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ISTANBUL AYDIN UNIVERSITY

INSTITUTE OF SOCIAL SCIENCES

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İSTANBUL AYDIN ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ MÜDÜRLÜĞÜ

YÜKSEK LİSANS TEZ ONAY FORMU

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ONAY

Prof. Dr. Ragıp Kutay KARACA
Enstitü Müdürü

This thesis is dedicated to my childhood dream of being honorable, independent, honest, respectful, strong character of a scientist woman.

DECLARATION

I hereby declare that all information in this thesis document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results, which are not original to this thesis.

İlknur ATEŞ

FOREWORD

Firstly, I would like to thank myself strongly, and follow an advice for my future never forget İlknur: "Carefully watch your thoughts, for they become your words. Manage and watch your words, for they will become your actions. Consider and judge your actions, for they have become your habits. Acknowledge and watch your habits, for they shall become your values." Mahatma Gandhi

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ABBREVIATIONS

ASL : Avarage Sentence Rate
CAF : Complexity, Accuracy, Fluency
IRT : Item Response Theory
OFL : Online Fluency
OLC : Online Lexical Complexity
OSN : Online Sentence Number
OSYNC :Online Syntactic Complexity
OWACC : Online Word Accuracy
OWE : Online Word Error
OWEP : Online Word Error Percentage
OWN : Online Word Number
PL : Phonological Loop
PPFL : Pre-Planning Fluency
PPLC : Pre-Planning Lexical Complexity
PPSN : Pre-Planning Sentence Number
PPSYNC : Pre-Planning Syntactic Complexity
PPWACC : Pre-Planning Word Accuracy
PPWE : Pre-Planning Word Error
PPWEP : Pre-Planning Word Error Percentage
PPWN : Pre-Planning Word number
STTR : Standardized Type, Token, Rati, Tokens
VSS : Visuospatial Sketchpad
WM : Working Memory

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THE INTERACTION AND INFLUENCE OF WORKING MEMORY ON TURKISH EFL'S ARGUMENTATIVE ESSAY WITH RESPECT TO CAF

ABSTRACT

With the guidance of Kellog's (1999) model of working memory in writing, to be supported by McCuthen's (2000) theory of writing in the light of Baddeley 's (2003) multi component working memory model, with the asistance of Limited Attentional Capacity and Cognitin Capacity theories (Lan, 2014) the present study has explored, the effects of planning, specifically pre-planning and online planning and working memory, specifically Visusospatial Skechpad (VSS) and Phonological Loop (PL) influence on argumentative writing of Turkish EFL (pre-inermediate and intermediate) adult sudents in terms of complexity, accuracy and fluency (CAF). The participants have been required to complete an English Proficiency exam to prove their levels of pre-intermediate and intermediate, one operation span task to measure their PL level, one symmetry span task to measure their VSS level and two argumentative essays one of which is with pre-task planning, while the other one is online planning. The research has revealed that 1) There has been observed no big difference in online planning and pre planning regarding accuracy and fluency. However, in pre planning PL influence has been obvious on high lexical and syntactic complexity. In addition, in online planning, PL effects have been observed on lexical complexity and accuracy in a positive way despite the negative effect of VSS on accuracy has been observed, while it has a high positive effect in lexical complexity. 2- In pre planning VSS has negative influence on complexity and accuracy, except fluency. However, PL impacts have been relatively high and positive in accuracy, fluency, and lexical complexity, except synactic complexity 3) In online planning PL has not had a positive effect on syntactic complexity and fluency except accuracy and lexical complexity. In pre planning syntactic complexity has not been influenced by PL positively, but a mattered effect of lexical complexity and a drastic effect of accuracy and fluency has been observed by PL influence (According to SPSS analysis results, 2018).

Keywords: Phonological Loop, Visuospatial Skethpad, Working Memory, Argumentative Writing

YABANCI DİL OLARAK INGILIZCE ÖĞRENEN TÜRK ÖĞRENCİLERİN ELEŞTİREL KOMPOZİSYON YAZIMINDA İŞLER BELLEĞİN İLŞKİSİ VE ETKİSİ

ÖZET

Mevcut çalışma, Kellog (1999) işlev belleğin metin yazmadaki modeli önderliğinde, McCuthen'in (2000) teorisiyle desteklenip, Baddeley'in (2003) metinde çok bilişen çalışma belleği ışığında, sınırlı dikkat kapasitesi ve biliş kapasitesi teorisi (Lan, 2014) yardımıyla, planlama etkilerini, özellikle metin yazmaya başlamadan önce ve metin yazım aşamasında, işlev bellek, özellikle görsel mekânsal hafıza ve fonolojik döngü etkilerini yetişkin Türk yabancı dil öğrencilerinin (pre-intermediate ve intermediate seviyelerinde) eleştirel yazıda güçlük (compexity), doğruluk (accuracy), ve akıcılık (fluency) açısından etkilerini araştırmıştır (According to SPSS analysis results, 2018).
Katılımcıların İngilizce seviyelerinin pre-intermediate ve intermediate olduklarını kanıtlamak için birer İngilizce seviye tespit sınavı almışlardır, fonolojik döngülerini ölçnek için birer operation span, görsel mekânsal hafızalarını ölçmek için birer symmetry span, ve biri metin öncesinde planlamalı (pre-planning), diğeri metin sırasında planlamalı (online planning) iki eleştirel metin yazmışlardır. Araştıma şu sonuçlara varmıştır; 1) Metinde doğruluk ve akıcılık açısından online planning ve pre planningde büyük bir fark gözlnememiştir. Fakat, pre planning de fonolojik döngünün kelime ve kelime çeşitliliği açısından açık bir etkisi vardır. Yanısıra, online planningde, görsel mekansal hafızanın doğru yazı yazmadaki negetif etkine karşı, fonolojik döngünün kelime çeşitililiği ve doğru yazı yazma açısından, pozitif etkisi gözlemlenmiştir. 2) Pre-planningde görsel mekânsal hafızanın cümle çeşitliliği ve doğru yazma üzerine negatif etkisi vardır, akıcılık hariç. Fakat, fonolojik döngü etkileri yazıda doğruluk, akıcılık ve söz çeşitliliği açısından yüksek ve pozitiftir, dilbilgindeki çeşitlilik hariç. 3) Online planning de fonolojik döngü doğruluk ve kelime çeşitliliği hariç, dilbilgisinin kullanımındaki çeşitlilikte ve akıcılıkta pozitif etkisi vardır. Pre-planninge, grammar kullanımın çeşitliliği fonolojik döngü tarafından posizitif etkilenmemiştir, fakat fonolojik döngününg kelime çeşitliliğinde ortalama, doğru yazma ve akıcılıkta ise önemli etkisi gözlenmiştir According to SPSS analysis results, 2018.).

Anahtar Kelimeler: Fonolojik Döngü, Görsel Mekansal Hafıza, İşlev Bellek, Eleştirel Yazı

1. INTRODUCTION

The relationship between Working Memory (WM) and writing is planning to be examined specifically by the role of the Visuospatial sketchpad (VSS) with writing in on-line planning and pre-planning in terms of complexity, accuracy, and fluency. Young Turkish adult learners of English as a second language will be tested to carry out the study.

One of the most crucial and difficult cognitive task that us, people have to achieve in their second language or foreign language performance is writing. To generate this complex language skill, cognitive attentional resources and processes such as working memory capacity, together with the engagement of other cognitive mental representation processes such as semantic and syntactic processes, which are the basic necessities cognitivel to create a writing when foreign language learners are willing to express their ideas and propositions to communicate with others (Olive, 2003).

There have been several reserachers have analyzed L2 writing in relation with cognitive memory in several aspects, such as: Research which examines VSS relations with writing, specifically descriptive writing in L1 is Kellogg, Olive and Piolat's (2007). Their research focuses on verbal and visual WM in written sentence production. According to their research, during written sentence production, semantic content is planned and then translated into a linguistic expression. Verbal WM may provide these necessary competitions by temporarily storing word representations. On the contrary of that, visual WM might only be required on the course of semantic content which activates imaginal memory together with prepositional codes. As a result of dual task reserach; both high and low imagery words have interacted equally with verbal WM task. Furthermore, Kellogg (2004) has claimed that the secondary task of tone detection assits a measure of executive attention required by writing. Fayol and collaborators (Fayol et al.,1994; Kellogg, 2004; Power, 1985; Ransdell et al., 2002) have answered why heavy loads on verbal WM disrupts sentence

production. It seems these effects are due to central executive which has also been heavly loaded.

For VSS; evaluating subject concerning writing task, descriptive writing and VSS interaction the only things that are examined on recalling spatial and visual material by the participants (Levy &Ransdell, 2001). To illustate arguing the composition of a descriptive text needs more imaginal memory. As menitoned above, Passerault and Dinet (2001) have clarified fluency subject which have been slow down on descriptive text. Furthermore, it is seen that pre-palnning has a good influence on complexity, accuracy, and frequency (CAF). Hence, pre-planning will be generated by the participants to see effect on descriptive writing as well as on-line planning to be able to compare and contrast the differences (Passerault and Dinet, 2001).

Depending all the aforementioned findings related to VSS, it has been assumed that planning phase is also related to visuo-spatial sketchpad, it is about a great deal of written visualize images (Kellogg, 1996; Olive, 2004).

Yi and Ni's (2015) research on planning and WM effects on L2 performance in Chinese EFL learner's argumentative writing will be revealed. After participants have completed one operational span task and two argumentative essays in pre-task planning and controlled conditions (no-planning). The results have cleared that pre-task planning has assisted a significant increase of lexical complexity in L2 writing performance. WM impact has been observed on syntactic complexity, and fluency, but no impact of WM has been seen on lexical complexity, accuracy, and lastly pre-planning relations with WM could be accepted in terms of affecting L2 writing performance (Yi and Ni,2015).

As it seems that, the reseraches have evaluated the working memory all seperately, there is no comparsion have been generated between PL and VSS as well as online planning and pre-planning, specifically in Turkish EFL learners'argumentative writings.

The study will take into account WM capacity interaction with writing, specifically VSS WMC concerning argumentative writing with on-line and pre-planning's impact on CAF; therefore, it is necessary to mention on writing as well as on-line and pre-planning. Language performance and proficiency are

thought to be multidimensional in nature, and that their principal dimensions can be evaluated through the notions of complexity, accuracy and fluency (Skehan, 1998; Ellis, 2008; Ellis & Barkhuizen, 2005).

The subject of this study will have a crucial influence in Turkish EFL leanrners's writing, specifically argumentative writing because the effective task-driven writings will be carried out in relation with the specific part of the working memory, which will have a great influence in generating writing better with respect to CAF.

As for planning, the participants will be taught outlining and listing as pre-planning (Ellis, 2003) and we will have a chance to compare advantages and disadvantages of pre-planning in writing in relation with the specific parts of the working memory with respect to CAF.

The reserach will start with a proficiency test to measure our particpants's English Level. Pre- Inermediate and Intermedıate students will be participated. An Operation span to measure PL and a Symmetry span to measure VSS memory for each participant will be carried out. Two argumentative writings with online planning and pre-planning will be generated by each participant to be able to see the impact of planning on CAF.

2. THEORETICAL BACKGROUND: WORKING MEMORY

2.1 Working Memory (WM)

To measure and prove WM existence there have been some researches carried out such as; Jacobs (1887) has elaborately explained this by claiming that older children have the ability to recall larger digits than younger ones. Correspondingly, Binet and Simon (1905) has created digit span task to evaluate intelligence. Depending on this, Miller (1956) has argued that it has been a good idea to use digit span task to measure of a person's short-term memory. However, Scmalec, Brybaert, and Duyck (2012) have expressed that, as the digit span task has showed the WM as a passive storage buffer, in the 1970's, several authors have felt uncomfortable with the digit span task, because of this, on the point of WM, it has been put forward as a concept of representing both storage and having power to put plans and actions into effectively controlled and management of information.

The well-know Working Memory model has been introduced by Baddeley and Hitch (1974). It consists of an attentional system, the central executive, which temporarily hold information so as to make it available for processing. The Phonological Loop (PL) is responsible for verbal and acousitc information. It is divided into a passive and temporary phonological store and an active rehearsal system. The visuospatial sketchpad (VSS) acts similar functions for visuospatial information, spatial locations, and an active spatial rehearsal system (the inner scribe). It manages sequential locations and movement and make them alive again when they decay in the visual cache (Logie, 1995). The central executive in this early model depends on the supervisory attentional system model of attentional control developed by Norman and Shallice (1986) to clarify how the cognitive system overload relatively automatic behaviors on the course of task schema is not available. However, lately this expectation has not been ensuring to explain WM relations with writing. Then, Baddeley (2001) has added a new

slave system which is called Episodic Buffer whose duty is to collect data from PL and VSS and provide interaction with LTM to generate the writing process.

Working Memory (WM) researches have dated back more than 100 years. Hitzig and Ferrier (Fuster, Joaquin, 1997) have been the first who have said that frontal cortex has been crucial for cognitive memory rather than sensory processes (Fuster, Joaquin, 1997). What do "sensory processes" mean? As it can be conceived from the name, the senses helping us to function in the world. The senses receive information both from inside and outside via stimuli of the senses which are seeing, hearing, tasting, smelling, and touching. As we can guess, to do their job, they need to work together to be responded appropriately by our bodies. This information is utilized to organize our daily life. Moreover, it is utilized for a crucial foundation for later more complex and behavior (http://www.neurodevelop.com/sensory_integration, 2016). Its place can be seen in (https://www.simplypsychology.org/multi-store.html, 2016).

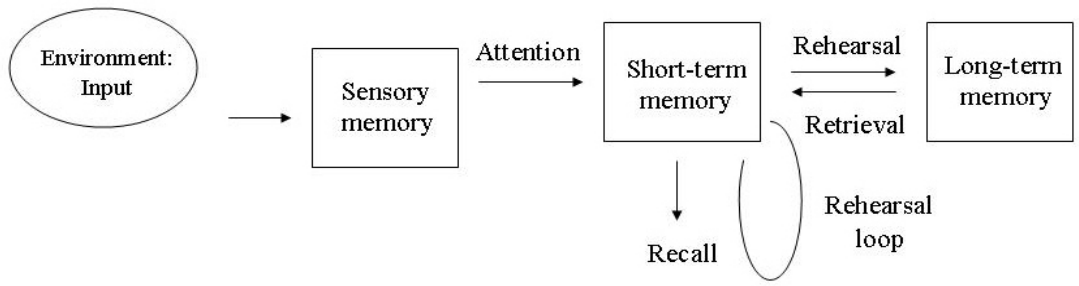

Figure 2.1: Atkinson and Shiffrin's (1968) multi-store model

To have a better idea about working memory, its existance and improving by the time, we will have an idea on most well known working memory samples.

First of all, the name of working memory goes back to Atkinson and Shiffrin's model (1968), they have named it as "short-term store". After that, it has named in a great deal of different ways, such as; "short-term memory (STM), primary memory, immediate memory, operant memory, and provisional memory." (Fuster, Joaquin, 1997). Despite of all these explanations there might have been confusions still about the place of WM (Cowan, 2009). First we need to make sure that WM is the place where temporal and the chunk capacity-limits. Together with this, sometimes short-term memory and WM can be used interchangeably (http://www.human-memory.net/types.html, 2016).

Furthermore, short-term memory sometimes can be perceived as sensory memory which is the previous process from WM and can hold the information for less than 20 seconds. Furthermore, WM and STM are similar for keeping the information for a limited period of time distinctively. Apart from holding the information, WM also utilizes, store, and manipulates it (http://theydiffer.com/difference-between-long-term-short-term-and-working-memory/ 2016). Not to have a confusion, in the thesis, I will be using sensory memory for 20 seconds information keeping as it seems in Figure 1, for the next process, WM will be used generally.

But what is the functional role of WM and how has it been decided to these functions? Szmalec, Brybaert, and Duyck (2012) have also mentioned the substantial changes of WM understanding, which supports the 1974 model of WM of Baddeley and Hitch. To illustrate, Daneman and Carpenter (1980) has considered WM as a unitary system with a single capacity. Lately, in 2006 Jarold and Towse's study has been seen that there have been several subcomponents within their own capacity. Hence, in an equivalent way, in Baddeley and Hitch's (1974) model, its capacity has been depended on processing effect, capacity of storage verbal, numerical, and spatial information. Moreover, a controlled attention system, which has been needed for the coordination and integration of storage and processing and slowing, and prevention of the unrelated process to the progressing subject which is like a boss of WM, called central executive attention.

WM is a crucial individual difference variable and means an important portion of variance in general intellectual ability (Conway, Cowan, Bunting, Therriault, & Minkaff, 2002; Conway, Kane, & Engle, 2003; Engle, Tuholski, Laughlin, & Conway, 1999; Kane et el., 2004; Kyllonen & Christal, 1990; SüB, Oberauer, Wittman, Wilhelm, Schulze, 2002). Moreover, it has seemed in neuroimaging and neuropsychological studies. WM is connected with cells in the prefrontal cortex of the brain, which means it functions to assist in goal directed human behavior. May be that is the reason why; Baddeley (1986) has claimed that WM has been used to manage complex cognitive tasks, which have been comprehension, learning, and reasoning. As for the language acquisition, WM has had a great impact on learning new vocabulary, Daneman and Green (1986)

has found that how easy even for elementary school children to get the meaning of a word from a text via WM.

As WM models have been a wide area to be discussed, it can be mentioned on some crucial models; one of the most crucial models of WM has been Baddeley and Hitch's (1974) model. However, if necessary to look back the history of the WM models, we can start from Atkinson and Shiffrin's (1968) model has been the based on most of the models. One of which is Baddeley and Hitch's (1974) model, as we mentioned above, multi-component model consisting of some slave systems, which have been the central executive, the phonological loop, (PL) and the visuo-spatial sketchpad (VSS) (Levin, 2011). Next one is Cowan's model whom he has added Long-term Memory (LTM) to STM (Cowan, 1995). As for the last one, which we mention in the thesis, is Ericsson and Kintsch's (1995) model. The difference of it, is to retrieve orthographic coding, grammar, and etc., from LTM (Gobet, 2000). To understand the slave systems better, let us see them in detail.

Starting from the PL Baddeley (2003) has proposed that PL can be broken into two subcomponents: a temporary memory system which holds memory traces more than a matter of seconds, at the time they decay if not it is not refreshed by the second component have a sub-vocal rehearsal system that not only keep the information within the store, but also serves the function of registering visual information within the store, in order to name the items. Therefore, on the condition that a subject is shown a sequence of letters for the instant recall, then although their visual presentation, subject will subvocalize them, that is the reason why, their retention will depend substantially on their acoustic or phonological characteristics.

As far as the visuospatial sketchpad is concerned, Baddeley (2003) has claimed that, this subsystem of WM provides the function of integrating spatial, visual, and possibly kinesthetic information into a unified information which can be stored and manipulated for a short time. Baddeley, himself, has an experience in the area which assists him to light up his way. Baddeley (2003) says that he has been driving on a highway at the same time as he has been listening to, and vividly considering a football game, then he has figured out that the car was drifting from lane to lane, and immediately he has switched the music. Then in a

laboratory version of this, subjects are supposed to recall a sequence of instructions that in one case can be stored in terms of an elaborated of visual image at the same in the other relied on purely verbal coding. They have had opportunities to perform this task either done, or as performing a spatial tracking task where they have had to keep a stylus in contact with a moving light spot. The tracking has had disrupting influence on imagery performance; however, no impact has been seen on verbal task (Baddeley, Grant, Wight, & Thomson, 1973). Subsequent research has showed, regarding the memory task, storage may be primarily spatial (Baddeley, & Lieberman, 1980), principally visual as it is observed by colour and shape (Lugie, 1986), or possibly motor or kinesthetic (Symth, & Peddleton, 1990). Both leison and neuro imagining studies have shown that the system is principally, yet not exclusively, depend on the right hemisphere of the brain (for reviews see Della Solo & Logie, 2002; Smith, & Jonnides, 1997).

Baddeley (2003) has also proposed that on the one hand comparing to PL, the sketchpad is less relevance to the language disorders, on the other hand, it is involved in everyday reading tasks, keeping the representation of the page and the logout in mind to be able to better following the lines from beginning to the end via moving the eyes.

Logie (1995) has proposed that there have two components with WM: a visual cache, dynamic information is stored there such as organizing trajectories of movements; therefore, it provides spatial rehearsal. The visual cache assists to be processed of visual information such as, shape and color. Despite of the fact that, it is questionable what type of information is seen in the inner scribe and in the visual cache. For example, spatial information is sometimes searched as dynamic information and sometimes as an outline of object (Zimmer, Speiser, & Seidler, 2003)

It can be said that the dynamic characteristic of a visual stimulus is not the critical unit for conducting of information in the true spatial unit (the inner scribe) as it has been initially introducing (Zimmer, Muner, & Umla-Runge, 2010).

Ungerleider and Mishkin (1982) claimed that the separation object and location information in WM, have been the same as in the separation of these two kinds

in perception as well. That is why; Zimmer, Muner, and Umle-Runge, (2010) have believed that it has been evaluated separately. Therefore; it is expected a higher performance in memory on the condition that the available capacity-limits.

