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The Effect of Manipulating Task Complexity According to Students' Cognitive Differences on their Writing Proficiency

The Case of First-Year Students of English at Larbi Ben M'hidi University, Oum El Bouaghi

Thesis Submitted to the Department of Letters and English in Candidacy for the Degree of L.M.D. Doctorate in "Didactique des Langues Etrangères"

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Dedication

In the name of Allah, the Most Gracious, the Most Merciful

I dedicate my work to my family and friends.

A special feeling of gratitude goes to my loving mother for her prayers and unwavering faith in me.

I also dedicate it to my father, my sister, my brothers and my niece.

I am thankful to my uncles, aunts, cousins, friends and colleagues for their support and words of encouragement.

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Abstract

Task-based language teaching has gained its rightful place in language research. It suggests sequencing tasks from simple to complex for syllabus design. However, little research has considered second language learners' cognitive differences as a factor intervening with their writing performance and proficiency. This study intends to examine the effects of manipulating task complexity using the number of texts as a resource-directing variable and planning time as a resource-dispersing variable according to learners' Working Memory and attention on students' L2 writing. A secondary aim is to investigate teachers' and students' perception of differentiating writing task complexity according to learners' differences. It firstly hypothesises that EFL teachers and students at the University of Oum el Bouaghi may underestimate and disregard differentiating writing tasks according to students' cognitive differences. Secondly, it hypothesises that the effects of task complexity on students' writing performance would vary among learners with different cognitive abilities. Thirdly, it hypothesises that manipulating task complexity according to students' cognitive differences would positively affect students' writing performance and proficiency. To attain the aims of the study, we designed two questionnaires and conducted two experiments. The first questionnaire was administered to the teachers of the Department of English at the University of Oum el Bouaghi, and the second was administered to 2017-2018 first-year students at the same department. The first experiment has a Repeated Measures design, and the second has a Pre-Test Post-Test Control Group Experimental Group design. Data for the two experiments were collected from students' text summaries and syntheses. The written data were measured in terms of fluency, accuracy, and syntactic complexity. A one-way ANOVA test, a Post-Hoc Test, a Two-way ANOVA test, a Paired T-test and an

Independent T-test were used for statistical analysis. The study firstly reveals that the English Department teachers at the University of Oum el Bouaghi and its first-year students acknowledge the value of differentiating writing tasks according to students' cognitive differences. However, teachers disregard it and rarely practice manipulating tasks according to students' cognitive differences inside the classroom. Secondly, it reveals that the effects of task complexity do not vary among learners according to their working memory and attention, but these two cognitive differences accumulate with task complexity to impact students' performance. Thirdly, manipulating task complexity according to students' working memory and attention positively affects their writing fluency and syntactic complexity but does not influence their writing accuracy. Consequently, teachers may use the results of this study to gain a better view of their learners' profiles, and thus design better lessons and writing tasks to enhance students' writing skill.

List of Abbreviations

CAF: Complexity, Accuracy and Fluency

CLT: Communicative Language Teaching

EFL: English as a Foreign Language

IELTS: International English Language Testing System

L1: First Language

L2; Second Language

LTM: Long Term Memory

PSTM :Phonological Short-Term Memory

PWM: Phonological Working Memory

SLA: Seconde Language Acquisition

STM: Short-Term Memory

TBLT: Task-Based Language Teaching

TBP: Central to Task-Based Pedagogy

TCF: Triadic Componential Framework

TEA: Test of Everyday Attention

TOEFL: Test of English as a Foreign Language

TTR: Type Token Ratio

T-Unit: Terminable Unit

WM: Working Memory

WMC: Working Memory Capacity

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General Introduction

1. Statement of the Problem

In Task-Based Language Teaching (TBLT), tasks are the basic organizational units of any type of instruction (Ellis, 2012). Therefore, research supporting TBLT elaborately investigated the effects that designing and implementing tasks in different ways have on learners' performance and ultimate attainment. However, learners are different in many ways and they will always impose their interpretation on tasks, which means that task design and implementing conditions are not the only factors affecting learners' performance and proficiency. Learners' differences do also have this power (Robinson, 2007). Nevertheless, little research has considered learners' perceptions of the task complexity which create its difficulty. In other words, many studies (Albert & Kormos, 2004; Ishikawa, 2008; Trebits & Kormos, 2008) have been dedicated to figuring out the relationship between task complexity and task types and conditions, but to the knowledge of the researcher, there are few studies (Kormos & Trebits, 2011; Rahimpour & Nariman-Jahan, 2010; Robinson, 2007) that investigated the mediating effects of individual differences, and none have tried to take learners' cognitive differences into consideration while altering task complexity. These studies have only deduced the effects of learners' differences after having manipulated task complexity. They, therefore, worked out that increasing task complexity varies in effect among different proficiency levels (Robinson, 2011), but no study, as far as we know, has started with learners' differences as an independent variable when it comes to task complexity. Previous research has just taken it for granted that task complexity does not have the same effect on different learners (Robinson, 2011). According to the researcher's experience as a former student, a teacher at the Secondary School level and a temporary teacher at the University, the Algerian EFL (English as a Foreign Language) classroom is no exception. In this context, the fact that individual cognitive differences may determine the impact which task complexity might have on learners' performance is equally neglected. Therefore, considering learners’ differences while trying to design tasks is observed to be disregarded and its benefits underestimated by both teachers and students. Need thus arises to investigate the effects of manipulating task complexity according to learners’ cognitive differences on their writing performance and ultimate attainment.

2. Aims of the Study

The complexity and difficulty of the task are some of the most important aspects of TBLT that lead to learners’ modification in allocating attention. Consequently, task complexity has a predefining control on learners’ performance and language learning, as it has been argued and proved by many studies (Robinson, 2007; Skehan, 1999). A growing number of studies have also paid attention to learners’ differences and to shape classroom instruction to fit those differences (Dörnyei & Kormos, 2000; Révész, 2011; Robinson, 2007). However, research in L2 (Second Language) learning and teaching has not shed enoughlight on the combination of task complexity and learners’ cognitive differences (Rahimpour & Hosseini, 2010). Therefore, this study aims first at filling the gap in research concerning task complexity. Secondly, it aims at calling for adopting tasks that respect learners’ differences in cognition in the EFL writing classroom context.

3. Research Questions and Hypotheses

The present study is guided by the following questions:

- What are the attitudes of EFL teachers and students at the University of Oum el Bouaghi towards differentiating writing tasks according to students’ cognitive differences?
- What effect does manipulating task complexity have on the writing performance of students with different cognitive abilities?

- What effect does manipulating task complexity according to students' cognitive differences have on students' writing performance and proficiency?

Accordingly,

First, we hypothesise that EFL teachers and students at the University of Oum el Bouaghi may underestimate and disregard differentiating writing tasks according to students' cognitive differences.

Second, we hypothesise that the effects of task complexity on students' writing performance would vary among learners with different cognitive abilities.

Third, we hypothesise that manipulating task complexity according to students' cognitive differences would positively affect students' writing performance and proficiency.

4. Means of Research

This study's participants are the full time teachers and first-year students at the Department of English, University of Oum el Bouaghi. To elicit data from these informants, two questionnaires: one for teachers and one or students, and two experiments for students only were designed.

