School	4	0.186	14.099	78.722	0.003				
Secondary	3	-0.067	20.791	90.380	0.000	127.004	0.000	8.185	0.042
University	14	0.128	91.678	85.820	0.000				

Studies conducted in ELT Colleges and secondary schools have negative effect sizes which means that if the learners use more metacognitive reading strategies, their reading

comprehension is affected in a negative way. Studies conducted in high schools and universities have weak effect sizes.

The forest plot in Figure 34 below also visualizes the dispersion among the effect sizes of the causal comparative studies according to school level of the studies.

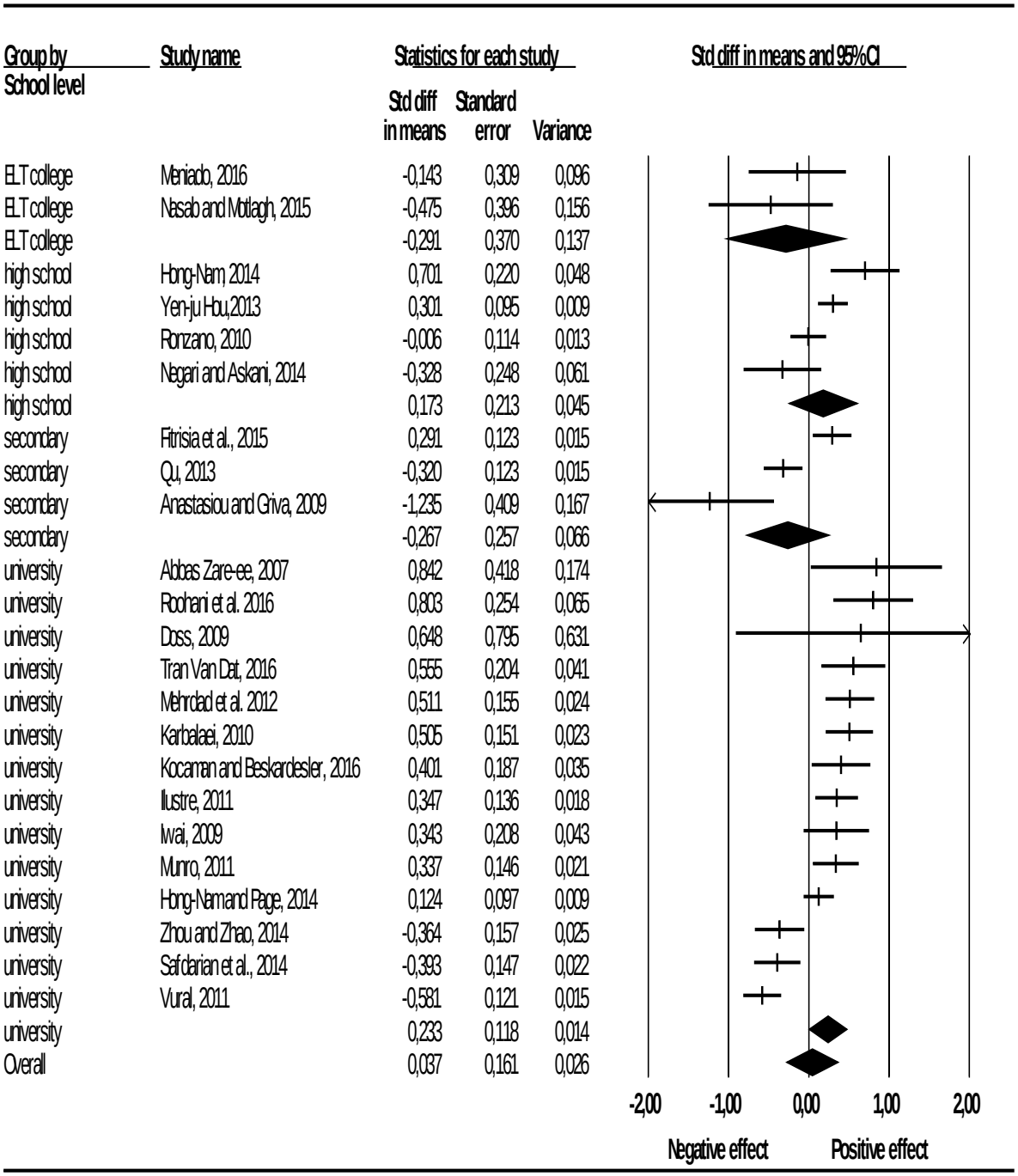


Figure 34. The forest plot of causal comparative studies according to school level of the studies (The effect sizes of the studies).

Effectiveness of metacognitive reading strategies to the context (region) causal comparative studies were done in.

Subgroup analysis of the region of the study contributes significantly to the variance found between effect sizes for the region of the study (Q_B=25.026, df=3, p=0,000). The result of these subgroup ANOVA analyses is presented in Table 18.

Table 18. *Subgroup Analysis- Region of Causal Comparative Studies*

Group	**Effect Size Estimates**		**Test of Heterogeneity**			**ANOVA Results**			
Region	**k**	**d**	**Q**	**I^2**	**p**	**$Q_{W\ Df=19}$**	**p**	**$Q_{B\ Df=3}$**	**p**
America	5	0.186	10.384	61.478	0.034	110.163	0.000	25.026	0.000
Asia	8	0.178	40.677	82.791	0.000				
Europe	3	-0.346	24.450	91.820	0.000				
Middle East	7	0.074	34.652	82.685	0.000				

Studies in America region demonstrate a slightly larger effects (d=0.186) than the other regions. Studies conducted in Middle East have very weak effect sizes and studies done in Asia and America have weak effect sizes. Studies conducted in Europe have negative effect sizes which means that the usage of metacognitive reading strategies by learners affects their reading comprehension in a negative way.