Logie (1995) has clarified that the absence of interruption in dual task techniques by the presumption that visual input does not automatically and directly is accepted by WM, yet unrelated information is refused although it is seen. On the contrary of that, this situation does not work either because other WM states that are impaired by unrelated input during preservation exist. To illustrate, dynamic visual noise in the course of preservation impaired a visual, just noticeable size task (McConnell & Quin, 2003). In this task the size of a circle has to be analyzed with another one presented a few seconds before. Similarly, it has been seen that temporary visual memory for movements (point-light walkers) has been interrupted by additional visual input (color patches or other walkers to be ignored) (Zimmer, Münzer-Scrobildigen, & Troje-submitted). Quinn and colleagues (Quinn, 2008; Quinn, McConnell, 2006) have hereupon searched to distinguish between passively keep visual material and material that is grasped in active visual buffer. As far as they are concerned visual input can be accessed directly by a visual store (McConnell, Quinn, 2004; Quinn, & McConnell, 1999); however, this visual store is not the passive visual store is not the passive visual cache, yet an active visual buffer (McConnell, Quinn, 2004; Quinn, & McConnell, 1999). This buffer manages conscious visual representations of conceived stimuli together with mentally generated ones (visual images).

More interestingly, within the visual working memory framework, a separate buffer has been proposed up to now by Peterson et al. (2001). This buffer is supposed to keep a conscious visual image, and it should therefore be closely connected to central executive and conscious awareness. The idea of *a visual buffer* that is utilized for image generation has originally suggested by Krosslyn and a great deal of research context of so-called imagery debate has been applied to this structure and its characteristics (Kosslyn, 2005; Kosslyn, 1980). Kosslyn (1994) has pondered that the buffer symbolizes visual information in a descriptive way, caring for distance between represented objects, all processes

on this buffer are alike to processes in physical space. Mental rotation for example goes through step by step passing intermediate positions between the start and the target orientation (Shepand, Meztxler, 1971), as for mental scanning which follows a trajectory in a two-dimensional space with Euclidean characteristics (Kosslyn, 1978). Despite of that it is still argued up to now if these characteristics are because of limitation of the mental representations or they are the same as in the real world (Pylyshyn, 2003). Nevertheless, after a great deal of researches, it has been seen that imagery processes in any case, act as if they were performed in physical reality. For example, visual images have specific separation in terms of size, include angles and distances between between objects, etc., and these specialties follow the same processing characteristic as their physical counterparts (Kosslyn, 2005). Zimmer and collaborators (Zimmer, Munzer, & Umla-Ringe, 2010) have hereupon claimed it can be considered that these features as so-called physical limitations of visual-imagined- processing. These are put into effect at the time of information is processed with the visual buffer.

As for the Central Executive Baddeley (2003) has proposed that the system is responsible for attentional control of WM. It is mostly, yet not exclusively relies on the frontal lobes (Stuss & Knight, 2002), and can almost be divided into a number of executive subprocesses (Baddeley, 2002; Shallice, 2002).

Daneman and Carpenter (1980) has suggested that executive processes are likely one of the principal factors determining individual differences in WM span which has been shown to be a robus predictor of a wide range of complex cognitive skills, differing from reading comprehension to learning electronics. It is highly in relation with performance which is a kind of reasoning test that supports standard measure of intelligence (see Daneman, Merikle, 1996 for a review) Despite of the differences in WM span certainly do impact on comprehension capacity. It is probably that degree of related semantic knowledge is also a major factor, as reading paragraphs are requested combine simultaneous processing and storage (Turner, Engle, 1989).

We can see it clearly, WM is an active system to carry out our behaviors, above all learning, hereupon language learning, especially in writing in L1 and L2, which are the matter of subject of the thesis. Moreover, it is necessary to

address the models of WM to be able to have a connection with writing that we will be mentioning. There have been outstanding models of WM, some of which are Atkinson and Shiffrin (1968), Cowan (1995), which we have mentioned above; however, the most frequently used and informative one is Baddeley and Hicth (1974)'s model. Hence, first, we need to focus on the model to clarify its relation to L1, and hereupon, L2 writing.

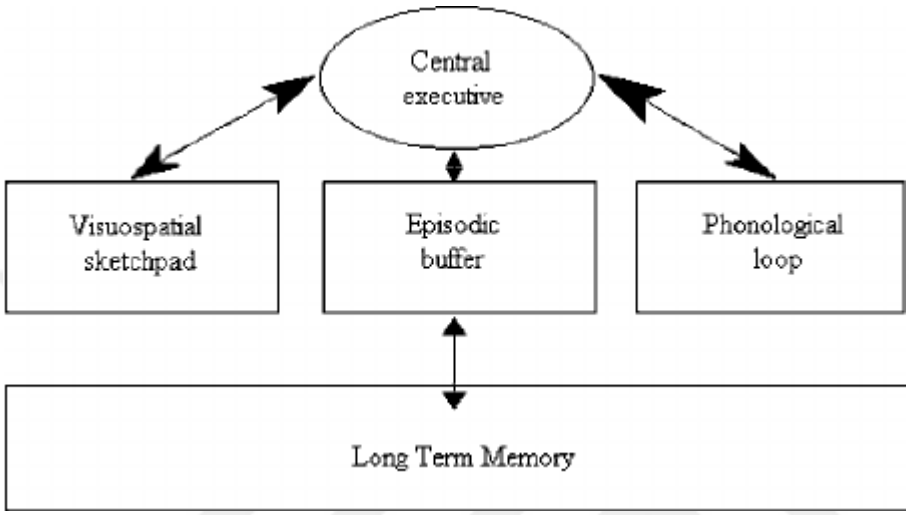

Figure 2.2: Baddeley's working Memory Model

(https://www.researchgate.net/figure/7811632_fig1_Fig-1-A-modified-schematic-diagram-of-the-revised-working-memory-model-Baddeley, 2017).

2.1.1 Baddeley's model of WM

The most effective WM model has been provided by Baddeley and Hitch (1974) which consists of an attentional system and a central executive. The central executive is assisted by a phonological loop which stores verbal and an acoustic information and a visuospatial sketchpad (VSS) which stores spatial information and involves an active spatial rehearsal component which is the inner scribe that helps to go on sequential locations and movements. Furthermore, it assists to reappear decaying information in visual cache Logie (1995) has claimed that. As it seems that each of the slave system has their own duty. However, the duty of central executive can be a little bit hard to comprehend. To grab that better let us look at Norman and Shallice (1986)'s explanation of central executive. Thay have proposed that the central executive shows up when there is not an automatized behavior, it is the attention. Indeed, Baddeley (1986), to get a

better comprehension, has used a company metaphor to explain the duty of executive component, saying as the boss of a company who collects all different kinds of information from a number of different resources and manages them. As for the learning process of WM, Gathercole and Baddeley (1990) have found that a subject with a high memory span can learn a new name in three trials, whereas a subject with a low memory span can learn a new name in more than five trials. Therefore, it provides us a clue concerning language learning, especially in terms of learning new words; however, where all these new words and new information are kept temporarily, because WM stores information temporarily, (http://theydiffer.com/difference-between-long-term-short-term-and-working-memory) as we have mentioned above. However, what happens after this temporary information keeping, Baddeley (1974) has claimed that the answer is Long Term Memory (LTM). We will look through it in detail in the next chapter.

2.1.2 Long term memory

In Baddeley' (1974) s model, as it seems above WM and its interaction with Long Term Memory (LTM) is explicit. However, Baddeley (2003) has claimed that their interaction has not been proved and acknowledged immediately. It has dated back to some experiences such as, the most noticeable study has come from neuropsychological patients who have a harm in their medial temporal lobes have caused extremely damaged capacity for new learning, as leaving performance on STM tasks without any affection (Baddeley& Warrington, 1970; Milner 1966). Furthermore, Baddeley (2003) has supposed that this has been explicit evidence to the two-component model, as it has been a sign the damage of the LTM system, together with keeping the same to short term memory from being damaged.

Accordingly, Shallice and Warrington (1970) with the research of conduction of aphasia patients have claimed that there might have been a specific deficit in STM. Even so, if STM functions as WM, the patient might have problems not only in LTM, but also a wide variety of cognitive tasks. However, it has not happened so, subjects have been a very efficient secretary, a taxi driver, and a shop owner. As my understanding, on the one hand, something cannot move on just in speaking, on the other hand, all the other functions related to STM and LTM can carry on. Depending on this, to solve this issue, Baddeley and Hitch (1974) has had a further experiment; otherwise, they have asked subjects to keep in their minds sequences of digits which have been different in length – from zero to eight items- together with acting a variety of tasks that have been assumed to be concerning WM and it has been indicated that when the concurrent digit load have been increased, there have been figured out a progressive impairment. As a response, WM have been proposed to divide into three separable subsystems which have been thought like working together as a part of unified WM system that has a role of making of a variety of complex tasks possible. The WM subcomponents have been PL, VSS, and central executive, which have been mentioned above, consisted a part of Baddeley's (1974) WM model. Hence, the deficiency reason in WM patients described by Shallice and Warrington (1970) have been the harm in the verbal-acoustic system in WM for Baddeley and Hitch (1974), which proves us that there is one more unit which is related to WM, but independent of keeping long-term memory information which is called, Long Term Memory (LTM)

The multi-component view of WM has been also supported by Cowan in 1988. Then the idea has been elaborated by Oberauer (2009) in terms of LTM and WM have been able to separate functions; however, the levels of activation of the representations in the memory and the attention control dedicated to to those represented images in the memory. Therefore, Szmalec et al. (Szmalec, Verbruggen, Vandierendonck & Kemps, 2011) has seen WM as a subsystem of LTM, which has leed to gain information directly and keep it interfusing from other memory contents thanks to attentional control. Accordingly, presumably language acquisition is one of the best examples of combined working between LTM and WM. (Goethe & Oberauer, 2008; Öztekin & McElree; 2007).

Hence, Kellogg, 87; Piolat, Olive, and Kellogg (2005) have clarified the writing subject and its interaction with LTM depending on the model. Therefore, as the topic of the thesis would be related to the writing, we will evaluate it in terms of writing. WM capacity can be overloaded while writing. Gathercole, Alloway (2008); Gethercole, Pickering (2000a/b); McCutchen (2000); Olive (2004); Swanson, and Berninger (96 a/b) clear the subject up explicitly, while composing a text, the cognitive parts of WM, which support writing, can exceed their limits. So, how is it supported, what supports it? Baddaley and Hitch (1974) has proposed that WM has been the place of temporary memory register to keep transient information of writing processes as well.

Baddeley (2000) have also added a fourth slave system to the WM, which is episodic buffer. The information from the PL and VSS has come together in the episodic buffer which has had a limited capacity as well. After collecting and processing the info, it directly encodes the collected data to LTM. Ericsson and Kintsch (1995) have illuminated that depending on retrieval cues and structures, the information related to the subject in LTM can be reached and activated in WM. Depending on this, knowledge in LTM can be directly and quickly reached by WM. Hence, Ericsson et al. (Ericsson & Delaney, 1998; Kintsch, Patel & Ericsson, 1999) have suggested that thanks to the stored information in LTM, the limitation of WM capacity can be reinterpreted and with the help of efficient encoding and retrieval memory processes, expert performance can come out. Therefore, it can be said that LTM can be used only in skilled and expert performances which mean to me in higher L2 learners, LTM usage can be seen in writing of expert writers and also the strategies can show differences comparing to novice writers. To illustrate, Dedeyan, Olive, and Largy (2006) have examined detection of subject-verb errors as subjects have practiced on verbal and visual secondary tasks. The detection has been in relation with a verbal task in novice writers, while it has been concerned with a visual secondary task in adults. It has been concluded that while novice writers have utilized an algorithmic procedure that basis on verbal WM on the text-based

subject – error detection, expert writers have utilized from the visual search procedures to see the texts surface of morphological agreement. (see Dedeyan, Largy, & Negro, 2006;). Correspondingly, Larigauderie, Gaonac'h, & Lacroix (1998) have proposed that detecting errors such as lexical and spelling errors most probably have been concerned with visuospatial WM at the time the expert writers scan the surface of their texts.

To summarize, we have seen that WM slave systems have not come into the picture immediately. Baddeley and Hitch (1974) have claimed the existence of PL and VSS to conveive the reason of aphasia patients (Sahallice & Warrington, 1970). Correspondingly, Baddeley (2003) has suggested that it is a sign of two-component model as the patients can carry out their ordinary duties as a secretary, a taxi driver, and a shop assistant. Moreover, for the connection between WM and LTM, Baddeley (2000) has proposed a fourth component model: Episodic Buffer, which also combines the collected information from PL and VSS, and provides the connection between WM and LTM (Baddeley, 2000). More interestingly, because of extra attention needing, especially during writing (Ericsson & Kitnsch, 1995) the capacity of WM can exceed its limits, and unfortunately, not by everyone, yet only those who have stored information in LTM, thanks to retrieval processes, the information can be functioned in WM (Ericsson & Delaney,1998; Kintsch, Patel & Ericsson, 1999). Furthermore, the LTM usage has an impact on not only writing performance, but also problem solving strategies in writing, it has been seen in (see Dedeyan, Largy, & Negro, 2006).

We have mentioned Episodic Buffer in terms of its interaction with LTM, but what is Episodic Buffer exactly, we will look through it in the next part.

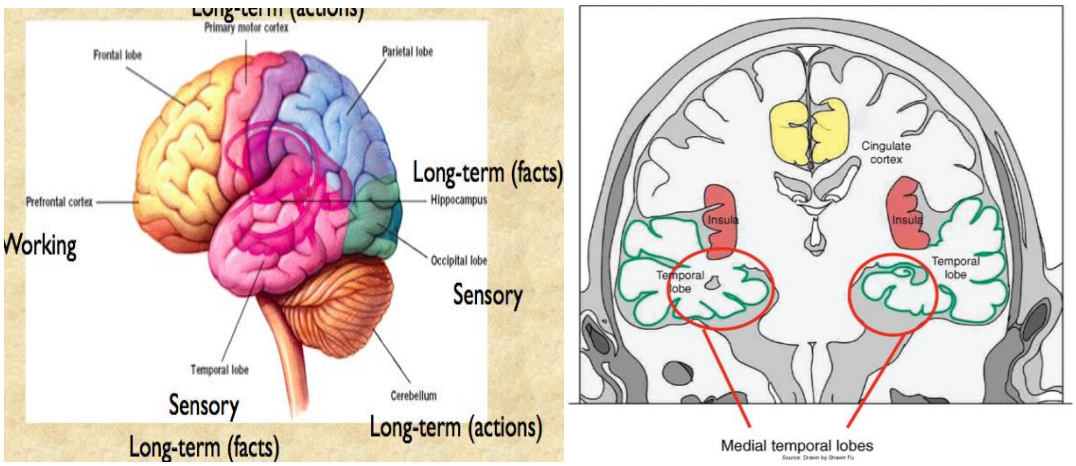

Figure 2.3: The three component model of working memory in which visual and verbal subsystems are controlled by an attentional executive. The shaded areas refer to crystallized, or long-term systems, which involve stored information which is capable of interacting with the working memory system.

2.1.3 Episodic Buffer

With regard to the Episodic Buffer, after re-defining the role of thecentral executive, leaving the idea that it has a capacity for storage as well; which actually function as an entirely that of an attentional based control system (Baddeley & Logie, 1999). This has caused the advantage of focusing attention on the fractionation of executive process (Baddeley, 1996; 2002), yet has then been challenged by the identification of a range of phenomena that has not comply neatly within the model. The first one has been a necessity for a system which allows visual and verbal codes to be gathered and linked to to multi-dimensional representations to LTM. The second one include the necessity for the temporary storage of material in quantities that have been observed explicitly to exceed the capacity of either the verbal or or visuospatial peripheral subsystems. This has been found out particularly clearly in the retention of prose passages. Immediate recall of prose has been initially combined with the LTM; however, this comment has been refused by a small number of densely amnesic patients' research whose LTM grossly impaired, nevertheless they have been able to perform at a normal level on immediate recall of a prose passage, including some 20 or more idea units, and that is why; substantially beyond verbal or spatial span (Baddeley & Wilson, 2002). Endel Tulving (personal communication with Baddeley) has taken our attention to a more dramatic sample proposing that an exceptionally densely amnesic patient

have been suggested nevertheless to be a good bridge player. To demonstrate this, not only patients who can recall the contract and the cards played, but have been able to carry information over games to the extent of winning the rubber, which was necessary to pay attention and the question rises up, how has it been possible by someone who has grossly defective LTM to do this (Baddeley, 2005). This kind of evidence, together with the necessity to provide an explanation of WM span, an of such fundamental features of WM as the capacity to chunk information (Miller, 1956), resulted in the suggestion a fourth component of the WM system which is called "the episodic buffer" (Baddeley, 2000). This has been accepted to be a limited capacity system that has heavily based on executive processing; however, it differs from the central executive in being principally related with the storage of information rather than with attentional centrals. It can combine different information from different sources of WM into a single multifaceted code. Finally, it is concerned to support the capacity for consciousness awareness (Baddeley, 2000). However, a system still cannot be found to evaluate it as numerically (Baddeley, 2005).

2.2 Working memory and first language acquisition

A language consists of listening, speaking reading, and writing – the last but most effortful process (Baddeley, 2000). That is why; learning a language and its processes cannot be thought completely different from each other to me. Krashen (1988)'s theories support all these interactions. He has two hypotheses "acquisition a language" and "learning a language". Acquisition of a language is just like a newborn baby learns a language subconsciously. In this case, the first step is listening, then speaking (Krashen, 1988), and it interacts with the PL (Acheson & MacDonald, 2010https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3000524/). As for, learning it is like consisting of learning consciously ends up conscious knowledge, such as learning grammar (Krashen, 1988). As far as Blake, Austin, Cannon, Lisus, Vaughan (1994) are concerned, longer utterances are the signs of greater grammatical and semantic complex sentences, it is related to PL again (Blake J., AustinW., CannonM., LisusA., & VaughanA. 1994).

Under these circumstances, it is clear that Working Memory (WM) plays a significant role in the first language acquisition. Lyons (1968) has supposed that language has consisted of specific sub-systems, which have been phonology, grammar, and semantics. These sub-systems work independently and they have worked depending on specialized system of rules. Furthermore, successful language systems have worked concerning both the interaction of input and output rules (Jackendoff, 2002 a, b). Vulchanova et al. (Vulchanova, Foyn, Nilsen, & Sigmundson, 2014) have claimed that it has been common to make distinction between L1 and L2 acquisition; however, the most crucial impact has been the onset time of acquisition. What usually happens is L1 has been acquired from, and even before birth whereas the second language has been acquired later, generally out of the sensitive period (birth to six years) (Leneberg,1967; Penfield, & Roberts, 1959). It has seemed true that second language acquisition has been ruled by maturational factors, typically be even sensitive period.

For speech development, it starts from nine months (Kuhl, Conboy, Padden, Nelson, &Pruitt, 2005; Weikum et al., 2007; Werker, Byers, Heinlein, 2008). However, Meisel (2009) has suggested that the critical period of morphology development does not go further than the 4th year of life. At this point, Vulchanova et al. (Vulchanova, Foyn, Nilsen, & Sigmundson, 2014) have questioned whether the acquisition of L1 and L2 have been the same or not. If it had been found, the consideration that they have been separate or different might have been weakened.

As for, the development of language both L1 and L2 have been supported by PL, as such a WM system (Masoura, Gathercole, 1999). Baddeley, Gethercole, and Papagno (1998), and Pieroni et al. (2011) have identified PL as the only Language Acquisition device that language learning can be accomplished. Stononovich, Cunningham, & Freeman (1984) have cleared it up that WM has been in a deep interaction with other cognitive skills which support language development, such as phonological awareness. There has been a great deal of explanations done of this interaction by many reserachers (Stononovich, Cunningham, & Freeman, 1984), together with a common underlying phonological coding and processing component (e.g., Bowey, 1996).

Concerning semantics and its relation with WM, Gathercole, Hitch, Service, and Martin (1997) have utilized experimental word tasks to connect the cognitive components in vocabulary acquisition in five-year-old-children. Their results have showed that the learning of new words have been arranged by both PL and Long-term knowledge of the native language, illustrating, the sound patterns of familiar words have assisted to the system. It has also been seen that the longer PL capacity has assisted the newer vocabulary learning whereas the similar sound patterns and semantics have been dissociated from PL. Correspondingly, in a couple of studies of Baddeley (1992) have brought a different perspective to the relationship between phonological memory skills and vocabulary development, while it has weakened with the children who are between 5 and 8 years. Furthermore, vocabulary knowledge has seemed to have more impact on further vocabulary development than has PL.

Regarding as a whole acquisition of the language, Gathercole et. al. (2005) have proposed that WM and central executive interaction influence WM in a great aspect. This has been proved with a research of testing repeatedly on measures of WM, phonological awareness, vocabulary language, reading, and number skills. Alloway et. al. (2004) have indicated in a research of 630 children between 4 and 6 years, which has been a confirmation the important role of the central executive in coordinating the flow of knowledge through the memory system, and provided a support the PL as a closely linked, but distinct component.