4.1. Population and Sampling

The total number of 40 full time teachers at the English Department, University of OEB, forms the first population of interest for the present research. The sample, in this case, is the whole population due to its small size (Johnson & Christensen, 2013). The second population is composed of first-year students of English in the same department during the academic year of 2017-2018. Writing summaries and syntheses, which is of interest to the current study, is part of first-year syllabus of the methodology module; therefore, this level is object to our research. The number of students is 301 divided into eight groups of 38 students each. A sample of 76 students was chosen from the already formed by the administration groups. The 6th and 8th groups constitute the research sample which forms a convenience sample of the accessible subjects (Mackey & Gass, 2005).

4.2. Research Methodology

Drawing on Robinson’s (2001) Cognition Hypothesis and to fulfil the aims behind conducting this study, this research is quantitative made of three phases. The first phase which aims at testing the first hypothesis consists of a questionnaire designed for the teachers and another for the students of the Department of English at the University of Oum el Bouaghi. The second phase of this research is an experiment with a repeated measures design where all participants are assigned different tasks with increasing complexity at various occasions of the experiment (Creswell, 2009. p. 159). This experiment is designed to test the second hypothesis. In this type of design, each student crosses over from one treatment to another since the aim is to compare the effects of writing tasks with different degrees of complexity on students with different Working Memory (WM) and attention. The advantages of such design are the greater comparability of the conditions (the manipulation of task complexity, in this case) and the economy of the design (Wichens & Keppel, 2004). Finally, the third phase of the research is an experiment with a pre-test post-test control group experimental group design (Mackey & Gass, 2005) where task complexity is manipulated according to learners’ cognitive differences in the experimental group. This experiment is designed to test the third hypothesis of this research.

5. Structure of the Thesis

This thesis is composed of six chapters. The first chapter introduces TBLT as a general framework, the approach's theoretical background, its rationale, the empirical research related to it, its implementation and challenges. Task complexity is also presented as a criterion for sequencing tasks based on the theory and the empirical findings of the Cognition Hypothesis. The chapter ends by operationalizing task complexity through planning time and the number of texts as variables to be manipulated in order to be matched with learners' differences.

The second chapter deals with learners' cognitive differences, in general, and with WM and attention in particular, as the specific group of abilities that correspond to the complexity factors (planning time and the number of texts) chosen to manipulate the task designs. This chapter also draws the link between these two cognitive differences and L2 learning in general with a special emphasis on L2 writing.

The third chapter is concerned with L2 writing as a dependent variable, and more specifically with academic writing. The types of writing tasks used in the current study are dealt with, and how learners' differences in cognition shape their performance and final outcome is explained. This chapter emphasizes the importance of academic writing and its relationship with reading as a skill.

In the fourth chapter, the research design and the procedures of data collection are tackled. The different sources of data take the forms of two questionnaires, one for teachers and another for students, a repeated measures experiment and a pre-test post-test control group experimental group experiment. In this chapter, the participants' profile is defined, and the used instruments are described.

The fifth chapter exposes the analysis, discussion and interpretation of the questionnaires' collected data and results. Its aim is to reveal the teachers' and students' views about differentiating writing tasks according to learners' cognitive differences. The analysis of both questionnaires is used as an introduction to the study experiments.

Finally, the sixth chapter deals with the analysis, discussion and interpretation of the results of the two experiments: the repeated measures experiment and the pre-test post-test control group experimental group experiment. The first experiment aims at investigating whether there is a significant effect due to the interaction between task complexity and learners' abilities on their writing performance or not. Based on the results of this experiment, the influence of manipulating task complexity according to students' WM and attention on students' writing is examined in the second experiment. To conclude, the data are analysed and the results are discussed to extract pedagogical recommendations and research suggestions.

Chapter One: Task-Based Language Teaching and Task Complexity

Introduction

Today, the relevance of learning a language within a context as preached by CLT and the importance of learners' centeredness are well observed and acknowledged by educators all over the world (Richards & Rogers, 2001). TBLT appeared as a teaching approach that is learner-driven and that emphasises communication (Ellis, 2012, p.196). It became a common method used in many second language classes and research (Ellis, 2004), for its units are well-defined and comparable in different contexts (Dornyei, 2003, p. 4). Tasks are there to provide learners with the opportunity to use language in order to learn it and to learn it in order to use it (Van den Branden, 2006).

Murphy (2003) stresses the fact that tasks may be designed and implemented in a way that targets particular pedagogic outcomes. Ellis (2003) adds that tasks have a cognitive dimension, and thereby concludes that there is a relationship between the specific level of cognition required by a given task, its design and the learning that results from it. Task design can be manipulated through cognitive complexity to influence L2 learning, and the best-known model trying to explain the relationship between task complexity, learners' differences and task performance is Robinson's (2001, 2003, 2005) Cognition Hypothesis. Therefore, this model is the one adopted in this study. In this chapter, we review the literature concerning the TBLT approach and task complexity as a basis for sequencing and grading tasks.

1.1. Task-Based Language Teaching

Second language teaching, as a field, has witnessed many pendulum swings and has gone through several trends over the last few decades. It has developed and thrived while shifting from one method to another. With the arrival of the Communicative Language Teaching (CLT) approach in the early 1980s and the unprecedented stress on learners' roles and abilities, the term TBLT emerged in the field of SLA to denote learners' actual use of language via communicative tasks within process-oriented syllabi (Ellis 2003; Nunan 2005; Richards & Rogers, 2001).

1.1.1. A Brief History of Task-based Language Teaching

The language teaching approach that uses tasks as its basic units and means for syllabus design, lesson planning and second language research and instruction is known as TBLT (Richards & Rodgers, 2001, p. 223). The use of tasks as core units, however, is much older than its coining. It was used in the vocational training practices in the 1950s (Richards & Rodgers, 2001). At the time, the training design concerned military occupational specialties and technologies. Different jobs were analysed to decide upon the tasks to be taught and the levels of proficiency to be attained. After that, a process of specifying task elements or acts, identifying skills and knowledge necessary for task performance and a hierarchy of objectives is set (Smith, 1971, as cited in Richards & Rodgers, 2001).

The Malaysian Communicational Syllabus of 1975 and Prabhu's (1987) Bangalore Communicational Teaching Project of 1979 were the earliest applications of tasks as tools for their research (Long & Crookes, 1991). They focused on learners' cognitive processes involved in learning an L2 and argued that tasks provide more naturalistic situations for learning than form-focused activities. The American Government Language Institutions started using foreign language task-based instruction with adults in the 1980s (Richards & Rodgers, 2001). Since then, more and more teachers and researchers all over the world have been convinced that tasks are of great value for classroom instruction and research (Shehadeh, 2005).

The development of TBLT, as a "fairly strong view of communicative language teaching" (Skehan, 1996, p. 20), is due to the disappointment with previous language teaching methods. Rahimpour (2008) argues that TBLT owes its emergence to a better understanding of language learning processes.