The forest plot in Figure 35 below also visualizes the dispersion among the effect sizes of the studies according to region of the causal comparative studies.

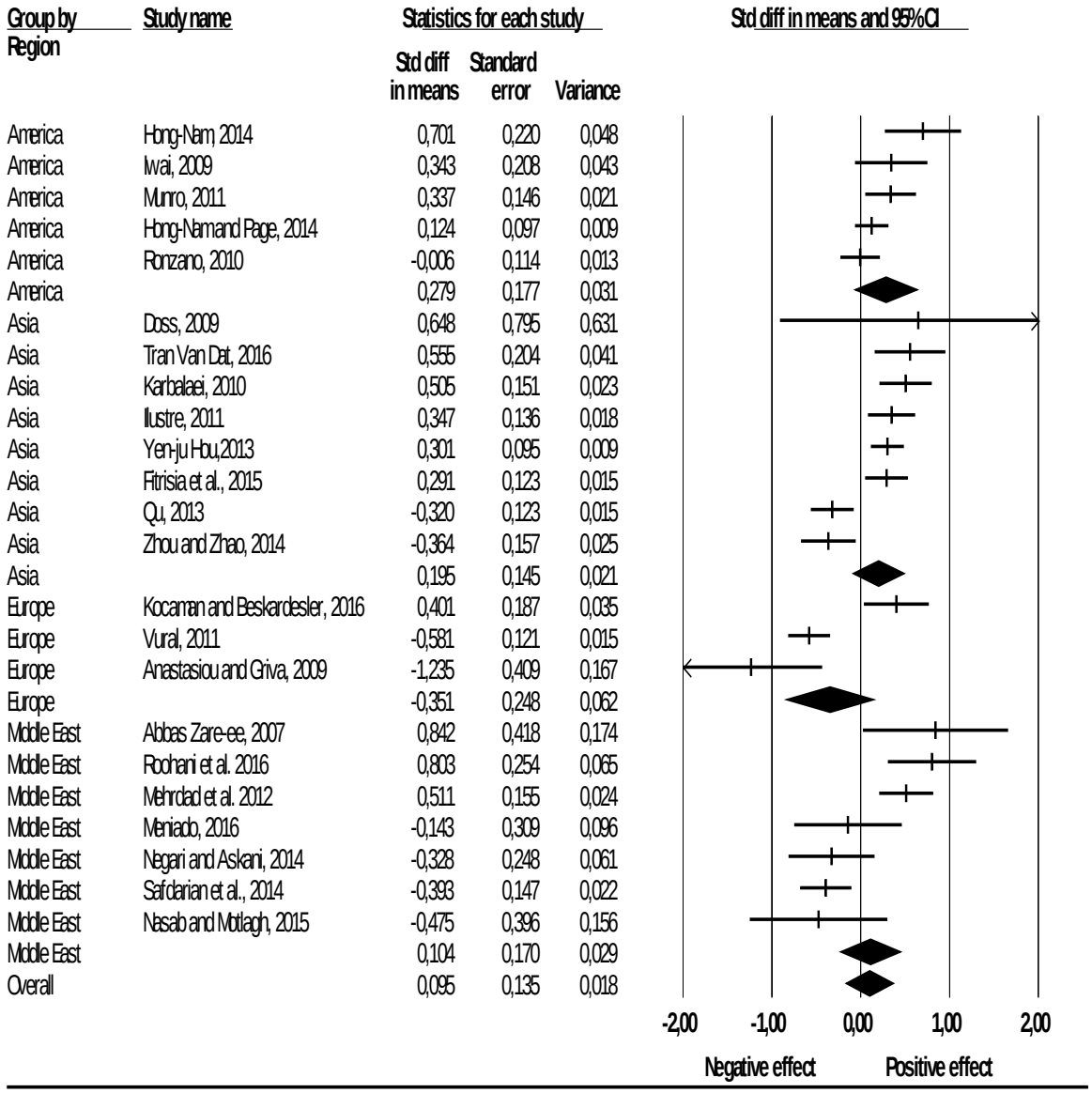


Figure 35. The forest plot of causal comparative studies according to region of the studies (The effect sizes of the studies).

Publication Bias for Causal Comparative Studies

Fail safe N analysis (see Figure 36) reveals that 41 studies are needed to nullify the significant effect at p>0.05.

Classic fail-safe N

Z-value for observed studies	3,24578
P-value for observed studies	0,00117
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	23,00000
Number of missing studies that would bring p-value to > alpha	41,00000

Figure 36. Classic fail-safe N for causal comparative studies.

Figure 37 shows the funnel plot constructed upon random effect model by considering each study in the sample of studies as unit of analysis. The "funnel" shape of the plot seems to be asymmetric indicating the potential for missing studies which means there occurs publication bias. Furthermore, TFM imputes 1 additional study for left of the mean and adjusted effect size is calculated as 0.101.