As it comes to vocabulary development, Gathercole et. al. (1992) and Nippold (2006, 2007) have supposed that, it might be increasingly crucial to acquire the meaning of new concepts. As abstract words have accepted harder to be comprehended comparing to physical objects, they have been acquired later in vocabulary development. The easy of learning it has depended on semantic skills of each child; therefore, when the semantic skills develop, PL loses its importance. Baddeley et al. (1998) have proved that it has been seen producing longer expressions and a greater variety of syntactic constructions have come out with the assistance of good phonological WM rather than a poor PL.

What about WM slave systems' duties separately, researches have paid more attention to be able to comprehend how they affect native language acquisition,

let us see their impact on native language acquisition starting from PL. Gathercole and Baddeley (1989) have started investigating a group of children who have suffered from a specific language impairment (SLI). They have been about age of 8 years with normal nonverbal intelligence, and on delay of 2 years in language development. The subjects have been provided a group of different things of the same general type of tests which consist of the Goldman, Fristo, and Woodcock (1974) test of verbal memory. This has showed a particular deficit in sound, the capacity to hear and repeat back non-words. As far as this finding is considered, Gathercole and Baddeley (1989) have developed a non-words repetition test that have been considerably beyond the original in cooperating words ranging up to five syllables. These results have been compared with a group of normal children matched for age and nonverbal intelligence as well as with a group of younger language children. The SLI group has performed considerably below, not only their age controls, but also their younger language controls, working at a level that finally proved to be that of 4 year-olds, 4 years behind their chorological age; moreover, 2 years behind their level of language development. It has been observed no evidence of articulatory or auditory difficulties. It has caused Gathercole and Baddeley (1989) name the subjects' deficit to an impairment in the phonological storage component of the loop.

Following a series of studies have searched the role of the PL in the acquisition of vocabulary within groups of normal children. 4 year-olds who have just started school have been evaluated by the non-word repetition, the sound mimicry component of the Goldman, Fristo, and Woodcock (1974) test, nonverbal intelligence have been evaluated by utilizing Raven's matrices, and receptive vocabulary. The procedure has been applied by showing pictures, the name of one has been spoken, and the child has been asked to point the appropriate item. The result of this and the test have been applied to the children. At age 5 have been correlated between vocabulary and non-word repetition which have been large in amount (r= 0.525); the link to Goldman et al.'s measure has been noticeable; however, less by a large amount (r= 0.295). Vocabulary have been estimated as well by nonverbal intelligence (r= 0.388), yet even in the course of this and other variables have been statically separated,

the association between non-word repetition and vocabulary have been explicit (Gathercole & Baddeley, 1990; Gathercole, Willis, Emislie, & Baddeley, 1992).

Baddeley et al., (Baddeley, Gathercole, & Papagno, 1998) have copied the findings many times across age groups differing from 4 to 13 years. Typically, the standard digit span assessment has also been interacted with vocabulary, despite it is being less reliably. Baddeley and collaborators (Baddeley, Gathercole, & Papagno, 1998) have assumed that the advantage of their non-word repetition assessment, where the participant is to repeat a different sequence of phonemes, take place because it is closer to the situation facing the language learner rather than digit span, which implicate sequencing highly familiar items. However, of course, relation does not mean causality, it might be believed that children with a rich vocabulary are able to utilize the assistance to obtain novel vocabulary, as is the reverse belief that good phonological memory assists vocabulary acquisition. Assistance for the ability of phonological store has come from a study in which cross-logged connection has been utilized to interrelate and non-word repetition between the ages 4 or 5, on the account of allowing for vocabulary at 4, as attending to assume non-word repetition at 5 from the vocabulary scores of 4 year olds have proved unsuccessfully, once non-word repetition at 4 have been permitted for (Gathercole & Baddeley, 1989).

It should be stated, however, that while children get older, the relationship becomes much more shared with good phonological memory learning, which in turn assists the repetition of different non-words. The shared connection between WM and LTM is presented in Fig. 3, where the first tripartite WM model is changed to demonstrate its interaction with LTM, appeared for by the shaded area labelled “crystallized” in the figure to mirror its long-term character. Baddeley (2003) has assumed the same process for VSS as well despite not having been investigated yet.

As far as the visuospatial sketchpad’s role in the acquisition of the first language is concerned, we will evaluate it with a research on Williams syndrome we will go through more researches on Williams syndrome. Baddeley (2003) has tested a group of people with Williams’ syndrome, comparing them with two matches control groups, one including younger normal subjects, and

the other consisting of people with mild general learning disability. It has been utilized from Bishop's (1979) test for the responding of grammar (TROG) to these three groups as well as presenting subjects with sentences. The Williams group has been approximately equal to the controls; however, with one or two items that have seemed to be performed at a little lower level. Inasmuch as these have seemed to be items including a spatial construction they have been tested directly, searching for the differences or equalities a series of grammatical structures which include spatial terms which are like; above, below, shorter, and etc. which also have been involved a similar number of non-spatial constructions which are like; neither, nor, X is but Y is not, and etc. The results have been presented in Fig.5 from which it is explicit that Williams group have been largely harmed on the spatial items, contrary to the non-spatial equivalents, where the two groups have been equivalent, not including of one item, which is not spatial, yet visual such as lighter and darker. Analyzing details which have presented that the deficit has not represented a total failure to master the spatial forms; however, rather to a greater inclining to make mistakes on the account of utilizing them (Philips, Jarrold, Baddeley, Grant, & Kermiloff, & Smith, in press). Baddeley (2003) has also claimed that, the VSS issues of Williams syndrome are not limited to STM, and that is why; it might picture factors that extend beyond the sketchpad. What they advice, yet, is that cognitive capacities and the ability to keep and conduct information of a VSS nature is possible to play a crucial role in language comprehension, at least in these circumstances types of material.

Despite it has all been believed that there is a relationship between executive functions and language learning especially in young learners, the all we know is not enoutgh to clarify its components and duties especially in young language learners (Šimleša, Cepanec, Ljubešić,2017). Executive functions and languga relations hav been research by many reserachers (Weiland, Barata, & Yoshikawa, 2014; Welsh, Nix, Blair, Bierman,& Nelson, 2010); however, their reseraches have not been enough to explaing language and executive functions interactions clearly. The resercehes have been restrşcted between mind and executive functions (Šimleša, Cepanec, Ljubešić,2017). Some reserchers have claimed that central executive assists children to be able to make decisions

among multiple choices, monitör errors, and make decisions regarding to available information which is necessary for chidren's acquisition an improving their initial language skills (Diamond, 2013).

Baddeley and Logie (1999) have attempted to reorganize the duty of episodic buffer by claiming it is an attentional control system rather than a capacity for storage. But, then it has been realized that it has not been fitted neatly to Baddeley and Logie's (1999) identification of a range phonemena. These have been the reflection of the deficiency of collecting information from PL and VSS and links them to the LTM Baddeley, A., 2003). But then the questions rises up, what happens when PL and VSS exceeds their limits, prose passages might be the answers of the questions which are connected to LTM, but it has been decayed by Endel Tulving theory (personal comminication) aggod bridge player of a amnesic patient have been abl to play very well brige without forgetting cards' places in the game. How has this been possible for a deficit LTM. Such evidences (Miller, 1956) have created the need of the fourth component of WM, which is Episodic buffer.

Summarizing all, for Oyama (2013) starting to learn a language has more advantages at early ages, it is to do with sensitive period effects. Speech starts from starting at nine moths old (Kuhl, Conboy, Padden, Nelson, & Pruitt, 2005; Weikum et al., 2007; Werker, Byers, Heinlein, 2008). Most probably, listening collects data, as Krashen (1988) suggests that the first part of the language is listening. Whatever happens, all the language activities get a shape in WM via its components, especially the PL (Baddeley, Gethercole, & Papagno, 1998; Peroni, 2005). Furthermore, Gathercole, Hitch, Service, and Martin (1997) have mentioned the interaction between PL and LTM in terms of learning new vocabulary. After testing phonological awareness, vocabulary language, and a number of skills Gerthercole et al. (2005) has put forward the crucial impact of central executive on language learning as well. Although all the impressive effect of PL on language development in terms of assistance of longer utterances to the complex grammatical sentences (Baddeley, 1998) as the semantic skills develop, PL loses its effect (Gathercole, 1992; Nippold et al. 2006;2007). Exective functions and frst language acquisiton studies have not been enough to explaing the relationship (Šimleša, Cepanec, Ljubešić,2017) and

tahnks to amnesic patients, the fourth component of wm has been come out which is episodic buffer (Endel Tulving, personal commication) As It has been mentioned beofore, the hardest part of learning second language is writing (Baddeley, 2000), how all these work in L1 will be evaluated in the next chapter.

3. WORKING MEMORY AND FIRST LANGUAGE

As for working memory (WM) and writing in the first language, it will be evalauted in the aspect of Exectuive Functions, Episodic Buffer, Developmental Changes, and Emotional Factos which have effect on writers. There has been a VSS dimension of writing as well. It will be mentioned at the end of the part in a great detailed way, as it is the core of the thesis.

First question that make me start studying WM and writing: What are their relations? In what aspects WM has in interaction with writing? Baddeley and Hitch (1974) explains it like that, WM provides the necessary duties which writing skills are needed. Olive (2011) has clarified it in that way, as writing one needs to keep sentences or ideas in mind and attention mechanism of WM assists you to put the ideas in order as well. How does it put the ideas in order? In that sense, it is time to mention on Executive Functions in writing, Vanderberg and Swanson (2007) have mentioned on high WM needing of writing processes which show that executive functions in writing is really necessary while indicating that attention functions are more important in writing than the short-term storage of information. Why is it more important than the short storage of information? It can be clearly understood when we look at Baddeley (1996)'s central executive description as homunculus which govern WM, as performing retrieval from LTM, selecting and separating the attention into WM components where needed, task changing, so coordinating of the slave systems.

Levy, Ransdell (1995), and McCutchen (1994) have claimed that recursion and interaction are important factors of WM in writing. On the basis of that Robinstein, Meyer and Evens (2001) have purposed that writers need to be able to shift knowledge and processes well to write well. After saying necessities of shifting, Anderson and Green (2001) have mentioned on necessities of inhibition while writing as it hinders irrelevant information concerning task. Olive (2011) has purposed that composing is also in relation with inhibition as

one composes, one tries to avoid frequent words and usages, so it is avoided by inhibition. Updating cannot be ignored while writing, as information concerning the task is updated. To understand updating better, it can be looked for interference and n-back task.

Concerning the relation of Episodic Buffer in writing, Kintsch (1998) has put forward that the episodic buffer completes all different types of information which is on a semantic level, assisting to organize the content of the text. Kellogg (2001a) has purposed that domain specific knowledge is lighted up by the secondary task which is similar to the present task. Hayes (1996), Le Bigot, Passerault, and Olive (2009;2011) have supposed that visuospatial sketchpad is organized as well as previous mentioned slave systems. Furthermore, the episodic buffer provides connection between WM and slave systems, which mean the information collected in PL, VSS, and LTM. However, why does WM need this interaction? It is to do with WM capacity can be overloaded while writing (Kellogg,1987; Piolat, Olive &Kellogg, 2005). Gathercole and his colleagues have detailed it; while composing a text, the cognitive parts of WM, which support writing, can exceed their limits (Gathercole, Alloway, 2008; Gethercole, Pickering, 2000a/b; McCutchen, 2000; Olive, 2004; Swanson, and Berninger, 96 a/b). What happens when the WM exceeds its limits? Ericsson and Kintsch (1995) clears it up in this way, the stored information in LTM can be used by WM via the retrieval cues and the structures connected to that knowledge are activated in WM. Then, the limited capacity impact can be reinterpreted in terms of inefficient utilization of knowledge stored in LTM (Olive, 2011). Correspondingly, McCutchen (2000) has claimed that expert writers make use of LTM while novice writers use short-term memory as they do not have extensive or background knowledge in LTM. While using LTM expert writers exceed limitations of short-term memory. As Kellogg (2001b) claims that domain specific knowledge is lighted up by the secondary task, which is similar to the present task. Glanzer and collaborators (Fischer and Glanzer, 1986; Glanzer, Dorfman, and Kaplan, 1981; Glanzer, Fischer, and Dorfman, 1984) purpose that expert readers do not get disrupted in terms of understanding the text; however, reading times can have a slight effect. However, do these arrangements happen at the same time in everybody's

language learning process? At this point, we can talk about the capacity limit of WM, McCuthen and collaborators claim that it differs from person to person (McCutchen, Covil, Haynes, & Mildes, 1994). As for, WM capacity effect on writing L2 learner with longer verbal spans have been able to make more accurate and complex sentences than students who have shorter spans (Flower & Hayes, 1994; McCutchen, 1996; Swanson & Berninger 1996; Swanson & Siegel, 2001). To illustrate, after making a research on measuring WM, accuracy, and complexity in a given narrative task to 32 Brazilian - undergraduate -English learners in the second level, Bergsleithner (2010) has also mentioned the positive relation with high WM capacity and L2 writing performance on L2 writing. Furthermore, it is proposed that more accurate and complex grammatical and lexical sentences can occur together with better cognitive processing over language performance. In this sense, a question can rise: Accuracy in WM can occur in what kind of writings? There are some hypotheses on argumentative and descriptive writing. Baoshu and Lou (2012) clear it up like that; WM effect on accuracy has been seen in descriptive writing explicitly. However, in some researches of Bridges (2011), Juffs (2004, 2005), Li (2003), and Lu (2010) there has not been observed any empirical evidence of WM capacity and writing interaction with respect to accuracy.

Olive (2011) has put forward the developmental changes regarding the difficulty level of the text; when the text become more difficult, developmental changes are needed in adults, it is the same for children as well. Therefore, Olive, Favart, Beauvais, and Beauvais (2009) have conducted an experiment to see the difference in cognitive effort changes when generating an argumentative or a narrative text. It has been seen a decrease in cognitive effort as composing an argumentative text between Grade 5 to 9. Depending on the experiment, an improvement in their skills concerning writing argumentative texts between Grade 5 to 9 has been observed.

Olive (2011) has driven our attention to different usage of componential model of WM. It is said that expert writers and novice writers have different WM approaches to the problems. To illustrate; we can look for Dedeyan, Olive, and Largy's (2006) research on subject and verb agreement detection and it is found that novice writers find out the mistakes with the help of verbal task while

skilled writers detect them with a visual secondary task. Moreover, novice writers use an algorithmic procedure bases on verbal working memory while skilled writers use visual research procedure to detect the morphological problems in their texts. Hence, Olive (2011) has pondered that following these differences in processing may be helpful in understanding how writing processes become more efficient with age.

Above all, we are human, and we do not consist of only flash and liquid, we have feelings and these feelings have impact on our body, and so on our writing system. Martine, Olive, and Milland's (2010) have made a research in the field. They have given a topic to support in an argumentative writing and they have given an opposite of the topic, which the participants actually do not support; however, they have been asked to write like supporting the idea (dissonance group). During the composition, recalling short and long series of digits have been provided. Fewer items have been recalled by the dissonance group. Accordingly, it has been proposed that, more WM resources have been utilized by them; however, their fluency has been better than non-dissonance group. Even so, with fewer WM resources, the dissonance group has come out with an equivalent writing as the non-dissonance group. Moreover, in a further research of Derakshan and Eysenck's (2009) it has been observed that intense situations' writing has been helpful to free up writers' WM. Hence, writing on writers' emotions can assist WM to work better.

As far as Olive (2003) is concerned, WM in writing has been a covered area until 1996 Kellogg (1996) and McCutchen has uncovered it. Accordingly, three effective writing models have been emerged mostly in 1990s, which are based on either a componential or capacity perspective.

As a consequence of this; we can summarize them like that, executive functions have crucial impact on writing as it is named as homunculus of the WM by Baddeley (1996). Among the activities of it, which should be mentioned, have been recursion and interaction (Levy, Ransdell, 1995; McCutchen, 1994), shifting (Robinstein, Meyer, & Evens, 2001), inhibition (Anderson, Green, 2001), and updating (Olive, 2011). Episodic Buffer is the other slave system, which combines all the information that comes from PL and VSS, and more from LTM as well (Le Bigot, Passerault, Olive, 2009; 2011). The connection

with the LTM has been provided due to limited capacity of WM (Gathercole, Alloway, 2008; Gethercole, Pickering, 2000a/b; McCutchen, 2000; Olive, 2004; Swanson, and Berninger, 96 a/b) to exceed and reach the expert writing level (McCutchen, 2000). Together with it in descritive (Baoshu, Lou, 2012), narrative (Bergsleithner, 2010), and in argumentative (Olive, Favart, Beauvais, &Beauvais, 2009) writings, WM effect can be observed. Olive (2011) drives also our attention, regarding the WM capacity; problem-solving ways can be different as well. More interestingly, even our emotions have a power to change our writing style (Martine, Olive, and Milland, 2010). If so, how all these variables can be addressed in L2 writing? It will be evaluated in the next chapter, but before that, it is necessary to know the functional Models of WM in writing.

3.1 Models of Working Memory in L1 Writing

It can be said that one of the most dramatic researchers on writing and WM relations is Kellogg. He has analyzed the way of WM support to each of writing processes (Olive, 2003). As a great many of researchers, he has claimed the limited capacity of WM and the reality that all writing processes heavy demand on central executive (having thought as a pool of cognitive resources). Then, the code specific components of WM which are PL, VSS and central executive relations with writing have been searched for. Depending on the aforementioned researcher, as planning, writers visualize images, or organize diagrams and plans, planning processes need to reach mainly to the VSS. On the contrary of that both translating reading and editing demands PL assistance largely (for a review, see Alamargot & Chanquoy, 2001, chapter 5).

Together with the above mentioned claims, there have been variety of suggestions at the end of those researchers' studies in the name of WM and writing relations. For instance; McCuthen's(2000) focus on individual differences instead of Kellog's model whose aim at clarifying the demands of writing on WM in adult and expert writing. As for McCutchen, her model has seemed heuristic; furthermore, in her many experiments, she has utilized the dual-task paradigm, to test her assumptions (Olive, 2003). Her model can be cleared up in two ways. Firstly, the interaction between the writing processes

and the slave systems. Secondly, under the condition of limited WM capacity and heavy demands of writing processes. WM can be searched for by studying the attentional and management functions of the central executive.

Concerning, general functioning characteristic of writing (i.e., the processing demands and the activation of the writing processes over a composition), the results do not always cover each other. This is to do with both processing demands and the activation of the writing processes change with the specific demands of the task, the knowledge, and skills of subjects.

Despite of this, without seeing the factor that have been manipulated, it can be mentioned on some certain findings regarding these experiments. First, planning, but also revision with a less extent cause more demands on WM than translating process do. To have less demand on WM in translating might be expressed by noting that translating sub-processes are also related with the production of spoken language. Second translating is the most activated process; however, planning is more activated than revision, although it can be vice versa for planning and revision which have been observed in some experiments (more detailed information can be found in Olive, Kellogg & Piolat, 2002; Piolat & Olive, 2000). Regarding translating, it remains the same while that of planning decreases and that of revision increases (Olive, 2003).

It has also been said that for invariant functional characteristics of writing, the triple task has provided new data. Most of the general feature of writing have been mentioned; however, there is still things to be addressed on writing researches concerning the way writers adopt their writing strategies to different situation of composition and it is questioned that if their level of knowledge, their skills, their WM capacity, and so on have an impact on these strategies (Olive, 2003). In this perspective, Olive, Kellogg, and Piolat (Olive, Kelllogg & Piolat, 2002; Piolat & Olive, 2000) have questined the issue. They have had three factors which have been identified which are accepted that they influence writing processes in different ways. Firstly, processing demands of the writing processes have been realized that they are affected by writers' indiviudal differences. To clarify, high knowledge are needed for less cognitive demand. Secondly, activation of writing processes particularly that of planning and that of revision are affacted by the situaiton –specific factors. What it means is, the

WM organization of the writing processes are principally influenced by the way writers organize the composition. Lastly, writers' linguistic skill and the way of production (computer, handwriting) have an impact on both the activation of the writing processes and on their processing demands indirectly.

3.1.1 Kellogg's Componential Model of WM in Writing

Olive (2011) claims that Kellogg's (1996, 1999) componential model of WM in writing basis on Baddeley's (1986) WM model. In this model, each part has its own duty. Olive (2003) has mentioned the assistance of WM systems to writing. The WM slave systems of writing are the phonological loop, visuo-spatial sketchpad, and central executive. On writing, firstly, the high pressure on central executive and then the limited capacity of WM have been clarified. Then, necessities of slave systems of WM in processing have been explained. As an addition, Hayes (1996) has added a new slave system to this model, which is called as semantic memory. Moreover, he takes attention to visuo-spatial sketchpad's graphic processing information and displaying the spatial task. Kellogg (1996,1999) has declared that all these slave systems are engaged in writing in different ways. To clear it up; VSS is responsible for visualizing images in writing, organizing diagrams, and planning. PL is responsible for translating, reading, and mostly in editing. Kellogg (1996) has also added, on condition that speaking up the word during production, it can be stored in phonological loop, either for speaking or writing output. Shelton and Caramazza (1998) have also supported this idea in their writing, it has been seen that writing and phonological encoding has been in a positive relationship with each other.

In the end, execution component is not in relation with any of the slave systems. However, later in a different research of Ransdell, Levy, and Kellogg (2002), it has been claimed that visuospatial WM interacts with execution, especially in novice writers who have to control their handwriting, then planning.