1.1.2. Defining the Term "Task"

The Cambridge Advanced Learner's Dictionary (2008) defines the word 'task' as "a piece of work to be done, especially one done regularly, unwillingly or with difficulty". A similar broad in scope definition is given by Long (1985, p.89). He proposes that a task is "a piece of work undertaken for oneself or others, freely or for some reward. Thus examples of tasks include painting a fence, dressing a child, filling out a form …" This definition includes all kinds of tasks counting those having little or nothing to do with language use and learning. Subsequent researchers, however, narrow their definitions to describe only pedagogical tasks that necessitate the involvement of language use, whether the final outcome is linguistic or non-linguistic (Ellis, 2003, p. 8).

According to Crookes (1986, as cited in Van Den Branden, 2006, p. 4), a task is "a piece of work or activity, usually with a specified objective, undertaken as part of an educational course, at work or used to elicit data for research". Reward in Long's (1985) definition is, thus, replaced by objective which is a fundamental characteristic of a task as the basic educational and research unit (Van Den Branden, 2006). The task's objective or goal is to use language communicatively in order to learn it and reach an outcome. Still, this last definition makes no reference to language, whereas Bygate, Skehan and Swain's (2001, p. 11) definition does. It proposes that a task is "An activity which requires learners to use language with emphasis on meaning, to attain an objective".

Bygate et al's (2001) definition adds the emphasis on meaning to the equation. Except for Breen (1989), there is a general agreement that tasks focus mainly, but not exclusively, on the meaning which means that the form comes second. However, Ellis (2003) argues that learners may decide to allocate their attention to form even if temporarily which makes the focus on meaning less of a task characteristic, at least from a learner's perspective. From a task designer's perspective, a task is by definition meaning-focused which distinguishes it from an exercise. Widdowson (1989), argues that some meaning is always involved when dealing with language. What distinguishes the one used in tasks and the one used in exercises is that the first is pragmatic and the second is semantic. Tasks set a context for learners to use language to learn it. Nunan (2004, p. 4) points out that form is used to express meaning which makes them interrelated and similarly important. What separates a task from an exercise is that tasks give more freedom to learners to use any form they may choose to express the intended meaning. Examples of exercises include drills and reading comprehension passages. Examples of tasks include activities linked to language but not necessarily to learning language (Willis & Willis, 2001).

A characteristic that most task definitions point at is the fact that task performance involves some cognitive processes (Ellis, 2003, p. 7). Nunan (2004, p. 4) defines the term as "a piece of classroom work that involves learners in comprehending, manipulating, producing or interacting in the target language". The words comprehending and manipulating imply, according to Ellis (2003, p. 7), that tasks have a cognitive dimension to which pedagogy and research have not paid enough attention. It is also wise, according to him, to expect a relationship between the level of cognition required by the task, the task design and the learning resulting from it. This is reinforced by Candlin's (1987, as cited in Van Den Branden, 2006, p. 7) definition which states that a task is "one of a set of differentiated, sequencable, problem-posing activities involving learners' cognitive and communicative procedures applied to existing and new knowledge in the collective exploration and pursuance of foreseen and emergent goals in a social milieu".

Ellis (2004, p. 16) defines a task as “A work plan that requires learners to process language pragmatically in order to achieve an outcome that can be evaluated in terms of whether the correct or appropriate propositional content has been conveyed”. Therefore, a task is more than a random activity or piece of work. It is a plan made by task designers and also a process in which learners engage their resources to learn language pragmatically and achieve an outcome that serves as a sign for task completion and has little pedagogical significance; what matters, in fact, is the process of using language to learn it. For example, learners might be asked to write a story plot using some story-lines. Coming up with a brilliant plot is not of real importance unless we are in a drama class. In a language class, what matters are the reasoning and linguistic processes used. By driving learners’ attention toward the outcome, learning the language becomes incidental and thus more natural (Ellis, 2004).

Our definition to the term 'task' is more of a selection than a combination of task characteristics that are mentioned in the literature. We have selected those characteristics that serve the purposes of our research the most. Consequently, we define a task as a work-plan that can be manipulated and sequenced in order to pose a problem to learners’ cognition. Task designers can regulate and control learners’ cognitive processes by manipulating tasks. Learners use their affective, cognitive and linguistic resources to attain pre-set goals (designers’ goals) or new ones (their own goals). Every component (task manipulation, task sequencing, problem-posing, learners’ cognition, learners’ resources and the task goals) of this definition can be a variable, and it is dependent on the other components. Learners’ attention is focused on using their linguistic knowledge to express meaning.

1.1.3. The Rationale for Task-based Language Teaching

Different justifications to TBLT have been given different, each according to a diferent research orientation. For example, while Ellis (2003) advocates the psycholinguistic approach, Skehan (1996) and Robinson (2001) stand up for the cognitive one to justify TBLT. However, before we embark upon justifying the necessity of using such an approach according to different directions, let us first tackle the theoretical rationale for TBLT which encompasses a myriad of learning theories.

1.1.3.1. Communicative Language Teaching

Language is a means to transmit messages and convey meaning. It is a communication tool rather than a set of structures (Nunan, 2004). Starting from this fact, language teaching has been for a long time synonymous to training for communication; however, Prabhu (1987) argues that teaching should be done through communication. He innovatively perceives it as a tool, not just as a goal. The reason behind such claim is that learners do not learn the pre-designed and pre-sequenced syllabus that is meant for them to learn, but they rather learn by fully engaging in the proposed activity while using the language to communicate. Learning is an internal process that involves learners' cognitive abilities and helps to develop them (Pérez, 2004). There is, however, a condition for the leaning via communication to happen which is, according to Krashen (1982), to practice communication in a meaningful way, i.e., learners must get involved in a task whose completion necessitates problem-solving and self-regulation, then learning will take care of itself (Prabhu, 1987).

One approach to language teaching may have many facets. It may have as many interpretations as those who try to interpret it. According to Nunan (2004, p. 10), Communicative Language Teaching "is a broad philosophical approach to the language curriculum that draws on theory and research in linguistics, anthropology, psychology and sociology" while TBLT is "a realization of this philosophy at the levels of syllabus design and methodology". TBLT is considered to be the present orthodoxy in language teaching, the logical development of CLT and a strong version of it (Skehan, 1996). The main difference between CLT and TBLT, however, is that learners learn language by getting involved in tasks and not from linguistic input. TBLT is, therefore, goal-oriented and offers a context to learners' interaction (Rozati, 2014).

1.1.3.2. The Task-Based Syllabus

A syllabus is a statement of what is to be taught (Ellis, 2003), and there exist two types of syllabuses which are the synthetic and the analytic one. According to Nunan (2004), TBLT advocates an analytical approach to syllabus design while the synthetic approach to syllabus design is more traditional and ineffective. In the analytical types of syllabus such as the task-based syllabus, language is taught holistically rather than part by part. Learners have to analyse the language as a whole then break it into parts. In the synthetic approach, however, language is divided into parts before it is presented to learners. Research in SLA supports the analytical approach to syllabus design over the synthetic one for it has been found that learners do not acquire one item perfectly at a time then integrate it with previously learned ones, but they rather learn various items simultaneously and imperfectly (Nunan, 2004).

As mentioned before, Prabhu (1987) was one of the first researchers to attempt to implement TBLT in his Bangalore project which lasted from 1979 to 1984 (Robinson, 2011, p. 10). Prabhu's (1987, p. 1) aim was to examine the new teaching methods based on the belief that developing second language competence calls for learners' engagement in communicative acts. For him, competence is both grammatical and communicative. Moreover, he explicitly argues that grammar should not be taught explicitly, for doing so leads to no development of an internal system of rules. It is the laborious working out of meaning-content connections within the framework of communicative tasks that leads to the development of such a system (Prabhu, 1987).