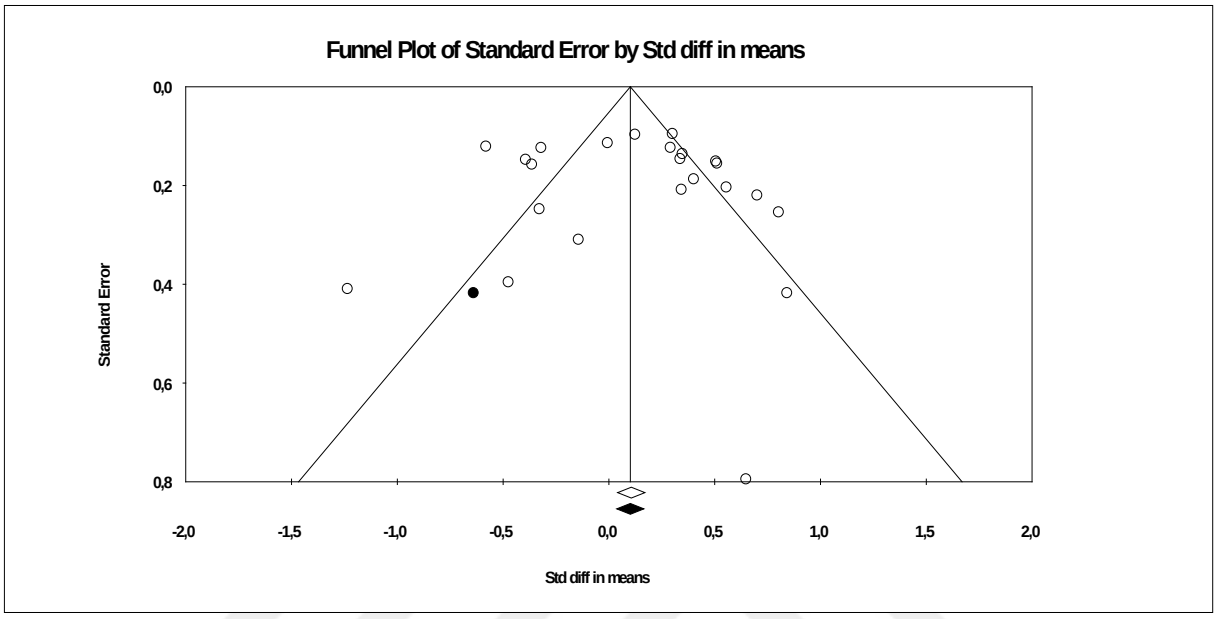


Figure 37. Funnel plot with the causal comparative studies imputed by TFM, resulting in an adjusted effect size.

Orwin's fail safe N (see Figure 38), with a trivial d set at 0.01, indicates that 221 missing studies with 0-effect size would be needed to take the overall effect size down to a trivial level.

Orwin's fail-safe N

Std diff in means in observed studies	0,10576
Criterion for a 'trivial' std diff in means	0,01000
Mean std diff in means in missing studies	0,00000
Number missing studies needed to bring std diff in means under 0,01	221,00000

Figure 38. Orwin's Fail- Safe N for causal comparative studies.

Conclusion

This chapter has presented 52 studies related to our thesis which were entered into CMA program and the results were tabled and presented with explanations.

In general, the first sub-section aimed at outlining descriptive data of 52 studies constituting the universe of the thesis in categorization of school level of study, the design of

study, year of study, type of study, region of study and country of study. In general, it is seen that experimental studies at university level are predominant. In the second sub-section, the heterogeneity of the 52 studies concluded in our analysis was examined and the effect sizes were presented by schematization. In the third sub-section, publication bias of these 52 studies was presented to improve the validity of our study. Later, experimental studies and causal comparative studies' findings such as heterogeneity and subgroup analysis with the tables and figures were given separately. Finally, for the experimental studies, it was examined whether year of the study, sample sizes and duration of the week training of experimental studies related to our current study have influence on effect sizes with meta-regression.

The following chapter will summarize the overall findings of the current study and discuss the effect of metacognitive reading strategies on reading comprehension by illustrating example studies done before. It will be intended to supply practical implications for practitioners and scholars regarding reading and metacognition in EFL/ESL. The chapter will conclude with outlining the limitations of the study and suggestions for further research.

CHAPTER FIVE

Conclusion

This chapter will synthesize the findings obtained in current study with discussion based on literature. Subsequently, the limitations of the study will be presented by impotently discussing the useful areas of further research.

Overview of Results

Metacognitive reading strategies have been one of the topics that have been seriously researched since 2000. Understanding what is read both in the mother language and in the second language is an important touchstone in education. Different strategies have been developed to make the reading comprehension more successful for learners and the most current and most effective strategies from them are metacognitive reading strategies. In this study, which is prepared by meta-analysis method, experimental studies and causal comparative studies were combined to determine the effect of using metacognitive reading strategies by learners and the instruction of metacognitive reading strategies on reading comprehension, and the effect sizes of the primary studies were determined. Moreover, they were also analyzed separately to see their effect sizes in their own group.

Experimental and causal comparative studies between 2007 and 2016 have been examined to find out the effect of the metacognitive reading strategies on reading comprehension. Within this scope, a total of 1446 studies consisting of MA theses, PhD dissertations and articles were obtained and as a result of the elimination criteria, 52 studies were included in the analysis. From these 52 studies included in the analysis, 31 studies (59.6%) were done at university level, 29 studies (55.8%) were done as experimental studies, 14 studies (26.9%) were done in 2014, 40 studies (76.9%) were done as articles, 19 studies (36.5%) were done in the Middle East Region and 5 studies (9.6%) were implemented during the 4-week training period.