3.1.2 McCuthen's Capacity Theory of Writing

After a writing span task, McCuthen and her collaborators (McCuthen, Covil, Hoynes, and Mildes;1994) propose that high WM holders are better writers than low WM holders, and WM is in relation with lexical retrieval. To illustrate that

findings, McCuthen (1996) has claimed that, to be able to write efficiently, WM members need to be able to work all together efficiently on the basis of Daneman, Carpenter (1980), Just, and Carpenter's (1992) researches.

Bourdin and Fayol (1994) purpose that a good handwriting is the spoiler of better WM capacity usage. Hence, in relation with this statement, Olive, Alves, Castro (2009), Olive and, Kellogg (2002) claim that if one part of WM saves less attention for lower processes, the rest can be saved up for high level processes such as; planning or revision.

3.1.3 Swanson and Berninger's Developmental Model

Berninger and his collaborators (for Grade 1, 2, and 3, see Berninger et. al, 1992; for Grade 7, 8, and 9 see Berninger, Whitaker, Feng, Swanson, and Abbott, 1996) propose that translation has a negative effect on translation from elementary to junior high-school. Then, Berninger and Swanson (1994) have claimed that WM constraints transcription and text generation over translation, thus if you are able to write better, that assists one to have a better interaction with WM capacity in terms of local planning and revision to produce a text in a better quality.

It has been suggested that in writing, language and semantic content has to be plannedand this content has to be encoded grammatically as well. Then, Caramazza (1992) has proposed that thoughts should find a body as words, phrases, clauses, and sentences together with grammatical encoding. Moreover, the phonological encoding which we need while speaking can also work with writing. Hence, it can be said that writing can occur either directly from phonological encoding or with the help of phonological loop.

Another sensational piece of work is the capacity conception of WM which has not based on brain evidence but rather on the functional capacity and considered that a single system with limited resources are utilized for temporary storage and processing of information in WM. As WM has a limited capacity, the tradeoffs come on the scene between the storage and processing capacity. At the time processing requires more WM capacity, less capacity is present for storing information, or vice versa (Olive, 2011).

4. WORKING MEMORY AND SECOND LANGUAGE

Working memory has also attracted attention of the researchers in the field of writing in the L2. Studies in L2 text generation has systematically developed theoritical and experiemental models improved to express generating in the writer's first langaue, and it has been created regardless of specific linguistic problems, and then this knowledge has been utilized to L2 research (Grabe & Kaplan, 1996; Krapels, 1990). Whalen and Menard (1995) has clarified some common elements in these models which have been basically depended on Flower and Hayes (1981), de Beaugrande (1984), Bereiter, and Scardamalia (1987). First of all, they have been applied a "process approach" to the explanation of text generation, which embraces several subprocessess which are planning, formulation, and revision. These subprocesses are in a relaion with one another repeatedly. To able to reach all those planning, formulation and monitoring processes, the writer is supposed to reach the knowledge at hand, and the store the mediator mental products with the asistance of working memory (Kellogg, 1999).

One of these approaches is taken from Hayes's (1996) approach applied to Baddeley' working memory model in writing (Gathercole & Baddeley, 1993). This processes have mentioned in L1 writing; however, as a reminder we will go though the process once more. In this working memory model in writing, central executive, because of the limited capacity of working memory, manages cognitive processes through schedulind and attentional control which is necessary for activating certain processes and inhibiting others which means when all these writing processes and their subprocesses occur by central executive (Kellogg, 1996), then trade-offs across processes can be created as in L1. This processes can be generated in this way; planning is distrupted by spelling (Graham, 1990), where idea creation is related to with handwriting (Bourdin & Fayol, 1994) and polish sentence generation effects the number of generated ideas systematically decreasing (Glynn, Britton, Muth, & Doğan,

1982). All these processes basically are related o planning, formulation, and revision in relation with limited source of central executive.

Barbier and Jullien (2009) suggest that it is a new way of communication. Barbier and Jullien (2014) also claim that writing does not need only new skills of a specific mode of communication, but also fundamental organization once again of communicative skills which mean it is necessary to think once more new linguistic knowledge and modifying their orchestration of writing processes by improving the functional writing strategies or inhibiting the less useful ones. The most tiring one of the activity for Roca de Larios et al. (2008) is to find the most suitable match between intentions and expressions, therefore; it has an impact on the proficiency level.

Barbier and Jullien (2009) have proposed that to acquire L2 writing ability one needs more than just the new appropriation of new graphic codes. Moreover, Jones and collaborators (Jones & Tetroe, 1987; Yau, 1991) believe that for most of all not only linguistic proficiency; but also adequate language skills are necessary. Campbell (1990)'s studies have supported this point of view by suggesting in L1 and L2, having quantitive differences cause the difficulty in planning their texts at both the local and global levels. Adding to this, Yau (1991) have suggested that concentrating mostly on spelling and grammar lead the translation to be less effective. Accordingly, often as making busy the WM with all those cognitive load, for revision in L2, there is left less effort than in L1 (Hall, 1990).

Van Weijen et al. (2008) has suggested that due to cognitive load that L2 writers experience while writing, the orchestration of their cognitive processes have been affected. Furthermore, this causes the resource allocation problem to be crucial. As central capacity is limited (Just &Carpenter, 1992; McCutchen, 2000), making decisions on which operations are most needed to generate in the writing task is another issue (Gaonac'h, 1990; Barbier, 1998; Sasaki, 2002). Accordingly, Gaonac'h and collaborators (Gaonac'h, 1990; Barbier, 1998; Sasaki, 2002) has claimed that the main problem in L2 learning is not the dysfunction of a linguistic process in the automatization in the process. Hence, Segalowitz (1993) has given the importance not only language ability, but also speeding up the language processing skills. Schoonen (2005) has clarified the

subject in a different way, by claiming that writing is a slower activity than reading, and even for the familiar concepts to the L2 writer, faster lexical access does not have a crucial impact on the written performance, conceptualizing sentences and getting over all the cognitive demands of writing are more important.

Besides learner variables depending on the limited capacity, it has been utilized from tsk variables as well (Ellis, 2003; Hayes, 1996; van der Bergh & Rijlaarsdam, 2001). Barbier and Jullien (2009) have claimed hereupon matching between learner and task variables involving the social and the way of writing task work some needed processes concerning the task situation. However, it has been a detailed farm of orchestration of their writing processes. Furthermore, it has been the same across all tasks, besides in relation with cognitive overload. Van Weijen (2008) has claimed that somehow it inhibits the L2 writers' ability to adopt their orchestration of cognitive processes over task in some ways.

Ellis et al. (Ellis 2003; Hayes 1996; van den Bergh & Rijlaarsdam 2001) have claimed that learner and task variables have also been searched to grab L2 writers' performance and cognitive capacity. Barbier and Jullien (2009) have mentioned that some necessary parts inhibit others; however, they ask in this case their relationships with one another while putting in order the text. Van Weijen (2008) has searched task differences over writing, and it is found that for every step that writer take a different cognitive memory parts.

After mentioning task-dependent learning of L2, Barbier and Julien (2009) have offered us a more interesting issue in task-based language learning relations with the impact on task complexity and writing performance for a while: expository and personal prompts have been expected to be easier than argumentative and public prompts as the second ones usually seem to get lowest scores. Conversely, Hamp-lyons & Mathias, 1994; Kuiken & Vedder, (2008) have suggested that cognitively more difficult tasks lead the L2 writers to reach higher goals. Iwashita, McNamara, and Elder (2001)'s studies on L2 speech production has supported this idea, to get with Robinson (2005) studies which focus on the accession multiple and non-competitive attentional resources. According to Robinson (2005) if the task drives the curiosity of different attentional resource pools, increasing task complexity should not give charm to

the linguistic output. On the contrary of it, it should support structural incorporation of forms in a great deal of way which generate a better product than easy subjects. And the reason of it, as cognitively demanding tasks lead to greater attention needing, this assists greater linguistic complexity and accuracy in so as to meet the functional demands of the learner. Recently, in Kuiken and Vedder (2008)'s study has been observed that at the time task complexity increases resource-directing variables can cause learners to pay more attention to linguistic form, therefore; their written production becomes more correct, but not more syntactically complex or lexically varied. These authors have claimed more on task- complexity by suggesting that there must be a threshold level for the issue as it might be difficult in beginner levels. In a similar extent, Cummins (1980) has pondered that task complexity should not be easier for the ones who cannot utilize their L1 skills in L2 tasks. Kuiken and Vedder (2008) have claimed more on task complexity which cannot create the task complexity on its own, contrary to it, this leads more control over the existing interlanguage. Especially, the slower and more decontextualized pace of writing provides writers a wide range of opportunities for, planning, focusing on form and their drawing on their explicit knowledge. Hence, more control assists leaners to make fewer errors. Despite of them everything is not said on quality and coherence of the resulting texts. As an additional information, there are needed more researches and precise data needed in terms of task-attention relation.

According to Bialsystok and Ryan (1985) while people learn their first language, they create a conceptual world, and it consists of metacognitive knowledge, which means first language, learning experiences light up L2 learning. Correspondingly, Ransdell, Barbier, and Niit (2006) have claimed that this way of learning assists WM capacity to improve. However, Devine, Railey, and Boshoff (1993) have made a research with 10 English students and 10 American students to evaluate their metacognitive knowledge in L2 writing, yet the results have not been in the direction of previous researches. L1 writings have been well designed while L2 writings have been conflicting and competitive. To be able to grab the various subsystems of writing in L2, Manchon, Roca de Larios, and Murphy (2000) and Zimmerman (2000) have used loop backwards and forwards method and it has been found that L1

backtracking procedures have been used in L2 writing to translate the text and the writer claims that L1 writing skills can be useful while learning L2 writing as it is managed with limited capacity.

Barbier and Jullien (2009) have even implemented more stunning points. For them, L1 writing does not only need new skills which mean they need to be able to deal with new linguistic knowledge as well as modifying their orchestration of writing processes thanks to efficient writing strategies or inhibiting the less useful ones. Trying to do them take more time in L2 than in L1 (Roca de Larious, Manchon, Murphy, and Martin, 2008). It has been observed that time increases on the point of interaction between formulation and other processes and it can also be said that proficiency mostly related to the time devoted to seek out the most suitable one between intention and expression instead of reducing the bad effect of the lack of linguistic resources.

Different measurements have been used to evaluate WM and L2 writing interaction. One of them is Think- aloud protocols. Ericsson and Simon (1993) have used think-aloud protocols to observe L2 writing, they introduce the method saying that L2 writers express their cognitive processes after being asked, either over writing or after writing, and observers or instructors listen them without criticizing. Roca de Larios and collaborators (Roca de Larios 2008; van Weijen 2008) have also purposed that while it is done concurrently, it can be recorded. Barbier and Jullien (2009) have added that the questions can be responded either in L1 or in L2. In van Weijen (2008) researches, it has been observed that people who turn into their L1 instead of keeping silence during the interview, they can manage better writing than ones who have fallen silence.

With chronometric recording the VSS, verbal WM and L2 writing interaction can be measured as well. Accordingly, Matsuhashi (1982) and Schilperoord (1996) mention on chronometric recording in this way; instead of think-aloud protocols, chronometric recording comes out without being figured out. Pauses and fluency are basic steps to measure all planning, formulation, and etc. Pauses can be measured without being realized. As for fluency, it is the indicator of producing the text in total writing time. Faraco (2002) et al. (Faraco et al. 2002; Ransdell et al. 2002; Spellman-Miller 2005; Van Waes and Leijten 2006) have

claimed that unlike cameras as in the past, digital recordings on graphic tablets, or word processors are used to measure these processes.

Spellman- Miller (2005) have put forward that whatever action that writers take is recorded by their respective temporal and spatial information. A graphic tablet usage is preferred to avoid from a complexity because of subject's typing skills.

Barbier (1998) Faraco, Barbier, and Piolat (2002) have mentioned on the importance of pauses, they claim that pauses are necessary while producing the text; however, every pause cannot be into account, to illustrate; to put a dot above i. Hence, there is a threshold starting from 200 ms., and for Schilperoord (1996) ending in one second. Correpondingly, Barbier and Jullien (2009) have purposed that because of capacity processing limitations; reading, planning, generating, formulating, and revising cannot be done at the same time. Barbier (1998) and Ransdell et al. (2002) have claimed that producing and increasing the cognitive load are in inverse relation. Barbier and Jullien (2009) hereupon have suggested that it means after pauses, or after long pauses, production can take a shape. That is why; Barbier (1998) and Matsuhashi (1982) have purposed that better units means longer pauses. To illustrate this, Whalen and Ménard (1995) have claimed that even the most advanced students in note-taking or in argumentative writings can utilize the longer pauses to produce a direct transcription of their ideas which can be neither sufficient nor efficient conceptual operations.

Briefly, to review of all, the basic and most prominent writing L2 model in relation with working memory has been developed by Hayes' (1996) model depending on Baddeley's (Gathercole & Baddeley, 1993) working memory model. According to Sasaki, Hirose (1996), and You (1991) L1 writing experiences can be observed in L2 writing as well. Accordingly, to write well, one needs minimum lexical, syntactic, and spelling information in L2 (Cumming, 1989; Jones & Tetroe, 1987); planning, translating, and reviewing specialities (Hayes & Flower, 1980). Besides, L1 can be useful in such a lot of different ways some of which the metacognitive world of the writer's created in L1 (Bialsystok & Ryan, 1985), and also translating (Manchon, Roca de Lairios,& Murphy, 2000; Zimmerman, 2000). And for the proficiency in L2, L2

knowledge in lexical and grammar level, must much more than L1 (Jones, Tetroe, 1987; Yau, 1991). Furthermore, proficient writers' way of dealing with writing is in the direction of formulation most (Roca de Larios, Manchon, Murphy, & Martin, 2008). Additionally, it is said that L2 writing seems getting harder starting from spelling, grammar, and translation respectively (Yau, 1991). Correspondingly, revision has the most limited one among them (Hall, 1990). For every step, for L2 writers take, a different cognitive load takes over the business. And the reason way; L2 writers cannot be so successful in the task level, is spending more time on formulation (van Weijen, 2008). Subsequently, Robinson (2005) claims that when the task is getting harder, as it needs more concentration, the result is generally better. While using the think aloud protocol to measure the cognitive load, when the writers even speak in L1, it is observed that they write better from those who fall silence, and more stops during writing end up with creating better ideas (Barbier & Jullien, 2009).

Phonoloical Loop (PL), Visuo-saptial Sketchpad (VSS), Central Executive, and Episodic Buffer

5. EMPRICAL RESEARCH STDUIES ON WM IN L2 WRITING

Barbier and Jullien (2009) say that this is about writer's performance on writing, to illustrate; writing skills, language abilities, the purpose of analyzing writing processes, strategies, and transfer happenings. That is the main reason why; we will go through regarding the studies which have been created so far to measure and to see how L2 writing is generated through on-line methods.

Barbier and Jullien (2009) have explained that the article explains why on-line methodologies is important to track L2 writing strategies. As for the meaning of on-line methodologies, hard data, which means pause analysis and reaction times, is used, not soft data, which means people's opinions and feelings in introspection method. These traditional methods are explained, which focus on conceptual processes, and on the proficiency of L2 learners' cognitive processes. It is also mentioned specifies of L2, self-monitoring, and cognitive resource allocation during text production.

In terms of traditional research perspectives in L2 writing: high-level processes

Sasaki, Hirose (1996), and Yau (1991) mention that psycholinguistic studies have tried to describe L2 writing's specific skills and L1 knowledge in a relationship with each other. Cummins (1980) hereupon propose that native language writing skills can be carried over into the second language.

According to Bialsystok and Ryan (1985) while people learn their first language, they create a conceptual world, and it consists of metacognitive knowledge which means first language learning experiences light up L2 learning and Ransdell et al. (2006) claim that this way of learning assist WM capacity to improve. However, Devine et al. (1993) have made a research with 10 English students and 10 American students to evaluate their metacognitive knowledge in L2 writing, yet the results have not been in the direction of previous researches. L1 writings have been well designed while L2 writings have been conflicting and competitive. To be able to grab the various

subsystems of writing in L2, Manchon et al. (2000) and Zimmerman (2000) have used loop backwards and forwards and it has been found that L1 backtracking procedures have been used in L2 writing to translate the text and the writer claims that L1 writing skills can be useful while learning L2 writing as it is managed with limited capacity.Researchers have focused on L2 learners' differences such as, linguistic level in L2. Cumming (1989), Jones and Tetroe (1987) add more mentioning writer's procedure in writing concerning writing experiences, which have happened so far, and training. Cumming (1989) Jones, and Tetroe (1987) claim that to write well, writers require at least minimum lexical, syntactic, and spelling information. Furthermore; Hayes and Flower (1980) put forward that planning, translating, and reviewing are also crucial.

Concerning, the proficiency dependency of cognitive processes while writing

Jones and Tetroe (1987) and Yau (1991) claim that writing in L2 needs more linguistic proficiency than just L1 base knowledge as they are less efficient in L2 writing. Yau (1991) adds more saying that while concentrating on spelling and grammar translation is also a difficult task. Hence, Hall (1990) purposes that they pay less attention to the revision because of the limied capacity of working memory.

Barbier and Jullien (2009) claim that L2 writing is a new way of communication. Roca de Larios et al. (2008) put forward that L2 writers spend twice as much time as in L1. Furthermore, it has been said that it is not proficiency dependent, it has been observed that proficient writers try to interact formulation with other writing processes to reach proficiency.

Evaluating in terms of self-monitoring and cognitive resource allocation

According to Segalowitz & Segalowitz (in the context of reading skills, see Segalowitz & Segalowitz 1993) one of the reasons why writers cannot reach high capacity of L2 writing is lack of automatization.

Barbier and Jullien (2009) mention that some necessary parts inhibit others; however, they ask ,in this case, their relationships with one another while putting in order the text. Van Weijen (2008) have searched task differences over writing, and it is found that for every step that writer take a different cognitive memory works. To illustrate; van den Bergh and Rijlaarsdam (2001) purpose

that while formulating, one side of the works, and while producing a text the other side of the memory works.As far as the differencies in L1 and L2 is concerned, in van Weijen (2008) studies, it has seemed that while L1 writers focus on task, L2 writers focus on form of orchestration which makes L2 writers inhibit the task to some extent over L2 writing processes. Ellis et al. (Ellis 2003; Hayes 1996; van den Bergh & Rijlaarsdam 2001) claim that learner and task variables have also been searched to grab L2 writers' performance and cognitive capacity.

Correspondingly, Barbier and Jullien (2009) mention that task complexity is another crucial issue. Moreover, for along time, easy tasks get higher marks than difficult tasks. However, recently, as Robinson (2005) states difficult tasks, as they trigger the attention and get all the systems worked all together. These kinds of subjects get higher marks.

In Kuiken and Vedder's recent studies (2008) it has been seen that complex tasks need more attention and it ends up more correct output; however, it cannot be mentioned a complex syntactic and lexical variance in L2 writing, but even so we should remember that participants have been L2 in Italian, so slow movements help to be good in planning as well. Above all, there might be said nothing on quality and coherence as a result. Hence Barbier and Jullien (2009) conclude in this way, more studies has been needed on task complexity in terms of usage of single or multi-store attention in L2 writing.

All this information has been collected by means of think aloud protocols, yet recently on-line recording and dual task paradigm have been used as well.

If necessary to talk about methods on L2 writing researches, Barbier and Jullien (2009) mention on the methods which will be presented. First, they say that the methods have been largely used in L1 writing researches and adapted to the L2 writing specificities. And, they need to be worked on more. For example, think aloud protocols; Ericsson and Simon (1993) introduce the method saying that L2 writers express their cognitive processes after being asked, either over writing or after writing, and observers or instructors listen them without criticizing. Roca de Larios et al. (Roca de Larios 2008; van Weijen 2008) also purpose that while it is done concurrently, it can be recorded. Barbier and Jullien (2009) say that the questions can be responded either in L1 or in L2. In

van Weijen (2008) researches, it has been seen that people who turn into their L1 instead of keeping silence, can manage better writing than ones who have fallen silence.

Barbier and Jullien (2009) claim that it has been focused on single processes of formulating, planning, or revising for along time, the studieshave given importance to the frequency of these processes. However, van den Bergh and Rijlaarsdam (2001) purpose that in L1 researches, it has been seen that the action time is crucial not their frequencies and this has been confirmed by van Weijen (2008). Barbier and Jullien (2009) purpose that this to understand how each processes can be affected by cognitive processes, think-aloud protocols, chronometric analyses (with key stroke recording protocols) and dual task methods can be used.

As for, researches on chronometric recording (analysis of pauses, fluency) are also useful in the field. Matsuhashi (1982) and Schilperoord (1996) mention on chronometric recording in this way; instead of think-aloud protocols, chronometric recording comes out without being figured out. Pauses and fluency are basic steps to measure all planning, formulation, and etc. Pauses can be measured without being realized. As for fluency, it is the indicator of producing the text in total writing time. Faraco (2002) et al. (Faraco et al. 2002; Ransdell et al. 2002; Spellman-Miller 2005; Van Waes and Leijten 2006) claim that unlike cameras as in the past, digital recordings on graphic tablets, or word processors are used to measure these processes.