1.1.3.3. The Interaction

"Nature" or "nurture" debate has always been controversial, especially in the field of language learning. The first position claims that learning is innate, while the second assumes that language development happens within the environment as learners are engaged in different sorts of interaction. Before the emergence of interactionism as a distinct way of conceptualizing L2 learning, it was merely learning the rules of the L2 grammar (often in the form of memorization), its vocabulary items and correct rules of pronunciation. Then when engaging in an interaction, all one has to do is to put those rules to use as a natural extension of grammar acquisition. Thus learning was separated from interaction; it also implies that second language use does not differ from first language use. The correct forms need to be plugged in to say the same thing as one does in his\her native language (Gass & Selinker, 2008, p.304).

Krashen (1982) argues that language learning happens only when a 'Comprehensible Input' is available, but Long (1983, as cited in Mitchell & Myles, 2004) challenged him saying that the input changes according to the type of interaction the learner engages in; the input becomes more comprehensible and thus more useful if it is questioned negotiated and reformulated because it will fit the learner's needs more, and this is what has become the 'Interaction Hypothesis'. Swain (1995), on the other hand, asserts that comprehensible input is not sufficient; the learner needs to produce the language to be able to process it and notice the gap between the meaning they want to convey and what they can convey. Her claims became known as the 'Output Hypothesis' (Mitchell & Myles, 2004, p.160).

Long (1983, 1989, as cited in Robinson, 2011) argues that interaction within tasks not only provides the input for language learning, but it also gives it a context to solve linguistic problems while working on the task and negotiating the meaning, i.e., while learners' focus is on completing the task, they must interact with the teacher and with their peers using the target language.

1.1.3.4. The Limited Capacity Hypothesis

According to Skehan (1998), the learners' limited attentional capacity is what limits their performance and makes their linguistic fluency, accuracy, and complexity deficient. If they cannot commit their information processing capacity and attention to all aspects of the task at hand, learners are obliged to focus on one aspect at the expense of another. Skehan's (1998) argument is called the 'Limited Capacity Hypothesis', and it proposes that learners' attention is always allocated first to language meaning not language form. If the task is too demanding, no attention is left for form. The hypothesis, therefore, claims that sequencing the difficulty of tasks from less to more cognitively demanding offers the learners the opportunity to gradually focus on form and develop their interlanguage in a balanced way. Robinson (2003) argued, however, that limitations in attentional capacity do not explain learners' production deficiency in areas of accuracy, fluency, and complexity. He, therefore, proposed his 'Cognition Hypothesis' as a substitute explanation of why learners succeed or fail to respond to varying task demands.

1.1.3.5. The Cognition Hypothesis

Schmidt (1990) asserts that only what is noticed is learned and that task demands determine what is noticed. Therefore, what the task emphasizes is what catches the learners' attention and sticks to their memory. Consequently, tasks are important learning tools that can be manipulated by altering their types and increasing or decreasing their demands to determine what is noticed and learned. Starting from this point, Robinson

(2011) debates that learners' failure to respond to the demands of a given task is not due to a limited attentional capacity, but it is rather due to "breakdowns in action-control" (Robinson, 2011, p. 12). In other words, learners fail to control directing their attention towards the task demands; therefore, they fail to fully take advantage from the learning opportunities attention directing offers. Their attention is not limited, but it is uncontrolled. Learners put a greater effort into controlling their output if task complexity is increased which is followed by better accuracy and complexity of L2 production. This last claim is one of Robinson's (2003), and it is based on Givon's (1985; as cited in Robinson, 2011, p. 14) "distinction between pragmatic and syntactic modes of production" which roughly argues that the more complex the task, the more complex is the learners' linguistic production.

Like Skehan's (1998) hypothesis, the Cognition Hypothesis, originating in Robinson's (1995) study of narrative discourse in language learning, attempts to close the gap in research addressing the optimal way to sequence tasks across long periods of instruction. Its basic claim is that sequencing should be based on the increases in tasks' cognitive complexity. Robinson (2011) explains this argument with the fact that children acquire their first language by meeting the cognitive demands of tasks that follow the same sequence. Robinson's (2011) work is based on claims of many researchers like Cromer (1973, 1991), Slobin (1993) and many others (as cited in Robinson, 2011) about whether in L1 or L2, learners try to linguistically encode well-developed concepts. Therefore, meaning always precedes form, a fact that emphasizes the importance of task-use in L2 pedagogy.

1.1.3.6. The Socio-Cultural Perspective

Constructing knowledge is a joint activity that is collaboratively carried out by learners according to the 'Socio-cultural Theory'. The theory assumes that the cognitive processes begin as an external socially mediated activity and eventually become internalized whereas other interactionist perspectives focus on the modified input and interaction as sources for the raw material for internal cognitive processes (Lightbown & Spada, 2006). In other words, learners' collaboration engages them in cognitive processes that are involved in language learning (Lantolf, 1996).

The socio-cultural theory, inspired by the works of Vygotsky (1987), claims that learning occurs when simple innate mental activities are transformed into more complex mental functions. This transformation involves symbolic mediation provided primarily by language whether what is being learned is language itself or some other area of knowledge. The results of learning through mediation include learners having heightened awareness of their mental abilities and more control over their thought processes (Saville-Troike, 2006). Learning is also socially mediated; it depends on face-to-face interaction. The socio-cultural perspective, therefore, looks at how the process of task completion contributes to L2 learning.

Task completion can either be individual or collaborative. Using the intrapersonal interaction which occurs within the individual's mind, a learner can engage in an inner speech and use it as a way of controlling his or her behaviour while performing the task individually; this takes the form of a private monologue (Mitchell & Myles, 2004). A common intrapersonal activity that is closely related to private speech, claims Saville-Troike (2006), is "private writing" which helps students store items in memory, organize thought, and solve problems without intending to communicate with others. Learners can complete a task collaboratively using the interpersonal interaction. Learners, therefore, learn through activities under the guidance of more skilled individuals. That is to say, they function through a process of other-regulation which is language-mediated. The learner is inducted into shared knowledge through collaborative talk until eventually they take over or appropriate new knowledge or skills into their consciousness (Mitchell & Myles, 2004). The help that is given by others as verbal guidance to the learners, as active participants, to help them perform tasks is called ‘scaffolding’.

According to Swain and Lapkin (1998), “Unlike the claim that comprehensible input leads to learning, we wish to suggest that what occurs in collaborative dialogues is learning. That is, learning does not happen outside performance; it occurs in performance” (as cited in Mitchell & Myles, 2004, p.221). The socio-cultural perspective rejects the separation between the social and psychological aspects of learning and thought. Learning happens in any kind of setting whenever learners play the role of active agents that shape their learning environment according to their developmental goals; thus, it emphasizes the social aspect of the learning process and stresses the role of learners in appropriating the socially constructed knowledge.

The research argues that each interaction is different in nature from another one, even where the participants undertake the same communicative task. The personal goal and the way with which an individual approaches a particular problem may vary, and therefore define the task in which the learner is engaged (Shehadeh, 2005; Mitchell & Myles, 2004). According to Roebuck (2000), learner’s subjectivity is an undeniable component of tasks in progress (as cited in Mitchell & Myles, 2004).