The obtained values were collected from the data that corresponded to the study criteria. Findings obtained in the study were calculated with CMA 3 program. The 52 effect sizes used in the study that examined the effect of the metacognitive reading strategies on reading comprehension were calculated and according to that it was found out that 42 studies with ratio of 80.77% showed a positive effect. What’s more, when 28 studies (53.84%) are

considered to have a strong and very strong effect on the study, the conclusion of the study can be better understood.

52 studies investigating the effect of metacognitive reading strategies on reading comprehension have been examined to find out to what extent they have effect sizes in terms of the types of publications (article, dissertation and master thesis). As shown in Table 5, it was observed that the effect size of master theses (d=0.434) was larger than the other publication types. Furthermore, the findings show that article type studies (d=0.385) have moderate effect size, dissertation type studies (d=0.222) have weak effect size and the thesis type studies (d=0.434) have moderate effect size. When the heterogeneity is taken into consideration, since the number of master thesis studies is 2, the results are found like this. It can be said that the results obtained in the type of article where the universe is wider can be considered more valid. Moreover, while the highest effect size was found in the study of Al-Ghazo (2016) (d=3.657) as an experimental study in the type of article, the lowest effect size was found in the study of Anastasiou and Griva (2009) (d=-1.235) as a causal comparative study conducted in the form of an article.

52 studies investigating the effect of metacognitive reading strategies on reading comprehension have been examined to find out to what extent they have effect sizes in terms of the designs of the study (experimental and causal comparative studies). As shown in Table 6, the overall effect size for studies with experimental design are 0.744 and it is larger than the overall effect size for the studies with causal comparative design (d=0.106). Studies with experimental design have strong effect size and the effect size for the studies with causal comparative design is weak. It can be considered that experimental studies have higher effect sizes as experimental groups of the studies have been taken metacognitive reading strategies education. It shows us that if the learners get this education, they will be able to be more aware of metacognitive strategies as a consequence of which they will comprehend clearly what they read.

52 studies investigating the effect of metacognitive reading strategies on reading comprehension have been examined to find out to what extent they have effect sizes in terms of the school levels (primary, secondary, high school, university and ELT college). When the Table 7 is observed, it can be seen that 4 studies out of the 52 studies included in our study were done at ELT college, 6 studies were done at high school, 2 studies were done at primary school, 9 studies were done at secondary school and 31 studies were done at university-level. As seen in the Table 7, it was found that studies conducted in ELT Colleges (d=0.439), universities (d=0.411) and primary schools (d=0.367) have moderate effect sizes. Studies

conducted in high schools (d=0.272) and secondary schools (d=0.218) have weak effect sizes. When Table 7 is examined again, it can be concluded that heterogeneity at university level is high, but heterogeneity is found low for primary school with a small number of samples. It can be interpreted that adults use metacognitive reading strategies at a higher level and comprehend what they read clearly if the primary school level is left out by considering this situation.

52 studies investigating the effect of metacognitive reading strategies on reading comprehension have been examined to find out to what extent they have effect sizes in terms of region. As shown the Table 8, there is a major difference between the effect sizes of the studies based on the regions (QB=46.149, df=4, p=0,000). Studies in Africa region demonstrate a significantly larger effects (d=0.757) than the other regions. However, there are only two studies included in this region. There are 19 studies in Middle East region and these studies demonstrate a significantly larger effects (d=0.598, p=0.000).

In the last part of the analysis for all 52 studies, the publication bias of the studies has been reviewed. As seen in Figure 21, Fail safe N analysis reveals that 3463 studies are needed to nullify the significant effect at p>0.05. In addition, Orwin's fail safe N (see Figure 23), with a trivial d set at 0.01, indicates that 1736 missing studies with 0-effect size would be needed to take the overall effect size down to a trivial level. By examining Figure 22, it can be inferred that there are extreme studies that affect the overall impact size negatively. It can be inferred that the results of publication bias analyses present that the magnitude of bias is modest for the samples included in this meta-analysis. This can be because of high proportion of unpublished studies like doctoral dissertations and master theses within primary studies covered by meta-analysis. Moreover, the results indicate another source of bias: small sample studies tend to have larger effect sizes than the studies with larger samples. Yet, the analysis also shows that it can easily be compensated owing to variety of primary studies included in the meta-analysis.

Additionally, as this study investigates experimental studies and causal comparative studies, they have been analyzed separately to evaluate their results more properly.

For experimental studies included in the meta-analysis Cochran's Q statistics is used to verify the heterogeneity across studies. Test of overall heterogeneity has been found to be significant within the strong range (I^2 = 88.706%; Q = 247.909, df = 28, p < .000) (see Table 9). These results suggest that significant dispersion (88%) exist between studies that are not due to chance alone. Heterogeneity points out that variance can be explained by moderator variables.

When Table 9 is examined again, it can be concluded that the overall mean effect size under fixed effect model has been found as 0.744 with a standard error of 0.043. Under random effect model, the overall mean effect size has been found as 0.911 with a standard error of 0.131 which shows us that the training of metacognitive reading strategies have positive and very strong effect on learners' reading comprehension.

As seen in Table 10, subgroup analysis of the type of the study for experimental studies has revealed that article type studies (d=0.864) have very strong effect size, dissertation type studies (d= 0.498) and the thesis type studies (d=0.434) have moderate effect sizes.