Spellman- Miller (2005) put forward that whatever action writers take is recorded by their respective temporal and spatial information. A graphic tablet usage is preferred to avoid from a complexity because of subject's typing skills.

Barbier (1998) Faraco et al. (2002) mention on the importance of pauses, they claim that pauses are necessary while producing the text; however, every pause cannot be into account, to illustrate; to put a dot above i. Hence, there is a threshold starting from 200 ms., and for Schilperoord (1996) ending in one second. Barbier and Jullien (2009) purpose that because capacity processing limitations; reading, planning, generating, formulating, and revising cannot be done at the same time. Barbier (1998), Ransdell, Levy, and Kellog, (2002) claim that producing and increasing the cognitive load are in inverse relation. Barbier

and Jullien (2009) hereupon say that it means after pauses, or after long pauses, production can take a shape. That is why; Barbier (1998) and Matsuhashi (1982) purpose that better units means longer pauses.

Barbier (1998) has had an argumentative text, Faraco et al. (2002) have had a note taking experiment and in relation with those experiments, they purpose that production comes after pauses, even with the most experienced students. Yet, the productions have not been sufficient or efficient. With further studies on planning, translating, and revising Whalen and Ménard (1995) see that, it is possible to produce texts in better qualities.

There have been a great many of examples of dual-or triple task paradigm. To illustrate; Barbier (1998), Ransdell, Arecco, and Levy (2001), and Sasaki (2002) mention the method like that; while writing, one more task is provided, this task might be reacting to auditory probes, listening to an irrelevant speech, or recalling series of random digits. Barbier and Julien (2009) think that the method shows sharing of the cognitive resources during writing and emphasize how L2 writers take action against working memory limitations regarding the task necessities.

Olive, Kellogg, and Piolat (2002) claim that the triple task method has been used to measure the usage of time and cost of writing processes. As for randomly distributed secondary probes, Piolat et al. (1999) purpose that they need to act together with an action, which is directed previously. On researches on Piolat et al. (1999) it has been seen that Scripkell software has been designed to use the triple task technique to manage three aims: "estimating the general temporal organization of writing processes, analyzing the recursiveness of writing and measuring the amount of resources allocated to different processes." (Piolat, Olive, Roussey, Thunin, & Ziegler, 1999).

On Levy and Ransdell' research (1995), it has been seen that while comparing reaction times, how the cognitive load operates the writing session is measured. First task has been on a single writing process over all the writing session. The second one has been on activation and orchestration in each composition session, and the third one has been timing among shifts. To illustrate; it might be from planning to translating, or from reviewing to planning. Olive et al. (Olive, Kellogg, & Piolat, 2002) claim for the method while activation of

revision goes up, activation of planning goes down, yet the activation of translating does not change. Hence, Barbier and Jullien (2009) claim that for getting information on task and on learner differences, the method shows that they can vary in terms of time and sharing the cognitive effort. Furthermore, it is to do with high cognitive effort, the method is not preferred.

Barbier and Jullien (2009) mention on Piolat's et al. (2008) and Barbier (in press) researches have not been able to end up as they will. In Barbier' (1998) research participants need to navigate around an experimental website, and write the necessary information down with a word processor, and lastly describe the website using their notes. While doing these, reaction times have not been taken into account, and during writing participants have not used a lot of abbreviations as it supposed to be in their L1. Moreover, unfortunately they have not been able to come up with new ideas.

6. RESEARCHES ON VISUOSPATIAL SKETCHPAD DIMENSION OF WRITING

Olive and his collaborators (Olive, Kellogg, and Piolat, 2008) have believed that visual and verbal demands of a text have been crucial equally while writing, and spatial WM has also importance even it has not been as effective as visual WM despite writing has been a language activity. Szamalec, Brybaert, and Duyck (2012) have put forward that the distinction of verbal WM and VSS WM have been a longstanding tradition. Despite of this distinction VSS assist to provide a survival advantage to the verbal WM in terms of continuing the info to utilize and control of visual and spatial information at the time the info is no longer accessible from the sensory registers.

As Kellogg (1996, 1999) has suggested visual WM is responsible for creating content while spatial WM is necessary for structuring the text. More specifically, Kellogg, Olive, and Piolat (2007) have seen that while visual WM is really necessary for the definitions of concrete words. It does not have an effect on the definitions of abstract words in their experiment. Moreover, in the experiments of Duyck et al. (Duyck, Szamalec, Kemps, & Vandierendonak, 2003; Papagno, Valentine, & Baddeley, 1991) have been seen that while utilizing the dual-task technique to prove verbal WM has not been able to enough in learning word – non-word pairs, such as finger-vilsan; however, the situation has been in the exact opposite of word-word pairs, such as frog – nail in both adults and 11 – 13 year-old children. Hence, on the account of mine, it is a big prove of visual WM as it is because word-word pairs have representations in the real world; subjects might have utilized the images of the concrete nouns.

Deppman, Ferrer, and Gordman (2004) have another aspect of visual WM in writing as the writing activity has come out to be guided by the writer's eyes, it can be said that it is a visual activity as well. Moreover, because of the graphic trace on the page, it is a spatial activity as well. It can be claimed that writing is visuo-spatial representations of words in the text, therefore. To illustrate, it can

be looked through Olive and his collaborators' (Olive, Passerault, Lebrave, and Le Bigot, 2010) research, in Flaubert's manuscript of *Herodias*; while the writer has been describing the citadel, different representations of it has caused conflict in verbal description. Kellogg (1999) has taken our attention to the importance of spatial WM. While organizing the content of the text, to put in order the text visuospatial assistance has been seen. As well as content ordering, Galbraith et al. (Galbraith, Ford, Walker, and Ford (2015) have made a research consisting of three phases, and they have observed that spatial secondary task has hindered creating new ideas in structuring phase. Hence, spatial WM is essential for generating new ideas. Furthermore, Kellogg et al. (Kellogg, Olive, and Piolat, 2007) have also searched whether planning requires visuospatial WM when the subject is figurative and concrete or not. In the end, the result is as expected that verbal task has been seen in defining concrete and abstract words; however, visual WM interference has been seen only in the definitions of concrete nouns. We see concrete names' definitions and visual memory interaction in planning phase as well. (Kellogg, Olive, and Piolat, 2007). As for, spatial WM effect and importance on generating new ideas, which have been confirmed by Galbraith, Ford, Walker, and Ford (2005).

After all these researches on the importance of concrete nouns definitions in visual WM, the findings of Passerault and Dinet's (2000) research on descriptive texts has showed that descriptive texts are dependent on visual memory more than argumentative writings. In deed, Hayes (1996) has summarized all this information in relation with Kellogg's (1996,1999) views in this way, VS WM incorporation with models of Kellogg has shaped together with writing processes and WM. Writing processes and the multiple components of WM have been explained, specifically while taking into consideration of VS WM storage necessities. Kellogg (1996,1999) has supposed that VS WM is essential to select and organize information to add their text. While adding diagrams, drawings, or pictures as well as retrieving concrete conceptual information from the LTM is the situation where VS WM is dependent on.

However, Shelton and Weinrich (1997) have suggested that visual WM can be helpless sometimes. Despite of the compulsory phase of linguistic encoding, the visual WM can be in relation with all these processes except organizing this

information on paper as using diagrams, trees, and plans. These are the business of spatial WM. However, the content retrieving and structuring of a text can be shaped in VSWM.

According to Hayes and Flower's (1980) model, in relation with the before mentioned researches, writing medium is also dependent on VS WM. By saying writing medium, they try to say; a limited space to write which can be a screen or a sheet of paper. Formats and material can also be named as writing medium. To illustrate, when it is typed on the computer, the measurement of the writing space, the computer screen can impact on the writing process, the strategy of the writer, and the mental description of the text. Accordingly, Haas and Hayes (1986) has mentioned on locating information, proof reading and generating the whole representation of the text's issues can be caused by writing on a small screen as it is hard to visualize the whole page because of restrictions. It can cause difficulties in revision as well. That is cleared up in Piolat, Roussey, and Thunin's (1997) research, it is to do with restricted boundaries, it is hard to insert notes, ideas, and shuffle them in a way. Hence, it ends in a poorer revision, and recalling of the text. Accordingly, it is not surprising Piolat's et al. (1997) findings. They have seen that page by page text revision has better results than just scrolling (Piolat, Roussey, & Thunin, 1997)

In Haas and Hayes' (1986) research has been seen previously, reordering of scrambled texts are faster in hard copies than soft copies. Furthermore, the importance of text representation in revision has been approved by Piolat, Roussey, and Thuning (1997) as well. Correspondingly, Le Bigot et al. (2009) have found that word location and visual interferences are necessary for the writers to decide the next word, and this is the reason why; visual WM is crucial on creating the physical text representation. Hence, in a further research Le Bigot et al. (Le Bigot, Passerault, & Olive, 20011) has suggested that word locations are better in participants who use both temporal and visuospatial representations than who use only temporal knowledge. Therefore, to retrieve the words visuospatial representation of texts have been used in writing as well as reading (Olive and Piolat, 2012). After speaking all these verbal, visual, and spatial WM components separately, we need to take into consideration of

Kellogg's (2004) comment, for him, verbal WM is more in charge than visuo-spatial WM as it is expected.

Bellugi and collaborators (Bellugi, Wang, & Jernigen, 1994; Jarrold, Baddeley, & Haves, 1999; Vicari, & Carlesimo, 2002) have seen that visuospatial sketchpad has also a role in grammar learning capacity of people with Williams syndrome. This genetic situation is explained by elf-like facial features typically related to with an unusual pattern of learning difficulties. This include relatively preserved verbal skills, together with impaired VSS processing.

After all these explanations, one can visualize all it has been mentioned on visual, spatial, and verbal WM. However, to get to know them better, we can get more information on domain specific and domain general meanings. As we can assume from the name, domain general means; one domain can have an impact on another domain (Wikipedia, 2015). As for, domain specific, which means one domain, may not have an effect on another independent domain. (Wikipedia, 2015).

There has been an extensive literature review on domain specific concept (e.g, Baddeley, 1996b; Cocchini, Logie, Della Sala, MacPherson, & Baddeley, 2002; D'Esposito et al., 1998; Gruber & von Cramon, 2003; McEvoy, Smith, & Gevins, 1998; Miyake & Shah, 1999; Smith, Jonides, & Koeppe,1996). To illustrate; verbal except visual memory has been interrupted by expressing ideas or feelings in words with the pressure in between stimulus presentation and remembering.

Moreover, Myerson et al. (1999) has observed that color naming is in interaction with memory for digits, except memory for locations. However, to point to match colors are carefully in relation with memory for locations, by leaving memory for digits without harm. Correspondingly, eye movements are interaction with spatial, except verbal WM. Therefore, Spiegel, Koester, and Schack (2013) has put forward that short-term storage and processing are subject to domain-specific information. Baddeley (2001) has put forward that the functional role of WM in the (re-) planning and execution of grasping movements can be kept by visuo-spatial sketchpad under the control of visual and spatial information. Moreover, VSS can reach the information either by senses or from LTM and it differs the visual and spatial information from each

other. Baddeley (2003) has claimed in his further research, verbal WM seems as a sensory of phonological store, which assists words not to be lost by retrieving them. Then, spatial WM takes it firstly, to the passive visual store, the visual cache, repeats it (not to forget) by an active store, the inner scribe. (Logie, 1995). Repeating processes can come true with the system, which moves the eyes (ocumulator) (e.g., Baddeley, 1986; Pearson, Sahraie, 2003; Theeves, Olivers, and Chizk, 2005) together with shifts of attention (e.g., Awh, Jonides & Reuter – Lorenz, 1998, Postle, Awh, Jonides, Smith, & D'Esposito, 2004; Smyth & Scholey, 1994). However, whether the exact mechanism is spatial WM or not is not known explicitly (e.g., Beloposky & Theeuwes, 2009; Chan, Hayward, & Theeuwes, 2009; Klauer & Stegmaier, 1997). Most importantly Repovs and Baddeley (2006) has claimed that crucial resources have been shared with spatial attention and oculomotor control by spatial WM.

However, it should not be underestimated the visual WM assistance on orthographic representations such as spelling, punctuation and errors such that (Kellogg, 2004). Another comment on phonological loop assistance in writing comes from Chenoweth, Hayes (2003), and Witte (1987). They have put forward the phonological assistance while reaching the orthography. For them, lexical entries have firstly been encoded by phonologically, then to hear them as an inner voice help the writer before writing by hand or on the computer.

In relation with execution, Liao et al. (Liao, Kronomen, Yau, Despond, and Marvel, 2014) have found that there has been a relation of motor systems with WM performance, and motor systems have an impact on verbal and non-verbal WM processing. Therefore, it has been speculated that motor system has an interaction with WM in terms of generating motor traces, which are in direct relation with the type of information being practiced during maintenance. However, we can still mention a scarcity of the researches on VSS (nonverbal) and orthographic coding (of visible language units such as letters or words in WM) according to Olive (2011). Accordingly, all these researches that we have looked thorough, it seems that it is true.

7. WHY ARGUMENTATIVE ESSAY IS CRUCIAL WITH RESPECT TO WM AND L2 WRITING INTERACTION

Rezazadeh, Tavakoli, and Rasekh (2011) has claimed that there has been a growing interest in the role of tasks in the second language teaching and learning. However, most of those studies have focused on oral language production. Previous researches have showed that task type is a crucial variable both in how learners take step to language production and in how it impacts on the fluency, accuracy, and complexity of language products. one of the researchers who pay attention to task type is Foster and Skehan's writing on the cognitive research framework (Foster & Skehan, 1996; Skehan & Foster, 1997; Skehan, 1998; Skehan & Foster, 1999; Foster & Skehan, 1999; Skehan, 2003). They have had a point of view that attentional resources are limited and there is supposed to be a competition between the aspects of fluency, accuracy, and complexity so as to gain the learners' attention.

In a couple of study, the observations have proved that in determining whether writers are able to automatize certain features of writing tasks or deal with additional cognitive load to implement those aspects (Foster & Skehan, 1996; Franken & Haslet, 2002; Sweller, 1994). To illustrate, as descriptive writing is less demanding than argumentative writing, which is supposed to be better than argumentative writing. However, descriptive writing has defined as a task which has a clear inherent structure (Foster & Skehan, 1996), that leads writers to describe individual actions or characters within cognitive frame work, Foster and Skehan have been well-known on task-based research. However, there is more than that which has focused on specific features on language learners that differs by task. Among them Duff's (1986) study has found that differences concerning to task type in syntactic complexity and Bygate's (1999) study has observed differences nominal and verbal constructions.

Duff (1986) has investigated task type among eight pairs of non-native speakers. Her interest has been both quantity and quality of interaction in two

tasks. One task needs solving a problem; the other one is about to find the different points of view on an issue which they have to debate. The measurement of the quantity of their language production has been carried out with the help of quantity of c-units which mean a word, phrase or sentence that in some way contributes pragmatic or semantic meaning to a conversation. And the quality measurement have been done with the help of the number turns, types and questions, and syntactic complexity. Results have revealed that, it has been seen that problem solving task lead to generate more turns, and more c-units per task. The debate task had had more words per turn, more words per c-units per task. The debate task had had more words per turn, more words per c-units, and more syntactic complexity.

In a different study, the impact of two different tasks have been have been investigated on grammatical complexity (Bygate, 1999). There have been four tasks two of which have been argumentative and the other two of them have been narrative tasks. It has been asked the subjects to prioritize a list of opinions in the argumentative task and in the narrative task. Furthermore, they have been expected to tell a story based on series of pictures and length of T-units, subordination, number of verb arguments, and type subordination have been utilized to measure the complexity. As a result, the narrative task has consisted of more words per T-unit; however, there has been no significant difference considering the utilize of subordination. As for argumentative task, it has had more verbal output. In the study of Bygate (1999) has been offered further proof of the often-unexpected variations in learner speech on different tasks.

One of the crucial researchers is Lan (2015) has established the effect of task type on accuracy and complexity in academic writing. And the study has revealed that in the graph description task (task 1) accuracy has been significantly better than the argumentative task (task 2). Despite of this, argumentative task language has been more complex in terms of grammatical subordination and lexical variation than the graph description task.

As coming to the end, one of the more related research to the study what I have been trying to reveal is Yi and Ni's (2015) research on planning and WM effects on L2 performance in Chinese EFL learner's argumentative learners'

argumentative writing. After participants have completed one operational span task and two argumentative essays in pre-task planning and controlled conditions (no-planning). The results have cleared that pre-task planning has assisted a significant increase of lexical complexity in L2 writing performance, WM impact has been observed on syntactic complexity and fluency, but no impact of WM has been seen on lexical complexity and accuracy, and lastly pre-planning relations with WM could be accepted in terms of affecting L2 writing performance.

As for the interest of the thesis which focus on the interaction between VSS and writing in L2 (Turkish), Kellogg (1986) has discovered that spatial WM assists planning conceptual concept. Moreover, Kellogg, Olive, and Piolat (in press) has had a sentence generation task. Subjects have written either abstract or concrete nouns definitions together with performing a secondary task that has demanded the description of visually presented targets. After testing verbal WM as well, it has been observed that sentence length, secondary task accuracy, and secondary reaction times have been collected and have disrupted the verbal and the visual secondary tasks. To clear it up, verbal task impact has seen on the production of definitions of both the concrete and abstract nouns while the visual task has disrupted the production of definition of only the concrete nouns. These results have been coherent with Kellogg's (1996) suggestion that verbal WM assists linguistic encoding of sentences and that visual WM assists planning image-based conceptual content.

The essential influence of WM in writing has been usually accepted on tasks which require subjects to memorize a spatial or visual material (Levy & Ransdell, 2001). Passerault and Dinet (2001) have clarified the issue with the hypothesize of overloading the VSS is supposed to have more effect on descriptive texts than with argumentative texts, if so, expectation in the name of fluency has been to slow down at the time of generating a descriptive text.

Depending all the aforementioned findings related to VSS, it has been assumed that planning phase is also related to visuo-spatial sketchpad, it is to do with a great deal of written visualize images (Kellogg, 1996; Olive, 2004). On the contrary of the findings, there have been found different relations with different WM components regarding planning. To illustrate, Levy and Ransdell (2001)

have carried out an experiment with the help of dual task technique which has aimed at overloading each slave system of WM which are PL, the central executive, and the VSS. Secondary stimuli has been characters completely. The single characters that have let differentiating these secondary tasks have been the dimension of the characters that has had to subjects to process to make a response. Actually, about all two seconds, the character, its font, its color, or its location have changed. Therefore, in phonological condition, subjects have to reply when two consecutive characters have shared the same phoneme, for example [i], e.g., in English: b,c,d,…. Furthermore, in the visuo-spatial task, subject has had to realize when two consecutive characters have been at the same place or have been similar in color. The task which has aimed at overloading the central executive, subjects have had to response when two consecutive characters formed a two letter English word. On the one hand, Kellogg's model (1996) the visuospatial task has been disrupted moslty over the the initial planning time (pre-handwriting pause). On the other hand, phonological task has influenced this initial planning time at the time the central executive has been necessary as well. This allows us to assume that PL is also engaged with planning.

Regarding the above mentioned study, we know well that dual-task techniques is hard (Olive, 2003). Furthermore, there have been even some researchers whom they are against it (Kahneman, 1973; Kerr, 1973)). To get over the duality, I would like to see the relation between VSS and initial planning, together with two descriptive writings one of which is with initial planning, and the other one is without planning. According to the studies of Keloogg (1996) which one I have also supported. The subject who have HVSS memory are supposed to be better at planning in descriptive writing as it is assumed to be related to VSS which will be evaluated in terms of CAF separately.

There have been detailed and crucial studies on planning to enlighten the study that I have been considering to carry out. Hence, I will be focusing on it, in the next chapter.

8. METHODOLOGY

8.1 Research questions:

Research Question 1. Does pre-planning assist or has a positive effect on VSS WM in argumentative writing in terms of CAF?

If yes, after seeing high pressure impact on VSS WM,

Research Question 2.Will L2 learners VSS WM capacity explain L2 learners' performance in argumentative writing by on-line planning interms of complexity, accuracy and fluency?

İf it cannot explain,

Research Question 3. Does PL WMC explain L2 learners' performance in argumentative writing in terms of complexity, accuracy and fluency? In what level?

8.2 Predictions for each questions.

As far as Ellis (2005) is concerned, all spoken and written language use, it even seems that it is effortless, and automatic includes planning which assists speakers or writers to decide what and how to say/ write it. Planning is actually a problem solving activity: It includes deciding what linguisitc devices are needed to be chosen so as to influence the audience in the desired way. As for, Clark and Clark (1977) have revealed that planning occurs at different levels, resulting in a discourse plan, sentence plans, and constituent plans. all of them have to be melted in the same actual execution of a language act.

Pre-task planning has been further put into rehearsal and strategic planning. Rehearsal means providing learners with an oppurtunity to perform the task prior to the main performance. In a different saying, it is task repetition with the first performance of the task viewed as a preparation for the actual performance. Strategic planning means learners preparing to perform the task by thinking the

content detailly which they will need to generate and decide how to express it. Hence, strategic planning is distinguished from other types of pre-task activities which are brainstoriming content, studying a model performance of the task and dictionary search. Within-task planning can be distinguished regarding to the extent to which the task performance is pressured or unpressured. This can be succeded most easily by managing the time made available to the learners for the on-line planning of what to say/write in a task performance. In an unpressured performance, learners can deal with a careful on-line planning resulting in what Ochs (1979) has called 'planned language use', of course all language use includes some level of planning. Ochs (1979) has clarified a number of linguisitic differences between the two types of discourse. To illustrate, unplanned discourse inclines to manifest non-standars forms acquired early whereas planned discourse contains more completes target-like forms.