1.1.4. Types of Tasks

A plethora of task types exist in the literature. It is almost as if every researcher who has ever dived into TBLT has had his or her typology (Nunan, 2004, p. 56). Nunan (1989), for example, differentiates between real-world and pedagogic tasks, with the second type being subdivided into other categories according to their functions or the cognitive processes involved in completing them. Others categorise tasks on different bases. Pica, Kanagy and Falodun (1993) look at the type of interaction necessary for task completion, while Long (1989) uses the task outcome as a basis (as cited in Shehadeh, 2005). Tasks can also be categorised according to the way information is organized, the type of activity required from the learners or the language skill used in the task (Ellis, 2004, p. 210). Adding to the fact that enumerating all existing task typologies cannot possibly be contained in our research, it is far from being its central focus. Therefore, we choose to draw on the scope of the current study and adopt Ellis's (2004) way of categorising tasks into four typologies in the next section. This will pave the path to the discussion of tasks used in this thesis.

1.1.4.1. The Pedagogic Typology

Tasks falling under this classification are tasks that focus on learner training, vocabulary and grammar as linguistic knowledge, the four language skills and the paralinguistics. Such pedagogic categorisation is the result of Gardner and Miller's (1996) work. However, Ellis (2004) argues that tasks belonging to such classification are more like exercises that target discrete aspects of language, whereas a real task must provide an opportunity of holistic and experiential learning. According to Shintani and Ellis (2013), a better sorting of pedagogic tasks is the one of Willis (1996). This kind of classification includes tasks that describe the operations necessary to perform a task like listing, ordering, comparing, problem solving, sharing personal experiences and creative tasks involving projects and research.

1.1.4.2. Rhetorical Typology

This type of classification is based on theories of rhetoric discerning discourse domains and genres. Different discourse domains have different structures and properties and are linked to specific linguistic functions like definitions and classifications. Meanwhile, different genres, like political speeches and job application letters, include different structures, properties, functions and communicative purposes. This classification usually underlies courses for language for academic purposes. In his work on teaching genres, Swales (1990) concludes that the best means to teaching is the means of task and different types of tasks differ in their socio-cultural situations. Examples of tasks falling under this category are writing recipes or giving political speeches.

1.1.4.3. Cognitive Typology

The cognitive classification is based on the type of cognitive operations necessary for learners to complete the task. Prabhu (1987) identifies three types of tasks that are grounded on three cognitive operations. He firstly categorizes tasks that require the transfer of information among two people or transferring it from one place to another or from one form to another, and he calls them information-gap tasks. The cognitive operations involved in transferring information are the encoding of the information into language and decoding of information from language. Prabhu (1987) also categorizes tasks that involve deriving new information from known information through operations of inference, deduction, practical reasoning, and a perception of the relationships and patterns that connect the two pieces of information (the transmitted and originally understood). The third type of tasks involves identifying and articulating a personal preference, feeling to complete open ended tasks that have many possible solutions. These tasks are called opinion-gap tasks.

1.1.4.4. Psycholinguistic Typology

While other classifications focus on the task potential for language use and assume that use supports acquisition, the psycholinguistic classification is based on the task potential for language learning through interaction. According to Pica, Kanagy and Falodun (1993), jigsaw, information gap, problem solving, decision making and opinion exchange are examples psycholinguistic tasks. Jigsaw tasks are perceived as the most psycholinguistically valid, for they guarantee interaction and negotiation of meaning of all participants; on the other hand, learners can choose to refrain from taking part in the interaction during a problem solving, a decision making or an opinion exchange task. Other psycholinguistic theories suggest other task typologies, for all is a matter of perspective. Skehan (1998), for example, classifies tasks according to the competence they promote, whether it is fluency, accuracy or complexity. Therefore, the instructor's decision about the type of tasks to employ depends on the targeted outcome and learning experience.

1.1.5. TBLT Implementation and Methodology

Unlike other approaches to teaching, TBLT does not make a distinction between the 'what' and 'how' of teaching, for the focal point is the learning process through task completion rather than the linguistic knowledge or skills to be attained. However, to implement TBLT, the 'what' and 'how' still have to be decided upon though merged (Nunan, 1989). Planning a task-based lesson involves selecting and sequencing the activities to be performed, the procedures to be followed in implementing instruction and the participatory role of both the learner and the teacher.

1.1.5.1. Selecting and Sequencing Activities

Breen (1987, p. 23) defines a task as "a range of learning activities". Therefore, a task consists of a number of different activities that are sequenced into different phases to form a task-based lesson (Ellis, 2009). Such a lesson is divided into three stages the pre-task, the during-task and the post-task phases (Willis, 1996, p. 155). This sequence of stages (though not the only one) is the most widely used, mentioned and approved throughout the literature since Prabhu (1987).

1.1.5.1.1. The Pre-task Phase

The pre-task phase is a preparatory one. It allows learners to frame the task and organise their thoughts before engaging into task performance. Although its length depends on the learners' familiarity with the task, this phase is the shortest among the three (Willis, 1996). According to Skehan (1996, p. 25, as cited in Ellis, 2009), there are two broad options during the pre-task stage. Either the teacher emphasises the general cognitive demands of the task or its linguistic factors, for learners' attentional capacity is limited and must be concentrated on one factor at a time.

The activities of this stage can fall under one of four categories. Firstly, the whole class can perform a task similar to the main one under the teacher's appropriate guidance or scaffolding for learners with different abilities (prabhu, 1987). Secondly, learners may observe a model of how to perform the task without performing it themselves. They can read a text, listen to an excerpt or watch a video that demonstrates the task performance. Thirdly, learners can engage in non-task activities which supply them with the information needed to perform the task. Such activities might for example be brainstorming or mind-mapping activities. Finally, learners can strategically plan the main task. Learners are given access to the task before hand and a chance to consider the forms needed to perform it (Ellis, 2009). Learners' attention is therefore explicitly guided toward one aspect of language use or another which helps them with the task (Foster & Skehan, 1996).

1.1.5.1.2. The During-task Phase

The during-task phase constitutes the task itself during which students use the target language the most and focus mainly on meaning to complete the task. The task cycle can be divided into three sub-stages which are the task stage, the planning stage and the report stage. At first, learners form small groups or pairs to do the task while the teacher monitors their performances. However, the task can be done individually depending on its communicative nature. After that, learners plan to report their performance and outcome to the whole class while the teacher gives linguistic advice.

Finally, the teacher selects some learners to present their work, orally or in writing, to the class while s/he leads the contributions, sums them up and gives feedback on content and form (Willis, 1996; Ellis, 2009).

1.1.5.1.3. The Post-task Phase

The post-task phase is the final phase of the task, and it gives a chance for explicit language instruction (Willis, 1996, p. 101). According to Ellis (2009), this phase has three principal aims. Firstly, it provides an opportunity to repeat the task. Secondly, it supports reflection on task performance. Thirdly, it attracts learners' attention to problematic forms.