As seen in Table 11, subgroup analysis of the school level of the study for experimental studies has revealed that studies conducted in universities (d= 1.068) and ELT Colleges (d=0.853) have very strong effect sizes. Studies conducted in high schools (d= 0.758) have strong effect sizes, primary schools (d= 0.367) and secondary schools (d= 0.438) have moderate effect sizes. We can deduce that the education of metacognitive reading strategies for adults can be more fruitful if we compare them with younger groups.

As seen in Table 12, subgroup analysis of the region of the study for experimental studies has revealed that studies in Middle East region demonstrate a significantly larger effects (d=1.122) than the other regions. Studies conducted in Africa (d=0.757), Asia (d=0.775) and Europe (d=0.648) have strong effect sizes and studies done in America (d=0.324) have moderate effect sizes. Thus, we can say that region is another moderator variable that affects the effectiveness of metacognitive reading strategies.

Experimental studies conducted 1-4-week (d=0.855) and 13-16-week (d=1.375) education on metacognitive reading skills have very strong effect sizes. Studies conducted 5-8-week (d=0.551) and 9-12-week (d=0.764) education on metacognitive reading skills have strong effect sizes (see Table 13). When the effect sizes of the related studies are observed, it can be inferred that education of metacognitive reading strategies in experimental groups influenced the use of metacognitive reading strategies and reading comprehension positively.

Additionally, the integer variables year of the study, sample size and education duration-week are subjected to meta-regression analysis. As seen in the Table 14, by considering the overall effect size estimates, it can be concluded that sample size and duration of the education-week are not significantly related to the effect size. Year is a significant predictor, recent years are associated with higher effect sizes for metacognitive reading skills

(B = 0.1223, z = 2,22, p < 0.05). In other words, as the year of the study approaches to today, the effect size also increases.

Moreover, when calculations R^2 of a model of moderator variables of year, sample size and education-week was computed, it was found out that this model is responsible for 10% of the between study variance, which shows that this model variable moderates the results of the study significantly.

The publication bias of the experimental studies has been reviewed. As seen in Figure 29, Fail safe N analysis reveals that 2608 studies are needed to nullify the significant effect at p>0.05. In addition, Orwin's fail safe N (see Figure 31), with a trivial d set at 0.01, indicates that 2130 missing studies with 0-effect size would be needed to take the overall effect size down to a trivial level. Figure 30 shows us the funnel plot with the experimental studies imputed by TFM, resulting in an adjusted effect size. We can deduce that there occurs publication bias which can be explained because of unpublished studies which have negative results.

For causal comparative studies, Cochran's Q statistics is used to verify the heterogeneity across studies included in the meta-analysis. Test of overall heterogeneity has been found to be significant within the strong range (I^2 = 83.726%; Q = 135.189, df = 22, p < .000) (see Table 15). These results suggest that significant dispersion (83%) exist between studies that are not due to chance alone. Heterogeneity points out that variance can be explained by moderator variables.

The overall mean effect size under fixed effect model has been found as 0.106 with a standard error of 0.033. Under random effect model, the overall mean effect size has been found as 0.124 with a standard error of 0.088. It means that causal comparative studies have weak effect sizes.

As seen in Table 16, subgroup analysis of the type of the study for causal comparative studies has revealed that article type studies (d=0.133) have weak effect size and dissertation type studies (d= 0.015) have very weak effect size. There has been done no studies for master thesis to investigate of the usage of metacognitive reading strategies by learners.

As seen in Table 17, subgroup analysis of the school level of the study for causal comparative studies has revealed that studies conducted in ELT Colleges (d=-0.269) and secondary schools (d=-0.067) have negative effect sizes which means that if the learners use more metacognitive reading strategies, their reading comprehension is affected in a negative

way. Studies conducted in high schools (d=0.186) and universities (d=0.128) have weak effect sizes.

As seen in Table 18, subgroup analysis of the region of the study for causal comparative studies has revealed that studies in America region demonstrate a slightly larger effects (d=0.186) than the other regions. Studies conducted in Middle East (d=0.074) have very weak effect sizes and studies done in Asia (d=0.178) and America (d=0.186) have weak effect sizes. Studies conducted in Europe (d=-0.346) have negative effect sizes which means that the usage of metacognitive reading strategies by learners affects their reading comprehension in a negative way.

Finally, the publication bias of the causal comparative studies has been reviewed. As seen in Figure 36, Fail safe N analysis reveals that 41 studies are needed to nullify the significant effect at p>0.05. In addition, Orwin's fail safe N (see Figure 38), with a trivial d set at 0.01, indicates that 221 missing studies with 0-effect size would be needed to take the overall effect size down to a trivial level. By examining Figure 37, we can say that the magnitude of bias is either trivial or modest for any of the samples included in this meta-analysis. Yet, the analysis also shows that it can easily be compensated by including very small amount of studies into the meta-analysis.

What Do Results Tell?

The main problem of our study is whether the metacognitive reading strategies affect the reading comprehension or not. As 52 studies included to this study are composed of experimental and causal comparative studies, it can be better to evaluate the results from both sides.

The education of metacognitive reading strategies can positively and significantly enhance reading comprehension. In practice, language classrooms should have a dual focus not only on teaching language content, but also on developing learning processes (Ellis & Sinclair, 2005) so incorporation of metacognitive reading strategies into everyday foreign language classroom activities and tasks will increase the rate of comprehending while reading in English (Tavakoli & Koosha, 2016).