As for more investigations on planning, Ellis (2005) proposes that it has a beneficial influence on learners' subsequent performance of the same task, even on the course of this is the same type as the original task. Accordingly Rouhi and Marefat (2006) have generated a study on planning time effect on fluency, complexity, and accuracy of L2 output. For them, planning time and feedback are two methodological procedures that hold some promise for meeting such a concern in EFL/ESL classrooms. The present study deal with planning time and searches impacts on complexity, accuracy, and fluency. Output across modalities 37 Iranian English majors have generated three narrative for different episodes of a silent cartoon under 3 conditions 1)oral reproduction with a 10-minute strategic planning, 2) oral reproduction without any pre-planning, 3) writing narrative with on-line planning. The results have revealed a positive influence of pre-planning on fluency and accuracy whereas neither have effect on complexity. Strategic planning and written mode of task completion are offred as effective methodological procedures in task.

It is also necessary to address the task type issue which Lan's (2015) reserach clarifies it explicitly; in a second language field, two contrasting theories on task demands are the Limited Attentional Capacity model which assumes a worse linguistic performance on a more complex task. And the Cognition hypotheses which supposes a better performance on a more demanding task.

The study examines the impact of task type as a crucial factor of task complexity on L2 writing on a testing condition. The study has been a single factor repeated-measures design which compares the performance of 30 L2 writers on task 1 and task 2 IELTS academic writing subtest. The partipants writing samples have been evaluated using a range of discourse measures focusing on accuracy and complexity. He findings have revealed that low demanding task (task 1- graph decsription) has exposed a better performance in terms of accuracy than high demanding task (task 2 – argumentative task). Furthermore, the second one has been more complex in terms of grammatical subordination and lexical variation. The use of discourse measurement and complexity have showed some IELTS' candidates language problems concerning to genre writing.

It has been addressed before descriptive writing is related to visualism and correspondingly related to VSS (Passerault & Dinet, 2001). What about PL and its impact on writing? The PL is accepted to be composed of two subsystems or elements: a phonological short term store to keep acoustic or speech based information, and articulatery control process, is similar to inner speech used to hold material within the phonological store. The articulator control process is also responsible for transferring visually presented verbal material into the phonological store by subvocalization, whilst audotorily presented verbal material has a direct and obligatory access to the phonological short term memory. This description has been supported by many researchers such as Baddeley, 1986; Belleville, Peretz, & Arguin, 1992; Valler , Coppa, 1987; Vallar, Corno, & Basso ,1992. Moroever, Olive has claimed that PL generally do not involve any memorization. Marek and Levy (1999) has proposed that the formulation processes need stronger access to the PL than the execution and revision processes did. What about argumentative writing: an argumentative essay utilizes evidence and facts to show whether or not a thesis is true. It provides two sides of a single issue and covers the most crucial arguments for and against (http://study.com/academy/lesson/argumentative-essay-definition-format-examples.html, 2018). Depending all these information as there has not been a definite research on the relationship between WM components and argumentative essay. Regarding all these explanations can be assumed that

argumentative essay is mostly related to PL because the essence of the essay is formulation the words properly well and PL is related to formulation and words which are mostly abtract because it is already mentioned concrete words are related to VSS (Sadoski et al., 1997).

8.3 Participants

To conduct the study, forty- three intermediate ESL students from a local University in Istanbul have been selected to participate in this study. They have been studying English Language and Literature and Translation from grade 1 to 3. They are between 18 and 23 years old. They are all Turkish, Their first language is Turkish and their second language is English

- They will be provided a background information test to enable a homogenous group in terms of language background and,
- They will be provided Oxford Language Assessment Test to conduct the study with true intermediate and pre -inermediate students.

8.4 Materials

8.4.1 Writing tasks

In this study, two argumentative essays have been utilized by the evidence and facts to show whether or not a thesis is true. It provides two sides of a single issue and covers the most crucial arguments for and against (www. study.com, 2017). It will be used two argumentative essays 1) University students should have complete freedom to choose their own courses with pre-planning and 2) The primary mission of universities should be preparing students for the workforce with on-line planning. The participants will be provided 15 minutes for pre-planning and 45 minutes for each writing.

Tasks in pre-task planning: In the planning stage the participants are believed to plan lexis and outline for their coming writing tasks (Ellis, 2005). That is why; in this study, listing and outlining are adopted to stimulate the process of planning. Listing means, to a task where the participants are required to write

down the words, phrases, or sentence structures that might be utilized in the following task. Outlining refers to the participants could work out a framework for the following argumentative writing. The two planning tasks are supposed to be completed in 15 minutes.

Timed argumentative writing tasks: Participants will be asked to write two argumentative writings. The first argumentative writing is 1) *University students should have complete freedom to choose their own courses, with pre-planning. Do you agree or disagree?* which should be completed within 45 minutes. In the second argumentative writing task participants will instructed to complete an essay about a topic, 2) *The primary mission of universities should be preparing students for the workforce. Do you agree or disagree?* with on-line planning.

Ellis (2005) has addressed the issue planning effect on CAF in L2 performance and L2 acquisition. First planning has been represented. There have been three types of planning concerning CAF: rehearsal, strategic planning and without task planning. Three types of planning influence have been seen on fluency; however, the results for complexity and accuracy have not been more clear, accepting the effect of both the type of planning, and also the moderating role of various other external factors, consisting of task design, practicing variables and individual differences factors.

Measures of L2 Writing: accuracy, fluency, and complexity

Fluency: Fluency means person's general language proficiency (Craven, 2017). Furthermore, Lennon (1990) says that the mastering langauge is particulary defined by perception of ease and smothness of speech or writing. Fluency is measured total generated number of words divided by the total number of minutes of a subject which takes to complete the writing task. It is called production rate (Ellis & Yuan, 2005).

Syntactic Complexity: It is the most controversil one of measuring the proficiency which means the usage of langauge in a way that is more challenging and difficult Craven, 2017) Syntactic complexity is evaluated in the view of average sentence length (ASL): the number of words are divided by the number of sentences. As for, lexical complexity, it is evaluated in the view of word STTR (Standardized Type, Token, Rati, Tokens = the total number of all

generated of alphanumeric symbols; Word Types = the total number of distinct words (e.g. 10 instances of “do” are counted as 1TYPE of “do”).

Accuracy: Accuracy is accepted as the easiest of complexity and fluencyby applying certain language usage norms, specifically in the areas of lexicon and grammar (Craven, 2017). Accuracy measurement is occurred by the number of errors per 100 words.

Errors in the writing task are included spelling, ignored words, commonly confused words, use of articles, pronoun agreement, subject-verb agreement, use of verbs, modal verbs, sentence structure, use of conjunctions, use of nouns, incorrect use of numbers, incorrect use of prepositions, use of adjectives, adverbs, comparing two or more things, confusing modifiers, incorrect use of negatives, use of qualifiers, quantifiers, verb agreement, conditional sentences, wordiness, passive voice use, ignored patterns, writing style, vocabulary use, and unknown words (Yi & Ni, 2015).

8.4.2 Working memory tasks

A Working Memory task which is shortened version of Foster et al. (2015) Complex Span task consisting of Symmetry, and Operation span to measure WMC as a whole.

Two working memory tasks which have measured PL and VSS have been provided to the participants to complete the tasks in two different days. After completing their argumentative essays, they have been asked to inform their avaiable days to measure their OSPAN for PL and SYMTRY SPAN for VSS and the participants attend to complete the tasks in two different days speerately. All 43 participants, 2 tests have been evaluated seperately.

As far as the issue why these tasks are chosen concerning the versions of the tasks, it is preferred to utilize the shortened versions of the tasks of Foster et al. (2015), that is why; the other version (long version), which belongs to Oswald et al. (Oswald, McAbee, Redick, & Hambrick, 2015), it is domain general instead of domain specific. That is how Oswald, McAbee, Redick, & Hambrick (2015) have explained the subject like that, shortened versions focus on specific content of WM task and specific outcomes of interest cover each other. However, Oswald et al. (Oswald, McAbee, Redick, & Hambrick, 2015) has

claimed that domain general perspective supposes that processing, storage, and recall necessities are correspondent across specific WM tasks (not unique to each other). To enlighten the subject Kane et al. (2004) has reported that verbal and spatial WM factors are highly close to each other, sharing between 70 % and 85 % of their variance, leaving little space for reliable variance unique to each other. At this point, it is necessary to recall Baddeley's example where patients who have verbal short-term deficit, in deed they have a normal VSS WM, it should be avoided loading the same type of information to manage two tasks at the same time (Repovs, Baddeley, 2006). That is why, Foster et al. (2015) shortened version task is preferred. Moreover, Conway et al. (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005) has reminded that WM is a multicomponent system which is responsible for active maintenance of information in the face of ongoing processing and /or distraction, most importantly domain specific storage, rehearsal process, and domain general executive attention. Furthermore, if necessary to say domain specific skills and domain general executive attention, which show different specialties as a function of individual ability, task context, and ability to unknown context interactions. To illustrate, a novice chess player depends on more significantly domain general executive attention to make decisions on recent moves or future positions than on domain specific skills. On the contrary of that an expert chess player generally depend more on domain specific processes and skills to maintain information. Despite of that under some sort of cognitive load or emotional load, even an expert player can ask for the assistance of executive attention. Therefore, domain general WM span tasks are mostly related on central executive attention (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005). That is the main reason why, a domain specific task would be better for the WM task it is to do with the participants would be intermediate and can called expert somehow. This is in the same direction what is really needed to be carried out, which is to analyze intermediate students.

Shortened version has also a crucial effect on accuracy and fluency which are really necessary to be measured as well. The OSPAN task will be used to measure verbal WM, to check verbal WM effect on descriptive if a relationship cannot be seen between VSS WM and descriptive writing. The comparison

effect of verbal WM (phonological loop) and VSS will be noticed. To measure accuracy and fluency as well, the comparison effect of verbal WM (phonological loop) and VSS is needed because it is said that less number of trails by 67 % in a battery of these tasks still bring about 90 % of the variance in their measurement of Gf (Foster, Shipstead, Harrison, Hicks, Redick, & Engle, 2015). Hence, it is assumed, as it saves time and it is supposed to assist to maximize their accuracy as there will not be much cognitive load in WM, again it is supposed to be be able to work better, and the better working means the better product.

Operation Span (OSpan): As panel A and Fig.4 presents the Operation Span (OSpan) utilizes the letters as to-be-remembered items, and simple math problems as the distractor task (Kane, Hambrick, Tuholski, Wilhelm, Payne, Engle, 2004; Unsworth, Heitz, Shrock, & Engle, 2005). Participants are first to solve a math problem, and then see a letter, and then solve another math problem, and see another letter. This math-letter sequence is practiced from three to seven times. For each trial with an unpredictable length each time. After each math-letter sequence, participants are requested to recall in order the preceding letter. scores are calculated by summing number of letters correctly remembered in the correct order. It is also known as the partial score (Turner & Engle, 1989).

Symmetry Span (SymSpan): Panel B of Fig. 4 presents an example item from the symmetry span (SymSpan; Kane, Hambrick, Tuholski, Wilhelm, Payne, Engle, 2004; Unsworth, Redick, Heitz, Broadway, & Engle, 1999). The SymSpan task has been almost the same method with three key differences. First, the distraction task has been exploring. If a displayed shape is symmetrical along its vertical axis. Second, the to-be-remembered items have been placed of red squares in a 4x4 grid of potential locations. In the end, per trial, the number of symmetry-location pairs have been varied from two to five times (i.e., the maximum number of items to-be-remembered have been varied between the three tasks. These differences in the maximum recall number have been based on previous studies and have also been used keep consistency with previous research utilizing these tasks.)

Samples of Operation Span, Symmetry Span and Rotation Span

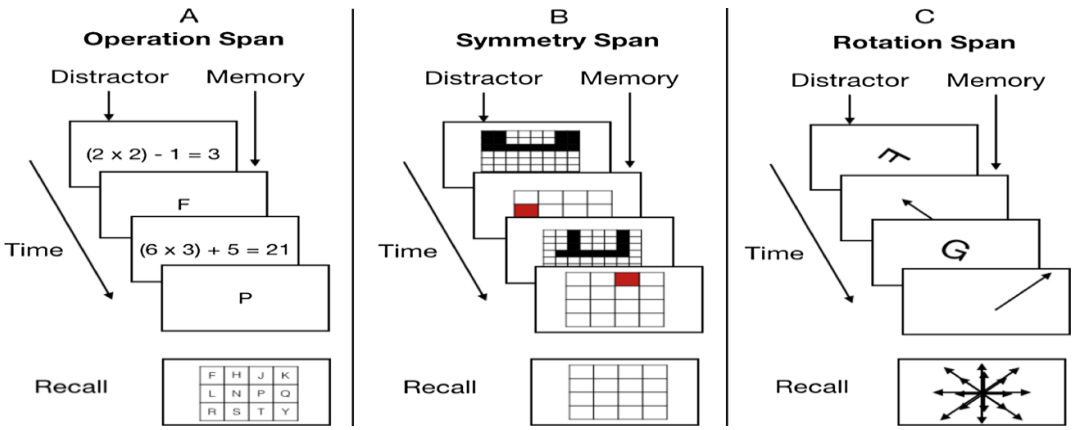

Figure 8.1: Examples of Operation Span, Symmetry Span, and Rotation Span (Foster ,Shipstead, Harrison, Hicks,Redick, &Engle, 2014)

8.4.3 Overview of IRT

IRT which is *item response theory* (Embretson, 1996) is a psychometric assessment and modeling technique, which has much more advantages than classical test theory (for a critical test theory, see Embretson, 1996). While classical test theory gives attention substantially on scores for an entire test, IRT evaluates latent analysis of items as independent from the test as a whole more sophisticatedly. Additionally, parameter on both the item and individual side independently can be roughly calculated enabling a more nuanced investigation into person ability level, item difficulty, item discrimination, and so forth. In IRT, items are evaluated separately and independent from one another which are the main advantages of IRT over classical test theories. That is why; each item in attest or their contribution cannot be evaluated as they had the same difficulty, as the difficulty level is different. Item difficulty parameter is most attention driven part in IRT in both individual items and the test as a whole. When looking at binary and dichotomous data, a particular subject ability level is roughly judged by the difficulty of item which equates to the individual (; conceptually analogous to a Z-score) like that the same ability level of a subject has 50% chance getting an item and correct information is increased at that point (for models without parameters for guessing). To illustrate, on the condition that on item with of 1 is given to a subject with of 1. The subject has a 50% chance to respond that item correctly and information for that subject is increased. However, if the information is inversely, concerning standard error, and that is why; it is desirable to match item difficulties with the

level of subjects to minimize error and maximize discrimination. As for, polytamus data (such as the data presented here) interpreting equivalent item difficulty with ability level for the same reasons as binary data. Roughly judgment of item discrimination is also presented. This parameter is related to the slope of the item characteristic curve and provides information on how narrowly or broadly and item can Figure 1 which is the illustration of three common complex span tasks. a processing and distractor task is presented to the subjects and given their mean RT on practice trials 2 to five their SD to answer. Then to-be-recalled items are displayed. The process repeats a number of times until a recall screen appears. In the standard length task, each set sizes consist of from 3 to 7 which is administered three times in the operation span, and each set size from to seven which is administered in symmetry and operation span.

WM has been measured by three established complex span tasks have been utilized to measure WMC. In a complex span task participants are presented a sequence of to-be-remembered items (such as a sequence of letters). However, participants must also complete a distractor task (such as solving a math problem) between the presentation of each to-be-remembered items, and the next distractor task, unpredictably varied from one trail to the next. Participants have seen a sequence of anywhere from two to seven to-be-remembered items which are depending on the task, and they have seen each sequence three times. Throughout the complex span task, these sequence lengths have been randomized. In deed, it is necessary to say that these randomizations have been modified for the current study. That is to say, participants have completed three blocks of trials with one of each sequence lengths blocked, yet doing so has allowed researchers to keep each block of trials equal in terms of sequence lengths.

Except blocking sequence lengths, the three complex span tasks have all followed the procedures of Unsworth and colleagues (Unsworth, Heitz, Shrock, & Engle, 2005). The most important distinction of this method has been that it is necessary for subjects to maintain their response times for the distraction items in each task which is a crucial requirement to reduce people's ability to rehearse the to-be-remembered items during the distraction task. To reach this purpose, participants have been timed while practicing the distraction tasks

during the instruction phase. Then participants have been required to respond within 2.5 standard deviations (SDs) of their average response time to each distraction item. Furthermore, the tasks can be reached from the attention and WM Lab Website (www.englelab.com, 2015)

8.5 Procedure

First, a background information test and Oxford language assesment test will be applied for all the participants, after having a homogenous group, the estimated time is 1 week, Working Memory tasks will be applied. After a week of the WMC task, the results will be evaluated and two groups will be established as HWMC holders, specifically HVSS WMC holders and LWMC holders, specifically LVSS WMC holders. First, online planning writing task will be presented. They will asked to complete two argumentative essays in an estimated time. After 1 hour break, pre-planning will be explained and the particioants will required to prepare a listing and outlining for the scene that they will watch, after that the real writing will be asked to be generated in the estimated time. In the end, the planning papers and the writings will be collected by the observer to evaluate them individual

Participants have completed three complex span tasks as measures of WMC and three measures of Gf as part of a larger cognitive battery completed in their laboratory.

9. RESULTS

In this section, I will first present the results of the two writing tasks: (1) Online Argumentative Essay and (2) Argumentative essay with Pre planning. Then, I will give the results of the two working memory tasks: Automated Operation Span task and Automated Visual Spatial Span task.

9.1 Results from Online Argumentative Essays and Argumentative essay with Pre planning

After collecting data from Operation span to measure phonological loop and symmetry span (www.englelab.com, 2015) to measure visuospatial skecthpad, and argumentative writings with pre-planning and online planning to evaluate writing skills of our participants the data have been evaluated in two main levels; online planning and pre-planning which have been analyzed later under the measurement of abbreviations of writings o observe the evaluation of word number (OWN), sentence number (OSN), syntactic complexity (OSYNC), lexical complexity (OLC), word error (OWE), word error percentage (OWEP), word accuracy (OWACC), and fluency (OFL) and "O" added for "Online" planning while "PP" added before abbreviations to mean "Pre-Planning".

The tasks have been carried out as Descriptive statistics to see the difference between pre-intermediate and intermediate levels. Independent t- tests were used to see if the results are meaningful or not. Paired sample t-test to reveal the comparison between online planning writing and pre-planning writing. Then, WM results have been commented after that, Correlation analysis have been carried out to observe the interaction with working memory and writing elements. Table 1 below provides mean scores and standard deviations of the data collected from online Argumentative Essays of pre-intermediate and intermediate groups

Table 9.1: Descriptive Statistics of Online Argumentative Essay

*Group	OWN	OSN		OSYNC		OLC		OWE		OWEP		OWACC		OFL		
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
PRE-INT. (n=32)	16.3	1.3	248	15	17	1.5	1.24	.03	16	1.4	6.5	.502	93.5	.493	5.5	.351
INT. (n=11)	15	1.5	235	24	17	2.5	1.04	.40	12.7	1.5	6	.889	94	.889	5	.530

*OWN: online word number, OSN: online word number (OWN), online sentence number (OSN), online syntactic complexity (OSYNC), online lexical complexity (OLC), online word error (OWE), online word error percentage (OWEP), online word accuracy (OWACC), and online fluency (OFL)

As it is seen, the largest difference is between Pre-intermediate OSN and Intermediate OSN which is 13, the rest is almost equal, that is the main reason why; it can be said, there is almost no difference has been observed between Pre-intermediate and Intermediate writing in online planning. As the table reveals, the largest difference between two levels has been seen on OWN which means Pre-intermedaite students have used relatively more variety of words than intermediate students, the reason might be the overload of wm with more grammatical rules than words.

In table 2, we present mean and standard deviations of the data collected from Argumentative Essays with pre-planning written by pre-intermediate and intermediate groups.

Table 9.2: Descriptive Statistics of Argumentative Essay with pre-planning

*Prof. Group	PPWN		PPSN		PPSYNC		PPLC		PPWE		PPWEP		PPWACC		PPFL	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
PRE-INT.	286	70	19	6	17	6	18	10	6.5	3	6.63	2.75	93	2.70	6	1.6
INT.	265	105	18	8	16	4	12.5	8.5	4.5	2	5.91	2.95	94	2.95	6	2.5

*PPWN: pre-planning word number, PPSN: pre-planning word number (PPWN), pre-planning sentence number (PPSN), pre-planning syntactic complexity (PPSYNC), pre-planning lexical complexity (PPLC), pre-planning word error (PPWE), pre-planning word error percentage (PPWEP), pre-planning word accuracy (PPWACC), and pre-planning fluency (PPFL)

As for the comparison of Online and Pre planning Argumentative writings, in on-line planning sentence numbers are obviously more than pre-planning writings (OSN 248 – 239 while PPSN 19-18), however; in pre planning word variety has been explicitly more than online writings (PPWN: 286-285;

OWN:16.3 – 15), apart from that the other difference that worths mentioning is seen between lexical complexity (OLC: 1,24 – 1.04; PPLC: 18 – 12.5), which can be asserted pre-planning really assists to produce more variety of words in lexical complexity.