The activities in this stage are called follow up activities and can either be analysis activities or practice ones. The analysis activities are consciousness-raising, and they focus mainly on language form. Such activities encourage learners to scrutinise forms that were used during the task after focusing solely on meaning. For example, learners may be asked to study, correct and explain illustrated errors from their own production. As for the practice activities, they are consolidation and revision activities which help learners gain more control over forms they have used during the task. Examples of these activities can be repetition, completion, substitution, gapped sentences, jumbled sentences, transformation drills, and dialogues (Willis, 1996; Ellis, 2009).

1.1.5.2. The Role of Task-based Language Learners and Teachers

Prabhu (1987, p. 24) perceives a task as "an activity which requires learners to arrive at an outcome from given information through some process of thought, and which allows teachers to control and regulate that process", a definition which emphasises the main role of learners as the doers and the one of teachers as the guides within the task-based framework.

Language learners in task-based classrooms should carry out three major roles which are being group participants, monitors, risk-takers, and innovators. Firstly, learners must adapt to the fact that tasks are generally, but not necessarily, performed in pairs or small groups as communicative language teaching preaches. Secondly, learners have to monitor their performance by being attentive to both meaning and form. Thirdly, learning involves the need of guessing answers and the risk of making errors. Therefore, learners have to fulfil such a need and take such a risk by consulting with others and asking for explanation (Richards & Rogers, 2001, p. 235).

According to Willis (1996, pp. 40-41), teachers in TBL classrooms play primarily the role of guides. They have to explain the objectives of any lesson and motivate learners to prepare them for the task. They are also supposed to select and sequence tasks and guide learners' performance. TBL teachers are learning facilitators. Their job is to provide learners with the optimal conditions for learning to happen. Therefore, they need to monitor and balance the amount and quality of language exposure and use. During the post-task phase, teachers perform the role of consciousness-raising, i.e., they explicitly draw learners' attention toward specific language forms (Richards & Rodgers, 2001, p. 236).

1.2. Task Complexity

Syllabus design essentially involves content sequencing based on some criterion which is conventionally the concept of linguistic complexity. Such concept suggests that learners acquire one item perfectly at a time and that simple linguistic structures are learned before complex ones. However, this type of synthetic syllabus has been widely criticised offering its way to analytical syllabus where language is taught holistically (Nunan, 2004). Furthermore, according to Baralt, Gilabert, and Robinson (2014, p. 2), difference in linguistic complexity between linguistic structures does not entail difference in learnability. As a result, TBLT suggests sequencing tasks from simple to complex in order to design a syllabus. The rationale behind such decision is that learners adapt their language to the task cognitive and conceptual demands, i.e., progressively complex tasks incite learners to develop more complex interlanguage. However, things are not that simple. Learning does not happen in a vacuum; it is mediated by the learners' cognitive capacities and individual differences which play a significant role in complex task performance (Robinson, 2011, p. 19). Therefore, we must take learners' differences into account when manipulating cognitive complexity.

According to Hulstijn and De Graaff (1994, as cited in Bulté & Houssen, 2012, p. 23), cognitive complexity "refers to mental ease or difficulty with which linguistic items are learned, processed or verbalized in the process of language acquisition and use". Similarly, Robinson (2001) defines it in terms of information processing demands such as attention, memory, and reasoning that tasks design and implementation impose on the learners.

1.2.1. Different Models for Task Complexity

Task complexity is defined by Robinson (2001, p. 28) as "the result of the attentional, memory, reasoning, and other information processing demands imposed by the structure of the task on the language learner. These differences in information-processing demands, resulting from design characteristics, are relatively fixed and invariant". A large variety of models that estimate task complexity exist in the literature. One of the first of these models is, according to Baralt et al. (2014), Prabhu's (1987), which states that tasks should be sequenced by complexity or "reasonable challenge". This means that the teacher should regulate the task in a way that allows the largest number of learners to perform it but with some effort. While doing so, the teacher must take into consideration learners' abilities and perceptions (Prabhu, 1987, pp. 56-57).

A succession of models have followed Prabhu's (1987) and emphasised different dimensions in tasks used to define complexity. For example, Long and Crookes (1992) assert that pedagogic tasks are chosen based on needs analysis and that they should be sequenced by complexity. However, their model does not operationalize complexity or specify how to manipulate it.

Ellis (2003, p. 220), on the other hand, observes that tasks should be chosen to suit learners' developmental levels and let them decide about the resources used to complete the task. He specifies that cognitive complexity should be manipulated using the amount, type and structure of information, context dependency and topic familiarity (Ellis, 2003, p. 223). Nevertheless, Ellis's model lacks a sophisticated guide to sequence tasks (Baralt et al, 2014, p. 12).

As for Skehan's (1996) model, it is a detailed one. The model is based on the 'Trade-off Hypothesis' which states that complex tasks put a pressure on learners' attentional resources. This pressure forces them to choose processing one or some aspects of language at the expense of others (i.e. fluency, accuracy or complexity). Skehan (1996) suggests that complexity can be manipulated using several criteria to balance the learners' limited attention to fluency, accuracy and complexity and to ease their processing load. Code complexity, as the first criterion, is related to the task linguistic demands while cognitive complexity deals with the content and structure of a task, and communicative stress denotes performance conditions.

The 'Triadic Componential Framework' (TCF) is Robinson's model; it is also known as the 'Cognition Hypothesis' (Kuiken & Vedder, 2007). Skehan and Foster's (2001) 'Limited Attentional Capacity Model' and Robinson's TCF (2001) are the two most significant models of L2 task complexity (Kuiken & Vedder, 2007). The two models agree that the learners' attention is, in one way or another, limited, and increasing task complexity will bring them to pay attention to L2 meaning first, which will negatively affect their linguistic production. However, opposite to Skehan (2014), Robinson (2001) claims that more complex tasks result in more complex language, for they help learners control their attention. Furthermore, Robinson’s (2001) model is more elaborate because it takes the learners’ differences into consideration as a distinct type of variables. It predicts different results depending on the way complexity variables are related to learners' attention (Kuiken & Vedder, 2007). This model of task complexity is the one of interest to the present study.

1.2.2. Robinson’s Triadic Componential Framework

The TCF is a three-dimensional model suggested by Robinson (2003) as a framework for applying the Cognition Hypothesis inside EFL classrooms and in designing syllabuses. The TCF divides the variables of the hypothesis into three factors which are task complexity, task difficulty, and task conditions. Task complexity is concerned with “the intrinsic cognitive demands of the task” (Robinson, 2003, p. 56), and task difficulty is perceived by learners. It depends on their cognitive abilities and affective differences. Task conditions, on another hand, are “the interactive demands of task performance, such as participation factors” (Robinson, 2003, p. 57). According to Robinson (2001), task difficulty cannot be manipulated, but it can help the task designer making decisions about task sequencing.

Robinson’s (2001) model distinguishes between two types of dimensions to manipulate task complexity which are the ‘resource-directing’ dimensions and the ‘resource-dispersing’ dimensions. It predicts how L2 production and proficiency would be affected (Robinson, 2011). Resource-directing variables are the ones “in which the demands on language use made by increases in task complexity can be met by specific aspects of the linguistic system” (Robinson, 2011, p. 57). They are called developmental variables because they nurture language acquisition by directing the learners' attention towards a specific form of language (e.g. number of elements, reasoning demands). The resource-dispersing dimensions are called performance variables. They disperse learners' attention between the language used to perform a task and its other constituents. They affect task performance by increasing the learners' control over their L2 repertoire (e.g. less planning time or familiarity of task or topic). These variables disperse learners' attentional and memory resources (Robinson, 2003).