Brown (2006) states that 'Cognitive strategies are more limited to specific learning tasks and they involve more direct manipulation of the learning material itself'. Some of the most important cognitive strategies are repetition, resourcing, translation, grouping, note taking, deduction, recombination, imagery, auditory representation, key word, contextualization, elaboration, transfer and inferencing. O'Malley et al. (1985) (as cited in

Hosseini, Zamanian, & Karimnia, 2014) point out that 'metacognitive' refers to an expression to indicate an executive function, strategies which involve planning for learning, thinking about the learning process as it is taking place, observing of one's production or comprehension, correcting your own mistakes and evaluating learning after an activity is completed. When O'Malley's classification is considered, it can be concluded that advance organizers, directed attention, selective attention, self-management, functional planning, self-monitoring, delayed production and self-evaluation are included among the major metacognitive strategies (Hosseini et al., 2014).

With regard to the relationship between metacognitive reading strategies and reading comprehension, the results confirmed the findings of the study conducted by for example Msaddek (2016) which attempted to explore the relationship between metacognitive reading strategies and reading comprehension and has 2,184 effect size estimates. The participants were 113 university students studying English as a second language. In the study, two groups were used as a control group and an experimental group. After the education of metacognitive reading strategies, the experimental group (N=63) reflected a more significant improvement at the level of strategy usage and reading performance than their counterpart, the control group (N=50), did at post-testing. This stated fact accords with previous related research (Al-Ghazo, 2016; Razı & Çubukçu, 2014; Farahian & Farshid, 2014; Nosratinia & Mardi, 2013; Fan, 2009) that emphasizes the importance of metacognitive reading strategy training and its seemingly fruitful impact on the learners' reading comprehension.

When causal comparative studies related to our thesis are examined, it can be seen that generally researchers try to investigate to what extent the students use metacognitive strategies which are categorized as problem solving strategies, global reading strategies and support strategies. It can be inferred that the learners use PROB more than SUB and GLOB (Roohani et al., 2016; Hong-Nam & Page, 2014; Hou, 2013). Moreover, causal comparative studies like experimental studies show us that raising the awareness of metacognitive reading strategies in the classroom improves the students' reading comprehension (Fitrisia et al., 2015).

Implications

Under random effect model, the overall mean effect size has been found as 0.550 which means the studies included in the current study have strong effect. Thus, it can be concluded that metacognitive reading strategies have a positive and strong effect on reading comprehension. The higher rate of using metacognitive reading strategies will lead to the

greater success in reading comprehension as a consequence of which the academic success of the learner will increase correspondingly.

Thus, the findings of the current study have some implications for not only learners and teachers but also material developers in the field of teaching English as a second or foreign language. EFL/ESL learners need to interiorize that developing and applying appropriate metacognitive reading strategies seem to improve their reading ability of comprehending in not only their content subjects but also their academic performance. In addition to this, students can have the opportunity to take responsibility for their own learning by enhancing their autonomy, independence and self-direction and also to bolster their self-efficacy if they use appropriate learning strategies in general and metacognitive reading strategies in particular. These factors are crucial because learners need to continue reading even when they are not in a formal classroom setting. So, teachers should help them to know both what strategies to use and when and how to apply them. More simply, they can be a guide for their students to learn quicker, easier and more effectively by integrating reading strategy training into their regular classroom activities and tasks.

Furthermore, it can be good for teachers to explain the characteristics, usefulness and applications of the strategy explicitly with several examples. Teachers should explicitly teach learners how the strategy is used, why it is important and when and how it is applied to the specific task at hand. Furthermore, teachers should prepare and plan their lessons with the selection of appropriate reading strategies, the rationale behind strategy use and in the classroom they should monitor the strategy selection and use and then evaluate the usefulness of metacognitive strategies for reading comprehension. In addition to this, it is better for language teachers to provide students with various and repeated opportunities to practice the new strategies on different learning tasks and activities as a consequence of which the strategy itself can become a part of students' procedural knowledge. Teachers should also periodically check what students have understood and provide them with constructive feedback in the aim of helping them expand their strategy use not only in the classroom but also beyond it.

Additionally, for learners being aware of metacognitive reading strategies is very important so teachers should also help students identify their current metacognitive awareness of reading strategies with the help of a variety of data collection methods and consciousness-raising techniques like questionnaires, informal self-checklists, one-on-one and group interviews, diaries, verbal reports, strategy workshops and other means (Tavakoli & Koosha, 2016). In essence, learners are able to be metacognitively aware as well as to become effective users of the language and eventually to become strategic language learners

(Alhaqbani & Riazi, 2012). More importantly, teachers should be trained in strategy instruction and assessment for the instruction to be more beneficial.

The most important role should be taken by material developers. They should design and incorporate tasks and exercises into the reading materials which elicit different kind of reading strategies and they should also provide various practice opportunities as a result of which students can employ strategies autonomously (Tavakoli & Koosha, 2016).

Finally, in this field there is not enough meta-analysis to see the effect sizes of the studies done before. Scholars can use meta-analysis to combine the studies to create a full picture of universe which has been examined.

Limitations of the Current Study and Suggestions for Further Research

Databases provide great convenience in accessing the desired studies. However, not all of the studies could be added to the universe of the study because of the reasons such as the fact that some individual studies are restricted by authors and some databases can be accessed with the paid membership. This affects the content validity of the study results negatively. Moreover, most studies where the researchers do not present full quantitative data could not be included in the meta-analysis.