To examine whether the difference between the groups in online argumentative essay, we conducted independent samples t-tests on the means obtained from pre-intermediate and intermediate groups for each essay. Results of the independent sample t-tests are given in Table 3.

Table 9.3: Independent samples t-test results from online argumentative essay

*Online Argumentative Essay	mean	t-value	p-value
OWN	248	t (39) = .646	p =52
OSN	16.37	t (39) =.419	p=.67
OSYNC	17	t (39)=. 029	p=.97
OLC	1.24	t (39)= 1.7	P =.09
OWE	16	t (39) =1.4	p =.17
OWEP	7	t(39) =.75	p=.47
OWACC	93	t (39)= -.70	p = 50
OFLUENCY	5	t (39) =. 50	p = 60

*OWN: online word number, OSN: online word number (OWN), online sentence number (OSN), online syntactic complexity (OSYNC), online lexical complexity (OLC), online word error (OWE), online word error percentage (OWEP), online word accuracy (OWACC), and online fluency (OFL)

As the table reveals, the largest difference between two levels have been seen on OWN which means Pre-intermedaite students have used relatively more variety of words than intermediate students, the reason might be the overload of wm with more grammatical rules than words. We also conducted independent samples t-tests for the means of 6 variables of argumentative essays with pre-planning. Results of the independent samples t-tests are presented in Table 4 below.

Table 9.4: Independent samples t-test results from argumentative essay with pre-planning

Preplaning Argumentative Essay	mean	t-value	p-value
PPWN	287	t(39) = .74	p=.47
PPSN	19	t (39)= .26	p= .80
PPSYNT	17	t (39)= .60	p= .55
PPLEX	18	t (39) = 1.66	p = .10
PPWERR	6.4	t (39)= 1.9	p= .06
PPVACCU	94	t (39)= -1.9	p =.06

The table shows that the difference between pre-intermediate group and intermediate group in preplanning is statistically significant in vocabulary accuracy, word error, syntactic complecity.

As it is seen in t- test results word numbers in pre-planning writings have been explicitly more than online word number (PPWN : 287; OWN: 248), as for sentence numbers, the difference in pre planning s not too much, but there is still difference that is need to be mentioned proving pre planning is relatively helpful (PPSN: 19; OSN: 16.37). However, there is no difference between syntactic coplexity in pre planning and online planning. As it was seen in descriptive table as well, wrong usage of words are more possible in pre-planning than online planning (OWE: 16; PPWER: 6.4). When it comes to word accuracy and fluency there cannot be mentioned large differences (PPWA: 94; OWAC: 93; PPFL: 6.4; OFL:5) in pre-planning accuracy and online accuracy, it is the same as in pre-planning fluency and online fluency. In a nutshell, it is seen that pre planning asissts to write more words, to use better syntactic complexity and to do less words errors.

We also conducted paired samples t-tests for all participants to examine whether the difference between the means of 8 variables in online argumentative essays and argumentative essays with pre-planning. Table 5 provides paired t-test results of pre-intermediate group.

Table 9.5: Paired samples t-test results of Online-Planning and Pre-planning Argumentative Essays

Online and Pre-Planning Argumentative Essays value	mean	t-value	p-
OSENTnumb – PPSN	-2.390	t (40) = -2,34	p = 024
OWordNumb – PPWN	-36.000	t (40) = -2,99	p = 05
OSYNC – PPSYNTCom	.293	t (40) =.29	p =78
OLC – PPLC	.1880	t (40) = -1000	p = 33
OWE – PPLexErr	-1.512	t (40) = - 1.15	p = .25
OWEP – PPWerrP	.537	t (40) =.93	p = 35
OWAcc - PPWACCU	-.512	t (40)=-.88	p = 38
OFLUENCY – PPFLUENCY	-.902	t (40) =-3.13,	p = 03

Regarding paired t-test results, the largest difference is observed on words numbers in a negative way (OWordNumb – PPWN ; -36.000), which means while word number in pre planning is increasing, word number in pre planning is decreasing, or vice versa. With regard to sentence numbers and lexical errorrs; they are also in a negative dimension, while sentence numbers in online planning is increasing, sentence numbers in pre planning is decreasing or vice versa. It is the same for word errors in both type of writings (OSENTnumb – PPSN: -2.390; OWE – PPLexErr : -1.512). The negavive effect has been still on both types of writings, even it gets less, but when word accuracy and fluency gets high on a side, it gets lower on the other side (OFLUENCY – PPFLUENCY: -.902; OWAcc - PPWACCU : -.512). Seeing the effect of lexical complexity and word errors, which is in positive direction, necessary to be mentioned, this is not a big difference but there is still a difference needs to be clarified (OLC – PPLC : .1880; OWEP – PPWerrP : .537).

9.2 Results from working memory tasks and writing tasks

We applied two online working memory tasks to measure WM capacity of the participants: (1) Automated Operation Span task and (2) Automated Visual Spatial Span task. In this section, we first presents the results of descriptive statistics of the two WM tasks and the Latent Variable. Then, we provide results from correlation analyses of WM tasks and Writing tasks. Finally, we present results of variance analyses of the mean scores of the three WM groups (low span, mid span and high span) from writing tasks. Table 6 provides means of pre-intermediate and intermediate groups from two WM tasks.

Table 9.6: Mean scores and standard deviations of WM tasks

	AOSPAN (PWM)		AVSP (VWM)	
Groups	M	SD	M	SD
Pre-intremediate (32)	21.43	3.13	12.00	3.78
Intermediate (11)	24.00	5.57	13.72	4.59

Then, we conducted correlation analyses to examine whether there is significant relationship between WM measures and the writing performance of the participants. Table 7 shows correlations between WM tasks and Writing tasks

Table 9.7: Correlations among WM tasks and 8 variables online argumentative essay

		1	2	3	4	5	6	7	8	9	1011
1.	PWM	-									
2.	VWM	.306	-								
3.	LATENTWM	.796**	.815**	-							
4.	OSENTnumb	-.059	.123	.023	-						
5.	OWordNumb	-.085	-.062	-.100	.630**	-					
6.	OSYNC	-.133	-.243	-.222	-.502**	.222	-				
7.	OLC	.154	.202	.234	-.170	-.280	-.018	-			
8.	OWE	-.080	-.001	-.046	.277	.510**	.261	-.122	-		
9.	OWEP	-.119	.073	-.016	-.248	-.252	.138	.067	.655**	-	
10.	OWAcc	.131	-.065	.027	.244	.251	-.139	-.062	-.656**	-.998**	-
11.	OFLUENCY		-.106	-.094	-.131	.602**	.989**	.248	-.280	.518**	-.241 .238

**. Correlation is significant at the 0.01 level (2-tailed).

In searching PWM and VWM on CAF, it has been searched the other components of the sentence to see their interactions in online planning. As the topic of our thesis is working memory interaction with L2 argumentative writing which will be taken into consideration together with the drastic results. There have been seen drastic results on both nagative and positive sides, starting from sentence numbers PWM and sentence number relatioship is -.059, which means a pariticipant who has good PWM cannot write as many sentences as someone who has good VWM (.123). As for word numbers, there is a negative relationship has been observed in both PWM and VWM (-.085; -.062). When a participant has good PWM and VWM, who couldnt write as many words as it has been expected (Chenoweth&Hayes,2003;Levy&Marek,1999;Mueller,Seymour, Kieras, & Mueller, 2003). The situation is the same for syntactic complexity, holding good PWM and VWM (-.133;-.243) has not influenced the syntatic complexity in a positive way; As for, lexical complexity, positive relationships are observed when a particiapant has good PWM and VWM, they did better with regard to lexical complexity. However, comparing to PWM and VWM (PWM; VWM: .154;.202), VWM has more effect on lexical complexity than PWM. The reason of overloading WM, because the relationship between WM and lexical complexity is very high and in a positive way (PWM: .154; VWM: .202) (According to the results of SPSS analysis program). . There has not been a strong relationship between WM and word errors, but it is still seen a negative

one such as PWM: -.080; VWM; -.001..Regarding previous reseraches, there is seen a positive intereaction beween PWM and word accuracy,; 131, which is so dramatic, however, there is almost no relationship between VWM and word accuracy; -.065. sentence number and words numbers are interacted in a positive way with word accuracy (.244; .251). The dramatic point is OWEP, when it gets high, word accuracy gets deeper (-.656**). But it s so suprising, fluency and word accuracy is in a negative relationship, when one gets higher, the other one gets deeper, which menas many true words are not expected o be written so fluently, it takes time (-.998**). Above all, it seems that fluency has nothing to do with WM (PWM; VWM; Latent: -.106;-.094;-.131) in a positive way. When fluency exists, WM gets slow down, or when WM works hard, fluency gets slow down, which brings high sentence numbers, word numbers together with alot of errors (.602**;.989** ; .518**). Even though, it s not as much as the previous triple, wih fluency, in syntactic complexity and word accuracy have been observed too (.248 ; .238). However, when we talk about lexical complexity and OWEP, when they are high, fluency gets low (-.280; -.241), or vice versa

Table 8 shows correlations between WM tasks and 8 variables of argumentative essay with preplanning.

Table 9.8: Correlations among WM tasks and 8 variables argumentative essay with pre-planning

		1	2	3	4	5	6	7	8	9	1011
12.	PWM	-									
13.	VWM	.306	-								
14.	LATENTWM	.796**	.815**	-							
15.	OSENTnumb	-.059	.123	.023	-						
16.	OWordNumb	-.085	-.062	-.100	.630**	-					
17.	OSYNC	-.133	-.243	-.222	-.502**	.222	-				
18.	OLC	.154	.202	.234	-.170	-.280	-.018	-			
19.	OWE	-.080	-.001	-.046	.277	.510**	.261	-.122	-		
20.	OWEP	-.119	.073	-.016	-.248	-.252	.138	.067	.655**	-	
21.	OWAcc	.131	-.065	.027	.244	.251	-.139	-.062	-.656**	-.998**	-
22.	OFLUENCY		-.106	-.094	-.131	.602**	.989**	.248	-.280	.518**	-.241.238-

**. Correlation is significant at the 0.01 level (2-tailed).

In pre planning argumenataive essay, it seems that, PWM and VWM has been in a dramatic interaction with word numbers (.150; 234). When their effects have been compared, it is obvious that a participant who has good VWM has done better than someone who has good PWM. In sentence number, PWM and VWM has almost the same effect on the writing, but the dramatic one is the interaction

with the word numbers, when WM is good, word numbers get higher together with sentence numbers (.621**). In sytactic complexity, PWM (-.056) effect is in a negative way when VWM (.013) has a very little positive effect. When PWM (-.056) is good syntactic complexity is seen effected in a negative way in our research. However, there is a strong negative infleunce between syntactic complexity and sentence number (-.655**). When the number of the sentences are high, their syntactic complexity is getting lower, as it might be difficult to use two different abilities at the same time (According to the results of SPSS analysis program, 2018). Lexical complexity cannot be comment ed as all of the variables are constant. In lexical error, it is observed that the relationship with PWM is not strong (.034), while a strong relationship can be mentioned with VWM (.132). Besides, when word number gets high, lexical error gets high too, strongly (.505**), the effect on sentence number is almost as strong as the word number on lexical error (.327*). PPWerr has been affected by PWM (-.116)in a negative way, while I has been affected by VWM (.058) in a high positive way. When PWM is high, word accuracy is high too (.116); however, the situation is in a different direstion on VWM, becuase when VWM s high, word accuracy gets low (-.058). Negative effect is seen on word number as well in relation with word accuracy, when word number gets higher, the worng usage of the words get higher. The strongest negative effects are seen on lexical error and WerrP (-.847** ; -1.000**). At the time of having accurate words, lexicall error and Werr are in a strong negative effec on word accuracy, when one side gets high, the others dramatically gets low. As for fleuncy, there is an expilicit interaction with WM (.244). Compapring to PWM and VWM, when a participant has higher VWM than PWM, who is sronger n fluency (.158;.235). Nontheless, it needs to be declared that there is a very strong relationship with word and sentence numbers, (.986**;.610**) when fluency is observed, those wo gets high too, bringing up a strong lexicall error (.513**). But still, it can not be seen a positive interaction beween fluency and accuracy, when fluency occurs, it is hard to say most of the words are correct (-.085).

In this last section, we present results of variance analyses of the mean scores of the three WM groups (low span, mid span and high span) from writing tasks. We first formed a latent variable from the average of the two WM tasks and

then dived it thee groups using percentages: low span, mid span and high span. Then, we conducted one-way ANOVA on the means of three WM groups obtained from writing tasks.

Table 9.9: Descriptives of working memory of online argumentative essay

	OSN		OWN		OSNC		OWE		OWACC		OFL	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
High WMC (N=19)	16,1	5,9	241	87	15,4	3,7	13,5	7,5	94,4	2,6	5,2	1,9
MidWMC (N=13)	15,2	6,5	248	70	19,5	11,1	17,2	5,9	92,5	3,2	5,5	1,6
LowWMC (N=9)	15,9	7,6	246	92	9,14	3,01	15,7	7,3	93,4	2,1	5,4	2,2

OSN: online sentence number, (OWN): online word number, (OSNC): online syntactic complexity, (OWE): online word error, (OWACC): online word accuracy and (OFL): online fluency

As for, looking for, working memory levels to evaluate them with regard to writing elements; in online planning, among high, mid and low working memory levels, as it seems in the table, it cannot be asserted high working memory provides better generating writing. In online planning argumentative writing, among high, mid, and low results, the only dramatic difference has been seen on high word number which is 228.11, while mid and low are 78 and 87 respectively. That means in online planning, high working memory holders are far better producing a lot of words.

Table 9.10: Descriptives of working memory of argumenative essay with pre-planning

	PPSN		PPWN		PPSNC		PPWE		PPWACC		PPFL	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
High WMC (N=19)	19,5	7,8	291	87	16,4	5,6	17,5	11,7	94,2	2,9	6,5	2,0
MidWMC (N=13)	17,2	5,2	286	79	17,8	5,7	16,1	9,6	94,2	3,7	6,3	1,8
LowWMC (N=9)	17,8	6,3	249	65	15,3	5,0	16,2	7,5	93,5	2,4	5,5	1,6

PPWN: pre-planning word number, pre-planning word number (PPWN), pre-planning sentence number (PPSN), pre-planning syntactic complexity (PPSYNC), pre-planning word error (PPWE), pre-planning word accuracy (PPWACC), and pre-planning fluency (PPFL)

The situation is the same in pre planning argumentative writings too. High working memory holders has produced plenty of words (271) while mid and low working memory holders produce less words than high memory holders (73, 74).

We conducted a one-way ANOVA to see whether the difference between variables is significant. Table 11 provides the results of one-way ANOVA for online arumentative essay.

Table 9.11: Results of one-way ANOVA, online argumentative essay

	f- Value	p-Value
OSENTnumb	F (2,38)= .850	p=.435
OWordNumb	F (2,38)= .456	p=.637
OSYNC	F (2,38)= 1.276	p=.291
OLC	F (2,38)= 1.081	p=.349
OWE	F (2,38)= .815	p=.450
OWEP	F (2,38)= .217	p=.806
OWAcc	F (2,38)= .300	p=.743
OFLUENCY	F (2,38)= .745	p=.482

The results on Table 11 show no significant difference between working memory capaity and measures of online argumentative essay. To explore whether there is a difference between WM and performance in writing argumentaive essay with pre-planning, we conducted one-way ANOVAs and results were given on Table 12 provides the results of one-way ANOVA for online arumentative essay.

Table 9.12: Results of one-way ANOVA, argumentative essay with pre-planning

	f- Value	p- Value
PPSN	F (2,38) =.158	p=.854
PPWN	F (2,38) =.193	p = .825
PPSYNTCom	F (2,38) =.287	p = .752
PPLC	F (2,38) =.	p = .575
PPLexErr	F (2,38) =.035	p = .966
PPWerrP	F (2,38) =.117	p = ..890
PPWACCU	F (2,38) =.117	p = .890
PPFLUENCY	F (2,38) =.331	p = .913

As for, comparing high, mid, and low working memory holders in pre planning and online online planning, the dramatic difference has been seen word numbers; in online planning, word numbers are 228, while in pre planning, it is 271, which shows pre planning has been obviously assisted producing more words. The other imporant difference has been observed in word accuracy, suprisingly only in mid and low working memory holders in pre planning (94, 93). That means pre planning helped to write more accurate words than online planning. While looking at the rest crucial resukts, evaluating subjects, as it seems, there is not much difference has been seen, however; there is a difference, which is in favour of pre planning. This shows pre planning assists to produce better writing in relation with high usage of working memory assistance.

To sum up, there is a clear difference between pre planning and online planning in our participants' argumentative writings has been observed. The present sudy aims to clarify working memory specifically PL and VSS impact on Turkish EFL learners argumentative writings with respect to CAF with the effect of online planning and pre task planning in argumentative writing (According to the results of SPSS analysis program, 2018).

In online planning: VSS affect on syntactic complexity is in a negative dimension (-.056), which means when vss is high, syntactic complexity gets low, or vice versa. As for lexical complexity, there is a high positive interaction between vss and lexical complexity, which means when vss is high, lexical cmplexity is much better. Regarding accuracy and fluency, they have been effected by VSS in a negative dimension (Acc: -.065; Flncy: -.094). When VSS is high accuracy and fluency have been effected negatively, which means when

vss is high, accuracy and fluency gets low, or vice versa (According to the results of SPSS analysis program, 2018).

With respect to PL; syntactic complexity and fluency have been in a negative dimension with PL (Synt: -.133; Flncy: -.106), when one side is high, the other side gets low. In perspective of lexical and accuracy dimension, there can be mentioned a high positive relationship between them (Lex: .154; WAcc: .131) (According to the results of SPSS analysis program, 2018).

In pre planning: VSS has little positive effect on Syntactic complexity (.013). However, Fluency and Lexical complexity relation is too high (Flncy: .235; Lex: .132), which means when VSS is high, it helps to have much better writing in terms of Fluency and Lexical complexity. On the other hand negative relations can be still observed in accuracy (Acc: -.058). When VSS is high, accuracy gets low, or vice versa (According to the results of SPSS analysis program, 2018).

PL has a negative effect on syntactic complexity (Syn Comp: -.056), when PL is high, syntactic complexity gets low. As for, lexical complexity, which has a mottered relationship with PL (Lex Comp: .034). Word Accuracy and Fluency have been observed in a positive high interaction with PL (Acc: .116; Flucy: .158) (According to the results of SPSS analysis program, 2018).

When comparing pre planning and online planning, in online planning and pre planning VSS and PL have negative effects on syntactic complexity, which means there is no WM relations has been observed in syntatic complexity ina positive way. In online planning, the effect of VSS on lexical complexity is .202, while PL's effect is .154. In pre planning their effects have been like that; VSS: 132; PL: 034, which reveals wm has a positive interaction with lexical complexity; just as in Lan (2014)'s research, as Cognition Hypothesis asserts to produce better writing, wm can focus on better under more pressure with more demandind writing as all wm slave systems needs to work together this pressure seems to have a positive effect on lexical complexity. For word accuracy in online planning vss has a negative efffect while pl has a positive and high effect (VSS: -.065; PL .131) it is the same as in pre planning for VSS: -.058; but PL: . 116. However, interestingly pre planning is supposed to be related to VSS (Kellogg, 1996; Olive, 2004), while PL has worked better in pre planning.

Regarding fluency, in online planning VSS: -.094 and PL: -.106 has a negative interaction with fluency, but in pre planning wm seems very much helpful VSS: .235, PL: 158 (According to the results of SPSS analysis program, 2018).

In a nutshell, in our research, there cannot be said that VSS has been related to pre planning in terms of CAF, as it is expected (Kellogg, 1996; Olive, 2004); furthermore, wm is definetely related to our writings in tems of CAF either in a positive or negative way. Even though expectations, pre planning has not assisted to generate better writings in terms of accuracy and complexity, except fluency (According to the results of SPSS analysis program, 2018).

10. DISCUSSION

The study investigated the effect of pre-task planning, on-line planning and working memory on L2 performance in Turkish EFL leaners' argumentative writings. The first predicition have been that planning and working memory might have strong effect on L2 performance in argumentative writings. The second prediction has been there might be seen any effects of pre planning and working memory in L2 performance in Turkish EFL learners' argumentative writings.