As put by Skehan (2014, p. 231), the difference between his view and Robinson's (2011) is in their conception of attentional resources. The first researcher sees attention as a single restricted mechanism while the second sees it as encompassing multiple resources (resource-directing and resource-dispersing) that do not interfere in each other's work. Therefore, the cognition hypothesis predicts conflict between attentional resources (i.e., a trade-off effect) for resource-dispersing variables and no conflict between attentional resources for resource-directing variables. Robinson (2011) makes many claims about the effects of manipulating task complexity variables on L2 development and production. He predicts that increasing task complexity leads to improvements in language learning and production. He also claims that, learners' differences influence language learning and production gradually as task complexity increases.

Table 1.1.

The Triadic Componential Framework

Task Complexity	Task Condition	Task Difficulty
a) Resource-directing variables	a) Participation variables	a) Ability variables
+/− here and now **+/− few elements** **−/+ spatial reasoning** **−/+ causal reasoning** **−/+ intentional reasoning** **−/+ perspective-taking**	+/− open solution +/− one-way flow +/− convergent solution +/− few participants +/− few contributions needed +/− negotiation not needed	h/l working memory h/l reasoning h/l task-switching h/l aptitude h/l field independence h/l mind/intention-reading
b) Resource-dispersing variables	b) Participant variables	b) Affective variables
+/− planning time **+/− single task** **+/− task structure** **+/− few steps** **+/− independency of steps** **+/− prior knowledge**	+/− same proficiency +/− same gender +/− familiar +/− shared content knowledge +/− equal status and role +/− shared cultural knowledge	h/l openness to experience h/l control of emotion h/l task motivation h/l processing anxiety h/l willingness to communicate h/l self-efficacy

Note. Adapted from Robinson and Gilabert (2007, p. 164)

1.2.3. Task Complexity Variables

Robinson’s Cognition Hypothesis supports two kinds of dimensions that can be operationalized to influence learners’ L2 fluency, accuracy and complexity. Resource-directing dimensions are predicted to facilitate L2 development and acquisition of new form-concept mappings. Resource-dispersing dimensions, on the other hand, make performative demands on learners’ cognition; thus, manipulating them facilitates the automatic access to an already established interlanguage system (Robinson, 2007; Kuiken & Vedder, 2012). Each of these two kinds of dimensions has six variables along which task complexity is increased or decreased.

The Triadic Componential Framework (TCF) designates six dimensions through which cognitive resources can be directed toward specific linguistic forms and along which task complexity can be manipulated to produce an enhanced output (Robinson, 2007). The resource-directing variables are six (as noted in Table 1.1.), and they can be operationalized to sequence tasks along cognitive complexity. The first of these variables is the ‘here and now vs. there and then’ variable which directs learners’ resources to the use of the past time reference and some deictic expressions in complex tasks, as opposed to referring to the present in simpler tasks (Gilabert, 2007). The second variable is the reference to few elements in simple tasks and many in complex ones (Kuiken & Vedder, 2007). The third variable consists in increasing complex reasoning using more complex spatial locations while the fourth one loads reasoning with more causality expressing vs. using simple information transmission,. The fifth variable is related to intentional reasoning, and it directs learners toward the use of certain forms (like the verbs of opinion) to analyse people's intentions while performing social actions (Robinson, 2007). The final variable is the perspective taking one, in which learners are directed to use certain linguistic forms like the pronominal references (Cadierno, 2004; von-Stutterheim & Nuese, 2003, as cited in Robinson, 2007).

Resource-dispersing variables are the second type of variables belonging to Robinson's (2001) model of task complexity. They make increased performative demands on learners' memory and attention. However, unlike the resource-directing variables, they do not direct learners' cognitive resources to any linguistic aspect. These variables differentiate task characteristics on six different bases (Robinson, 2003). The first variable is allowing planning time which can ease the burden on learners' memory and attention. The second one is performing one action in a simple task as opposed to performing two in dual tasks or many actions in complex ones. The third variable is providing a clear structure for task performance versus allowing learners the freedom to choose the necessary steps to complete the task. The number of steps needed for task completion is the fourth resource-dispersing variable. The fifth one is sequencing task steps in a strict way versus not sequencing them at all. In this case, a predetermined chain of actions must be followed in order to complete a complex task; whereas, any order of steps is good in a simple task. Finally, the last variable is providing background knowledge about the task prior to performing it as opposed to not providing in more complex versions of the same task (Robinson, 2007).

For this study, the variables of choice are few vs. many elements as far as resource- directing dimensions are concerned and planning time as a resource-dispersing variable. Increasing these two variables is assumed firstly to draw learners' attention to vocabulary and syntax encoding and secondly to make great demands on learners' attentional and memory resources (Robinson, 2001). Therefore, they are in alliance with the cognitive differences chosen for this study, namely attention and working memory.

1.2.3.1. Planning Time

Task planning or planning time is a resource-dispersing variable from Robinson's (2001) TCF. It is a TBLT concept and a procedure that allows learners time to prepare for the task and monitor their production (Ellis, 2005). The theoretical framework of this variable draws upon two concepts which are limited working memory and attention (the two are amply explained in the second chapter of this study). Task planning time eases the load on two of the components of working memory to which it is closely related. These components are the central executive and phonological loop (Cowan, 1995). It gives time to the central executive to control the relationship between the working and long-term memory, and allows the phonological loop to store chunks of language while working with others to improve and refine the output. Regarding attention, which is considered to be necessary for learning to take place (Schmidt, 1990), providing learners with planning time allows them to notice and attend to language forms during task performance (Swain, 1995).

Kellogg's (1996) model determines three stages of writing which are the formulation stage, the execution, and the monitoring. The first stage needs writers to plan writing goals and translate the generated ideas into encoded language. The second stage needs writers to convert the translated ideas into text. In the final stage, writers edit the text. Planning is by default part of writing. According to Ellis (2005), when learners are given no time to plan, they allocate their attention to the formulation stage and neglect the other two stages. Therefore, planning time is valuable for controlling the L2 writing processes (see chapter three of the current study for more about L2 writing).

According to Skehan (1998), the human mind has two linguistic knowledge systems one is rule-based and the other is exemplar-based. These two systems work simultaneously, need and complete each other. The rule-based knowledge system is responsible for innovations in linguistic production based on the grammatical rules. Using this system requires language processing and analysis from learners which makes it cognitively demanding and may cause some lack of fluency, for learners concentrate more on creating new language. On the other hand, the exemplar-based knowledge system is responsible for storing and retrieving a set of lexical items and formulaic chunks of language. It is not very cognitively demanding to use it, for it includes no linguistic processing or analysis. This system is accountable for learners' fluency, but using it solely may cause a lack of both accuracy and complexity in language production. The existence of these two systems explains the importance of planning time in minimizing the cognitive load for learners. When they are asked to produce immediate language, they naturally draw upon the less demanding exemplar-based system. However, when given time, learners also use the rule-based system, which results ultimately in more fluent, accurate and complex language.