Coding procedure is very important in meta-analysis. Coding form of current study was composed according to research questions in excel program but coding reliability was checked with only the researcher and another researcher. Future research studies can compute coding reliability with more than one researcher.

In this meta analysis study done with the appropriate studies related to our thesis, subgroup analysis of publication type, design of study, the educational stage, the time frame and the context (region) was done. For the future studies, different subgroups can be examined like the level of proficiency in English, the gender and so on and their effect sizes also can be calculated. It can be identified with which elements metacognitive reading strategies will have more impact on the success of the reading comprehension.

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APPENDIX

APPENDIX 1

Coding Form

CODING SHEET

Coder Name:
Study No:
The title of the study:

1. **Authors or Researchers:**
2. **Year of the Study:**
3. **Country:**
4. **Publication type :**
   ___Journal Article ___Master Thesis ___Doctoral Dissertation
   ___Other (Specify): ……..
5. **Research Design:**
   ___Experimental
   ___Causal comparative study
   ___Other (Specify): ……..
6. **School Level:**
   ___Primary ___Secondary ___College ___University
   ___Unspecified ___Other (Specify): ……..
7. **Sample Size:**
8. **For experimental studies, duration of training (week, session etc.):**
9. **Study Results:**

	Independent Groups	Group A Experimental ( ) Control ( ) Pre-test Results	Group A Experimental ( ) Control ( ) Post-test Results	Group B Experimental ( ) Control ( ) Pre-test Results	Group B Experimental ( ) Control ( ) Post-test Results
n (Sample size)					
X (Mean)					
S(Standard Deviation)					
SE (Standard Error)					
MSE					
t (t-value)					
F (Anova F value)					
R					
p (p-value)					
Correlation Value					

APPENDIX 2

CODING MANUAL

Directions:

The coding sheet consists of 9 items on one page. For the items with multiple choices, you are expected to select one. For some of the items, you are expected to write short answers on the spaces provided. If there is not enough information provided by the authors about what is asked on the item, label it as "unspecified" by selecting or writing it explicitly.

The following instructions start with a clear explanation what you are expected to do for each item and then (if necessary) some important points are highlighted on the "be aware of that" part. Please, read and try to follow the instructions as strictly as possible to be able to establish high inter-coder reliability.

1. Authors or Researchers:

Write the author or authors' names and surnames.

2. Publication Year:

Write the publication year of the study.

Be aware of that:

Implementation year may be different from publication year and for this item publication year are asked to be written.

3. Country:

Indicate the country where the study has been implemented.

Be aware of that:

The country in which the study has been published may be different from the one it has been implemented. Be careful that, in this item, "country" refers to the one the research has been implemented.

4. Publication Type:

Indicate whether it is a journal article, thesis, dissertation or other kind of publications like a presentation in a conference or meeting or an ERIC document etc…

5. Research Design:

Decide whether the research has been designed as experimental or causal comparative or others. Make your decision based on explanation about the details of the research. Your decision may not be same with what the author(s) indicates about the type of research design.

6. School Level:

Select the appropriate school level the study has been implemented.

7. Sample Size:

Record the sample size of study.

Be aware of that:

Sample size refers to total number of the participants in both control and experimental conditions included in the main study. If there are different types of sample (i.e. from different school types or levels), record sample size for each type separately. Please note that sample size covers only the participants in the main study, so (if exists) exclude the sample in the pilot study.

8. Total Length of Treatment for Experimental Studies (in months, weeks, days, or hours):

Record total length of treatment, which is the time interval between beginning and end of the implementation, as it is stated on the paper.

Be aware of that:

Do not forget to specify the unit (i.e. month, week, day or hour).

9. Study Results:

Record the results for each instruments administered during the study.

Be aware of that:

Please code as much information as possible about the study results like effect size, p, t, F, pre-test post-test mean, standard deviation, sample sizes of experimental and control groups...

APPENDIX 3

INTER-CODER RELIABILITY DATA

The items, which have been coded consistently are labeled as "1" while the ones, which have been coded differently, are represented by "0" in the table.

	Coder													
Item No	Study 1	Study 2	Study 3	Study 4	Study 5	Study 6	Study 7	Study 8	Study 9	Study 10	Study 11	Study 12	Study 13	Study 14
1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	0	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	0	1	1	1	1	0	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	0	1	0	0	1	0	1	1	1
Score	9	9	9	8	9	8	7	8	8	9	8	8	9	9
AR	1.00	1.00	1.00	0.888	1.00	0.888	0.777	0.888	0.888	1.00	0.888	0.888	1.00	1.00
AR (Average)	**0.936**													

APPENDIX 4

List of Effect Sizes Revealed from Primary Studies with Subgroups and Integer Variables