With respect to first research question if pre-ask planning and online planning have an influence on complexity, accuracy, and fluency in Turkish EFL Learners' argumentative writings, the results have been varied either in online planning or pre planning. There has been observed no big differences between accuracy and fluency in online and pre planning writing which might be as Ellis (2003) asserts that each type of task might be an opportunity framework for communicative output which provide us an opportunity to assume that behind every task, there are different learning opportunities and potential activities for learning. Depending on this, it is likely to say, every task trigger to work different part of wm as wm has its own slave systems and each slave systems has its own duty (Baddeley, 2003). That is why, accuracy and fluency can be equal as task type have not triggerred the related part of the working memory which are supposed to be VSS (Baddeley, 2003). Above all, we know that spatial and visual parts of VSS Works differently from each other (Logie,1995). So what might have been if the task type has triggerred the necessary part of wm.The explanaion is, the Limited Attentional model which expects a worse linguistic performance on a more complex text, the other one is Cognition Hypothesis which predicts a better performance on a more difficult text (Lan, 2014). Depending on these hypothesis as online planning the text demands more concentrantion in doing planning, translating, and revising (Hayes & Flower, 1980) and which will make the text more demanding that's why lexical and

syntatic complexity is low in these situations, which can be clarified by Limited Attentional Model as limited capacity of working memory could not perform better on a more demanding situation in online planning. Despite of that, a high lexical and syntactic complexity have been onbserved in pre planning as limited capacity of wm works better under the condition of its load is less than online planning. There has not been observed a positive working memory relation in syntatctic complexity, while PL impacts has been high on fluency which let us to claim that LTM relation is something cannot escaped from wm too as in Baddeley' (2003) multi component model in terms of the necessity of having at least minimum orthography, morphology, lexicon, syntax, as well as the discourse and rhetorical conventions of the L2 (Khaled,2007) to be able to generate better writing in terms of syntactic complexity.

Descriptive statistics results according to SPSS anaysis program (PWM and OLC, .154; PWM, OSyntcomp, -.133; PWM, PSyntCom, .-056; PWN, PPLC: . .[a]) as it has been said on most of previous reseraches such as Baddeley (2001). The other crucial point that takes our attention is the equality of accuracy and fluency in online and pre planning. The reason of it might be the aim of writing together with task type. As widely accepted, writing tasks are divided into two categoires in L2 writing which are either real-world tasks, which depend on directly the learners' communicative goals, or pedagogic asks which are generated to improve students' genre knowledge and composing skills (Behbahani, 2011). Taking into consideration our writing subject which might be accepted as real-world task which did not force our participants to exceed their limits as it is a thesis study as well together with less practice in pre planning as they do not know very well how to develop their skills in pre planning.

In online and pre planning accuracy has been equal. However, when divide wm into its slave systems in online planning, there has been observed a high PL influence on accuracy (PWACC, 131) which can be explained by is Cognition Hypothesis which predicts a better performance on a more difficult text (Lan, 2014) or a more demanding process. Relatively high pressure migh have assisted to generate better accuracy on online planning writing task. In this perspective, Baoshu and Luo (2012) has already revealed wm effect on accuracy

which is relatively match with our results (interms of PL dimension). With respect to fleuncy in online planning (OFLUENCY: PWM,-.106 VWM, -.094). It has been seen a negative infleunce on WM in online planning which might be explained by being novice and expert writers as fluency needs more practicing which is related to LTM (McCutchen, 2000) which is why; WM infleunce can be negative in this dimension. As they can be accepted to make use of LTm mostly. This situation can be clarified by the WM interaction with Longterm memory (Kellogg, 1996, 2001a; Olive, 2003). As proposed by McCutchen (2000), novice writers are not able to use short term working memory effectively as they do not have fluenct text generation process and a large structured domain knowledge with respect to the composition. Hence, beginning writers are likely to depend on strategies that save working memory capacity, such as knowledge telling. So, it can be claimed that our participants do have much information to retrieve it by using working memory extensively or maybe directly. Although, expert writers, extensively utilize long term working memory to organize the large knowledge base they have. This srategy assists them to utilize wm limitations better by exceeding its limited capacity. However, if you do not have much information in LTM, what might they have been made use of, as it has been mentioned before.

As for, pre planning situation (PPFLUENCY: PWM:158; VWM:.235) a high and effective wm infleunce has been observed on argumentative writing which might be the effective time usage thanks to pre planning has assisted to retrieve necessary information from LTM ((Kellogg, 1996, 2001a; Olive, 2003).

VSS and PL have a negative inflluence on sytntactic complexity in contrast to the research of Bergsleithner (2010) has found working memory effect on complexity. The reason of this might be the individuls are to write and organise their ideas or write about a provided issue, specifically if the writing performance is in L2. To be able to do this, they need o reach and call back lexical and semantic information from their Long term memory so as to perform writing in L2 (Kellogg, 1996, 2001a; Olive, 2003).

This is the first principle that we need to recall now. For the next step, David P. McCabe, Henry L. Roediger, III, Mark A. McDaniel, David A. Balota, and David Z. Hambrick (2010)2s study has revelaled that working memory capacity

and executive function share a common specific executive attention component depending on this idea we can remember Baddeley's Working Memory model (2003) which executive attention manages all slave systems which are VSS, PL and Episodic Buffer, hence it can be concluded at the time of wm overloads while providing all source to the one side and cannot provide enough attention to the otherside, such as there has been observed a high positive relation between VSS and lexical complexity in online planning in our research, the other side of WM might slow down. Regarding complexity, what we have found has been almost similar to Gilabert (2007) grammastudy has found planning in no effect of grammatical complexity. As for words, in online planning, PL has a positive effect on lexical dimension and in terms of online planning this has not been expected for many studies (Yuan & Ellis, 2003; Gilabert, 2007) while Yi and Ni (2015) have in the same direction with our results. However, in terms of PL perspective which is not what is expected (Olive, Kellog, & Piolat, 2008) they revelaed that verbal wm is mostly related to words in writing one of the points that do not match with our results completely. On accuracy, in online planning PWM(.131) has a positive and huge effect on the writing while VWM (-.065) has negative high infleunce on writing which is suprising looking fort he previous researchers, to illustrate Hayes (1996) has supposed that writers also utilize of vss wm for mentally representing the spatial layout of their text. So, VSS has supposed to have a positive influence, this has been approved by Le Bigot et al. (2009, in press) who searched memory for Word which provides an idea accuracy in grammar are supposed to be better who has good vss wm holders which did not happen in our study regarding vss wm but pl wm in online writing. In pre planning PL (.116) has a better influence on accuracy while vss wm has (.-058) negative impact on it according to descriptive results.However, when we go through all our results, it can be claimed as pre planning and online planning tasks results are almost equal and depending on the observations while teaching pre-planning, our participants did not know much about pre planning and did not have any experience either. Hence, to be able to use wm they need to retrieve or recall the necessary information from LTM (McCutchen, 2000) to produce a good writing, but if we do not have enough background information on something what can we use, how can we use it?

All these resuts can be evaluated by being novice and expert writers (McCutchen, 2000). A novice writer has less information and practice, wm usage is limited too. It is known, wm is used to make instant decisions (Baddeley, 2000); however, it is also clear that writing also a complex process. That is, one is in need of to reach the linguisitc knowledge to transform planning into a verbal message (Olive, 2003). This knowledge includes grammatical encoding and the access of mental lexicon by recalling syntactic and morphological Word categories (Olive, 2003, based on Bock and Levelt, 1994). In this case, our participants can be accepted as novice writers with limited knowledge as writing process could not be generated over a level of which they can be expected expert writers. On the toher hand, there are several reasons to explain the inconsistency in our results of CAF; one of which is Skehan's trade off effect might illuminate this variation. Complexity, accuracy, and fluency compete for cognitive resources which are limited (Yi & Ni, 2015). Even this explaination is enough to see, all these CAF is generated from a unique place which has limited source of energy, which is WM (Attkinson & Shiffrin, 1968). It is aslo assumed that, task complexity, task difficulty, and task variation may explain the inconsistency in accuracy, fluency and complexity of language performance (Foster, Skehan, 1996; Kuiken, Veddar 2007). Depending on this, the natural features of argumenatative writing tasks may contribute to higher fluency (Yi & Ni, 2015) which has not been observed an effect on our study, while its effect has been seen on syntactic complexity in pre planning argumentataive task. As examining the problem, generating of a descriptive task needs more mental imagery than that of argumentative essay Yi & Ni, 2015). Taking into consideration of Kellog's model (1996) in writing, it could be assumed that overloading the VSS should have more infleunce on descriptive tasks than on argumenative tasks which can explain why our results in online planning argumentative essay has a negative dimension in our study (OSYCM, -.243;OACC,O -.065, OFLCY, -094), so the negative diension of the results can be claried by the task type as well. As the subject of the writing does not trigger the necessary part of working memory which can also be the reason of sleeping this side, but it has to spend some energy from the part that coordinated all the slave systems which is executive attention (Baddley, 2003) even in sleeping which can be the explanaion of negative results, while the

situation is not so bright in pre planning as well (PPSYCM, -.013; PPACC, -.058), Only difference seems in fluency in our research which .235. That even can be explained by VSS' duty which has the function of integrating spatial, visual and kineasthetic informtion into a unified respresentation which might be temporarily stored and organised (Baddeley, 2003). It also organizes visual input to be processed in VSS WM (Dehn, 2008). Moroever, VSS WM is specifically involved in the generation, manipulation, and maintenance of visual informaion (Gathercole & Baddeley, 2003), together with kineasthetic information (Kellogg, 1996). All those duties have been rehearsed in preplanning which might have helped to generate the words into correct places fluently. This stage and elaboration of the implyed interlanguage system can be explained by limited capacity of wm (McCutchen, 1996). Hence, it can be expected, highwm capacity holders might have done better than low wm holders as it happened in fluency and complexity in Yi and Ni's (2015) which was not occurred in our study except the higher difference shown in ppaccuracy which was 95 in high wm, 94 in mid and 93 in low while the resuls are 94, 3 and 3 in online planning. In Yi and Ni (2015) study has revelaed that pre planning might have assisted to low wm hoders as well so as to generate the same uality of writing as high wm holders; however, in this study has been pbserved that pre planning couldnot have assisted to low wm holders, but qualiy of writing in general in different aspects as mentioned above.

As for the responding the last research question whether vss engages with pre planning or not when we look at descriptive statistics results of PL and VSS in terms of CAF PL results have seem better in pre planning and online planning comparing to VSS in terms of CAF which reveals, in pre planning PL impact has been observed more than VSS impact in Turkish EFL sudents' argumentative writing despite of the fact that Kellogg (1999) has proposed that spatial wm is involded in planning process still spupposing visual demands come from the retrieval of concrete imaginal representations from long term memory during the planning of conceptual content (Kellog et al., 2007), which helps us to examine why this result might have been in this way, as our participants were lack of pre planning ability even though the process and

outlining and listing have been explained to them which was not enough to get into deeper undertsanding for our paricipants

11. CONCLUSION

This study examined the effect of pre-task planning and working memory on L2 performance of Turkish EFL learners in two argumentative writings one of which is with pre-task planning, and the second one is online planning to compare and contrast planning effects with the interaction of working memory effect. As carrying our this reseach Kellog's (1996) model of working memory in writing and Baddeleys' (2003) multi component working memory model has guided this study together with the assistance of McCuhen's Theory of writing (2000) theoretically. So as to comprehend working memory capacity Georgia Tech university (2017) operation span for phonological loop and symmetry span for visuospatial sketchpad working memory tasks have been utilized in a classroom environment for two to five peoples. Based on aforementioned data analysis and evaluating, it has been seen that working memory and planning have a role to play in L2 writing performance of Turkish EFL learners in positive and negative dimensions in terms f CAF inconclusively.

In a nutshell, this study clarifies 1) In online and pre planning has been no big differeces regarding accuracy and fluency which has been based on Limied Attentional Capacity and Cognitive Capacity (Lan, 2014) to be articulated better.However, pre planning impact has been so clear on high lexical and syntactic complexity without the effect of VSS () as it is expected.

2) on the one hand, concerning the words, in online planning, PL has an impact on lexical dimension as it does not come out usually in many studies (Yuan & Ellis, 2003; Gilabert, 2007). On the other hand, PL has been assumed to have a fully influence on words (Olive, Kellog, & Piolat, 2008) which has not been completely matched with our results in online planning, as for words, in online planning, PL has a positive effect on lexical dimension in pre planning and this has not been expected for many studies (Yuan & Ellis, 2003; Gilabert, 2007) in which pre task planning assists to generate better writing regarding fluency while Yi and Ni (2015) have in the same direction with our results .However, in

terms of PL perspective which is what is expected (Olive, Kellog, & Piolat, 2008) they revelaed that verbal wm is mostly related to words in writing one of the points that do not match with our results completely. On accuracy, in online planning PWM (.131) has a positive and huge effect on the writing while VWM (-.065) has negative high influence on writing which is surprising looking for the previous researchers, to illustrate Hayes (1996) has supposed that writers also utilize of vss wm for mentally representing the spatial layout of their text. This has been approved by Le Bigot et al. (2009, in press) who searched memory for Word which provides an idea accuracy in grammar are supposed to be better who has good VSS WM holders which did not happen in our study regarding vss wm but PL WM in online writing. VSS cannot explain good generation argumentative essay in terms of CAF as it is in a negative interaction with complaxiy, accuracy and fluency in online planning. In pre planning VSs has a negative effect stiil on complexity and accuracy, not for fluency which is no surprising as we know fluency is mostly likely to be related to VSS, as VSS's kieneasthetic effect is accepted (Baddeley, 2003). However, a positive and high interaction have been come out between accuracy, fluency, lexical complexity and PL, except syntactic complexity

3) In online planning PL cannot explain generating good argumentative writing concerning syntactic complexity and fluency as it is in a negative dimension, while PL has a positive effect on lexical complexity and accuracy. In pre-planning, PL cannot explain generating good writing regarding syntactic and lexical complexity: however, it has a better effect on accuracy and fluency.

As for the assistance of pre planning in L2 argumentative writing, the highest difference has been observed in lexical complexity which has been performed cobviously better in pre-planning, while accuracy and complexity are almost performed the same both in online and pre-planning (According to SPSS analysis results).

12. IMPLICATIONS

In the present study, after pre planning and online planning effect has been investigated in argumentative writing of pre intermediate and intermediate Turkish L2 students with he effect of working memory specifically phonological loop and visuo spatial sketchpad depending on the results of the almost inconclusive findings of the research, which can be said that there are two possible impacts of this study can be put into practice in future L2 argumentative writings of Turkish students.

As it has been implied in many more studies((Juffs & Harrington, 2011; Service & Kohonen,1995; Baddeley, Gathercole, & Papagno, 1998).

As for the main influence of this study reveals, during pre-planning teaching and observing the results, it has been seen that Turkish L2 students have minimum information of planning which shows that pre planning, online planning, and rehearsal (Ellis, 2003) should be taught better to Turkish L2 students which might be reason of why they could not be successful in accuracy and complexity, because they do not make practice before they generate the original task and his causes them not to be aware of their mistakes, so they repeat the same mistakes without awareness, however, planning and monitoring provides students to think on what they are planning to write and how they are planning to write so it is claimed to assist to generate better writings as we consider writing as the most complex process of language learning (Olive, 2003 based on Bock and Levelt, 1994), and assuming it needs full concentration and effort.

We are not inclined o teach more descriptive writings; however, to have a fully working short term memory, we need to trigger every slave system of it. That is the main reason why; diversity in writing is so important and supposed to be taught and carried out in our classrooms.

All writing processes are to be mentioned except graphic transcriptions in adults, place high demands on the central executive of WM (Kellogg, 1996). Hence, generating atext requires shifting between – and approximately concurrently activating- a majority of writing processes. That is the mean reason why; the investigations on central executive in writing are supposed to analyze how different writing processes are activated at the time of writing (Fayol, 1999). On the other hand, in what way the writers manage writing processes without exceeding the limits of WM (for a review, see Brown & Carr, 1989). It also means how much energy of WM subcomponents spend on writing processes can be estimated. These subcomponents are VSS and PL and they way that they work in different task types such as descriptive, and etc.

13. FOR FURTHER RESERACHES

In this study, we had limited time to carry out the pre planning processes' explanation and generation. That is main reason why; for the next study, as LTM and WM interaction is clarified deeply too, pre planning can be taught in a class with the all participants and there can be some of trials generated in a more extended time.

To comprehend why we had negative results, a research even can be carried out with dyslexia (According to the International Dyslexia Association, dyslexia is a learning disability which has difficulties in word recognition, decoding, and spelling (http://tracyalloway.com/dyslexia-and-working-memory/, 2018) as we can understand which part Works less in a dyslexic patient in writing processes such as planning, execution and etc.which might help us why we had negative results, which writing part is mostly related to which part of the working memory. Together with, as it has been explained above, argumentaive writing is accepted to be one of the most difficult from novice to expert writers (Kellogg, 2001a), while descriptive writing is accepted to be related to VSS (Passerault & Dinet, 2001). Hence, when we consider our results mostly have been negative in VSS parts, a descriptive writing of this type of research can be carried out, to see what might come out in VSS perspective to comperehend the negative dimension of the results.

Regarding planning extension, as it has been said above, a couple of trials might have been provided to the participants beforehand to understand the process better. For the further research of this study can be conducted by a rehearsal planning (Ellis, 2009), which is carried out writing a draft before generating the main copy.

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APPENDIX

Appendix1: Pre- Planning Lesson Plan

PRE-PLANNING LESSON PLAN

Write the previous (or a related subject) essay topic on the board, and ask what do you think about it?

“The primary mission of universities should be preparing students for the workforce. Do you agree or disagree?”

Their answers mostly will be in a negative way of the topic, saying, “No.”

Then, ask them;,” How about thinking in detail.?” Ask them questions related to the topic by having them saying, “Yes” or “ No”

Write under the topic YES and NO, and start aking:

In what age do the students from university graduate? About 24?

YES NO

24

What kind of people do the universities raise?

YES NO

Intellectual

Analytical thinking

What might be those intellectually mature people expect from the World?

YES NO

High life standards

If universities do not raise people for work, can they earn money after 24 by doing ordinary jobs easily?

YES NO

No

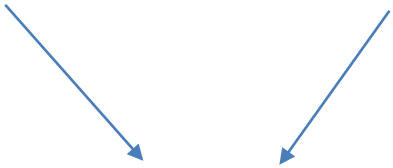
But do we also need intellectually mature people for a developed country?

YES NO

Yes

In this case, let us compare our answers:

YES	NO
24	Intellectual
Yes	Analytical thinking
	High life standards
	No



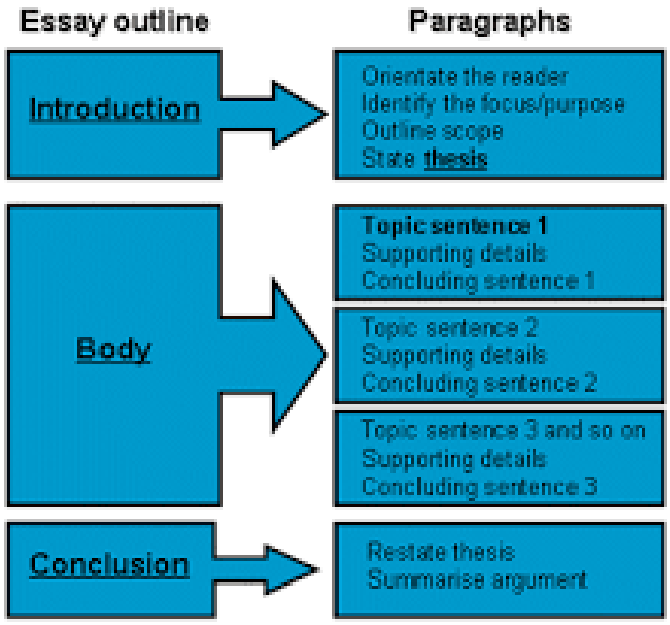
In this case, we can say that, in my country universities should have both missions of raising people for jobs and raising intellectually mature people tol ive in a developed country.

You see evaluating a topic with its plus and minus points can assist to see the topic in a better way, So can we say, pre-planning is helpful to write a better essay?

Yes!

That is why; Ellis (2005) have generated pre planning in two parts as outline to plan the structure of the essay and listing, to plan the words especially unknown words

before we generate the essay, but before explaining outline part, we should remember how we write ans essay properly.



And at the end of the essay we write the "Title"

Let us start planning our paragraphs

PRE-PLANNING

1. OUTLINE

INTRODUCTION

- Mission of univeritities general
- Mission of universities in my country
- Mission of univerisities how they are supposed to be

Introductions usually are one peragraph.

BODY PART

First Paragraph

- Mission of univeritities general, with examples

Second Paragraph

- Mission of universities in my country, with examples, quotoes, xamples from history and etc.

Third paragraph

- Mission of univerisities how they are supposed to be, with examples

According to the topic, body part can be more than three or at least two paragraphs

CONCLUSION

- What was the statement saying?
- How did you evaluate the topic?
- What did we learn, or how did we end up?

Conclusions are 1 paragraphs.

PRE-PLANNING

2.LISTING

In lisitng, we can prepare the words that we will utilize in the essay, eapeciaaly in EFL, we can list the unknown words by translating them beforehand to use the time effeicienlt by generating the text.

For example, I migh want to use idioms

Çalışan demir paslanmaz. A Rolling stone gather no moss.

I might quoto from different boks of different authors, I would quoto from "Nutuk" by Atatürk.

"Teachers are the one and only people who save the nations." Nutuk by Atatürk.

Bölüm Başkanı – Head of Department

Dekan - Dean

Now, we can start writing,

Thank you for your paticipation. ☺

RESUME

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