	Study name	Std diff in	school level	experimental-causal comparative	year	sample size	type	Country	Region	duration of edu.	EducDurationWeek
2	Al-Ghazo, 2016	3,657	university	experimental	2016	60	article	Jordan	middle east	10 week	10
3	Razi and Cubukcu, 2014	2,671	university	experimental	2014	93	article	Turkey	europe	6 week	6
4	Msaddek, 2016	2,184	university	experimental	2016	113	article	Morocco	africa	16 week	16
5	Farahian and Farshid, 2014	1,984	university	experimental	2014	74	article	Iran	middle east	4 week	4
6	Tavakoli and Koosha, 2015	1,482	university	experimental	2015	100	article	Iran	middle east	12 week	12
7	Taj and Bhatti, 2013	1,264	secondary	experimental	2013	60	article	Pakistan	asia	4 week	4
8	Razi, 2010	1,201	university	experimental	2010	46	dissertation	Turkey	europe	6 week	6
9	Habibian, 2015	1,165	university	experimental	2015	48	article	Malaysia	asia	12 week	12
10	Talebi et al., 2014	1,133	high school	experimental	2014	60	article	Iran	middle east	16 session	4
11	Hassaskhah et al., 2016	1,092	university	experimental	2016	30	article	Iran	middle east	4 week	4
12	Nosratinia and Mardi, 2013	1,053	ELT college	experimental	2013	64	article	Iran	middle east	6 week	6
13	Saeb, 2016	0,927	university	experimental	2016	50	article	Iran	middle east	16 week	16
14	Hosseini et al, 2014	0,895	university	experimental	2014	60	article	Iran	middle east	na	0
15	Tarchi, 2015	0,856	secondary	experimental	2015	166	article	Italy	europe	4 week	4
16	Abbas Zare-ee, 2007	0,842	university	causal comparative	2007	30	article	Iran	middle east	na	0
17	Roohani et al. 2016	0,803	university	causal comparative	2016	75	article	Iran	middle east	na	0
18	Fan, 2009	0,781	university	experimental	2009	143	dissertation	Taiwan	asia	7 week	7
19	Hong-Nam, 2014	0,701	high school	causal comparative	2014	96	article	USA	america	na	0
20	Estaji and Khosravi, 2015	0,663	ELT college	experimental	2015	62	article	Iran	middle east	5 week	5
21	Doss, 2009	0,648	university	causal comparative	2009	10	dissertation	Malaysia	asia	na	0
22	Tabar, 2012	0,642	primary	experimental	2012	39	thesis	United Arab E.	middle east	8 week	8
23	Torabi and Gholinia, 2011	0,614	university	experimental	2011	60	article	Iran	middle east	10 session	2
24	Cephe and Muhtar, 2008	0,609	university	experimental	2008	32	article	Turkey	europe	1 week	1
25	Wang, 2009	0,574	high school	experimental	2009	110	dissertation	USA	america	10 week	10
26	Juan, 2014	0,572	university	experimental	2014	84	article	China	asia	12 week	12
27	Tran Van Dat, 2016	0,555	university	causal comparative	2016	107	article	Vietnam	asia	na	0
28	Mehrdad et al. 2012	0,511	university	causal comparative	2012	180	article	Iran	middle east	na	0
29	Karbalaei, 2010	0,505	university	causal comparative	2010	190	article	India	asia	na	0
30	Kasim, 2014	0,416	secondary	experimental	2014	300	dissertation	Nigeria	africa	12 week	12
31	Kocaman and Beskardesler, 2016	0,401	university	causal comparative	2016	23	article	Turkey	europe	na	0
32	Dabarera et al, 2014	0,400	secondary	experimental	2014	63	article	Singapore	asia	5 week	5
33	Ilustre, 2011	0,347	university	causal comparative	2011	226	article	Phillippines	asia	na	0
34	Iwai, 2009	0,343	university	causal comparative	2009	98	dissertation	USA	america	na	0
35	Munro, 2011	0,337	university	causal comparative	2011	196	dissertation	USA	america	na	0
36	Gooden et al, 2007	0,324	primary	experimental	2007	238	article	USA	america	5 week	5
37	Yen-ju Hou,2013	0,301	high school	causal comparative	2013	454	article	Taiwan	asia	na	0
38	Fitrisia et al., 2015	0,291	secondary	causal comparative	2015	272	article	Indonesia	asia	na	0
39	Durgun, 2010	0,185	university	experimental	2010	31	thesis	Turkey	europe	6 week	6
40	Ahour and Mohseni, 2014	0,154	university	experimental	2014	30	article	Iran	middle east	16 week	16
41	Cubukcu, 2008	0,134	university	experimental	2008	130	article	Turkey	europe	5 week	5
42	Hong-Nam and Page, 2014	0,124	university	causal comparative	2014	432	article	USA	america	na	0
43	McCown, 2013	0,034	secondary	experimental	2013	97	dissertation	USA	america	4 week	4
44	Ronzano, 2010	-0,006	high school	causal comparative	2010	312	dissertation	USA	america	na	0
45	Meniado, 2016	-0,143	ELT college	causal comparative	2016	45	article	Saudi Arabia	middle east	na	0
46	Qu, 2013	-0,320	secondary	causal comparative	2013	272	dissertation	China	asia	na	0
47	Negari and Askani, 2014	-0,328	high school	causal comparative	2014	70	article	Iran	middle east	na	0
48	Zhou and Zhao, 2014	-0,364	university	causal comparative	2014	90	article	China	asia	na	0
49	Safdarian et al., 2014	-0,393	university	causal comparative	2014	194	article	Iran	middle east	na	0
50	Nasab and Motlagh, 2015	-0,475	ELT college	causal comparative	2015	30	article	Iran	middle east	na	0
51	Melanlioglu, 2014	-0,578	secondary	experimental	2014	60	article	Turkey	europe	8 week	8
52	Vural, 2011	-0,581	university	causal comparative	2011	300	article	Turkey	europe	na	0
53	Anastasiou and Griva, 2009	-1,235	secondary	causal comparative	2009	36	article	Greece	europe	na	0

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