1.2.3.2. Number of Elements

The number of elements is "the number of task-specific items a speaker has dealt with simultaneously during task performance" (Levkina & Gilabert, 2012, p.177). Some examples of these task-specific items might be the number of characters in a narrative or the number of places chosen from when showing a given destination to a friend (Robinson, 2001). According to Robinson (2003), increasing task complexity along such a resource-directing variable leads to more complex and more accurate language but, nonetheless, causes deficient fluency. These predictions are based on the rationale that burdening the learner's cognition has the power of influencing their L2 complexity and accuracy by drawing their attention to form. In simple words, increasing task complexity via the number of elements as resource-directing dimension results in good performance of this task, for learners put all their focus to meet the challenge. The predictions of the

Cognition Hypothesis are not always confirmed by experiments, as argued by Levkina and Gilabert (2012), for many other specifications and variables may interfere, like the relationship between different elements of a task or learners' different levels of proficiency and cognitive abilities.

In this study, as stated previously (in section 1.2.3.), the two variables in terms of which task complexity is manipulated are the amount of planning time accorded to learners before and during the task and the number of elements to be considered while performing the task. The two variables belong respectively to resource-dispersing and resource-directing dimensions which have different effects on learners' L2 production (Gilabert, 2005). These two kinds of dimensions have rarely been investigated in combination. In this respect, our study tries to fill in this gap and examines the effects of the combined effect of two different dimensions of task complexity on L2 written production and proficiency.

1.2.4. Empirical Studies on Task Complexity

Many themes have been raised in task-based research such as needs analysis, task selection, materials development, task implementation, assessment and evaluation using tasks and task sequencing (Norris & Ortega, 2009). The main problem that TBLT research deals with is designing and classifying tasks according to the appropriate grading and sequencing criteria for task-based syllabi (Robinson, 2003). As advocated by Robinson (2011) and mentioned before, sequencing task-based instruction should solely be based on cognitive complexity. Most recent research concentrates on investigating the effects of task characteristics and task design on task performance (Foster & Skehan, 1996).

According to the research led by Long and Crookes (1992), tasks allow form to be focused on while meaning is negotiated. Tasks can be designed in a way that draws learners' attention to specific forms and aspects of the language which influences performance and learning. Skehan (1998), on one hand, explains this by focusing on task complexity. He argues that learners are limited in their attentional resources; therefore, pointing the task design towards a selected characteristic leads to some predictable way of performance. On the other hand, Robinson (2001) gives a different explanation. He thinks that learners' attention draws on different pools of resources or modality areas. He argues that tasks can be manipulated through resource-directing and resource-dispersing dimensions at the same time without any conflict between them. He also asserts that with the increase of task complexity, learners will resort to different resources and produce more complex and accurate but less fluent language. While few vs. many elements dimension is our resource-directing variable of choice, planning is the resource-dispersing variable used in our study.

1.2.4.1. Planning

Ellis (2005) argues that planning is of pronounced importance for both teachers and SLA researchers. Planning can take place before the task (i.e., during the pre-task phase) or within the task (i.e., during the during-task phase). The first kind of planning is called the pre-task, strategic or off-line planning while the second type is the on-line or within-task planning. Therefore, learners are either allowed time to think about and prepare for the content and structures used in the task before it begins, or they are given time to monitor their performance while tackling the task. Learners can be given specifications about how to plan or left to their free will. Hence, planning is either guided or unguided (Tavakoli & Skehan, 2005).

1.2.4.1.1. Strategic Planning

Before tackling a task, learners may plan what they are about to communicate whether orally or in a written form. This process is called strategic planning. According to

Ellis (2003), learners use their preparatory attention (Schmidt, 2001) and get access to their long-term memory in order to plan the content, the organization of information and/or the language used in the task before even starting it. This use of attentional resources and memory has some effect on learners' accuracy, complexity and fluency, and allows them to compensate for their limited processing capacities (Ellis, 2003). It "reduces the processing load of subsequent online performance", as explained by Bygate and Samuda (2005, p.39). For example, a study conducted by Ahangari and Abdi (2011) revealed that pre-task planning has a positive effect on complexity but no positive effect on accuracy. This can be explained by the fact that strategic planning may help learners retrieve knowledge from memory, but it does not insure its availability for a long time due to working memory limitation. Therefore, accuracy is reduced because learners cannot recall all pre-planned language forms as opposed to content which is easier to keep in mind (Bygate & Samuda, 2005).

There is much more supporting evidence for the benefits of giving learners the opportunity to plan strategically on language fluency, accuracy and complexity. As an example of the evidence supporting fluency, we cite Mehnert (1998) who scrutinized the effect of different amount of strategic planning time on the L2 oral performance of four groups of learners. These learners performed a structured and an unstructured task in varied planning time conditions. The first group had no planning time available. The second group had one minute while the third had five and the fourth had ten minutes. This study resulted in a correlational relationship between fluency and lexical density on one side and the length of time provided for planning on the other side. To investigate accuracy, Salimi, Alavinia and Hosseini (2012) studied the influence of strategic planning and task complexity on the L2 written performance of 50 learners. They implemented a task with simple and complex versions. The results showed that accuracy improved. As far as complexity is concerned, Skehan and Foster (1999) reported that pre-planning resulted in more complex output but no significant change in fluency or accuracy. According to the two researchers, this is due to the interference of task structure which was inquired too in their study.

The aforementioned studies are just few of many supporting the effects of pre-task planning. As noticed, most of the research investigates oral production but little is concerned with the written one. The results of these studies can sometimes be contrasting depending on the other task conditions that are manipulated to design the tasks. Regarding learners' differences Wigglesworth (2001) found out that pre-task planning has different effects on learners with different proficiency levels. The high proficiency learners take more advantage from planning time to improve their fluency, syntactic complexity and some measures of accuracy.

1.2.4.1.2. Online Planning

Online planning is the process by which learners monitor the content of their output and attend to form during the task performance (Ellis, 2003). Learners get the opportunity to plan more careful language use if allowed within-task planning time (Ochs, 1979, as cited in Ellis, 2005). The careful language use takes the form of more complex and grammatically accurate language. On the other hand, fluency is negatively affected by too much planning time (Yuan & Ellis, 2003; Ellis & Yuan, 2005). Compared to strategic planning, online planning does not exert a great load on working memory as it takes place during the production of the output. On the contrary, online planning releases the working memory from much pressure.

Though not as numerous as the ones supporting strategic planning, there exist many studies which support the claim that online planning benefits learners' performance of L2 tasks. Yuan and Ellis's (2003, 2004) studies are examples investigating both pre-task and within-task planning on learners' L2 complexity, accuracy, and fluency. They concluded that online planning has a substantial effect on accuracy and complexity while strategic planning has more effect on fluency. In another study Ellis and Yuan (2005) found that learners given greater time to online plan produced more accurate and syntactically complex speech and written language, but achieved no significant improvement at the level of fluency and lexical variety.

The advantage online planning has over strategic planning is that it helps learners recall what to write and how to write it. Therefore, it assists the formulation of propositional content and linguistic forms. Whereas strategic planning influences fluency because of learners' haste to produce as much language as possible in order to avoid its loss from working memory, online planning results in improved accuracy and complexity because of the time provided to revise concepts and forms. Therefore, for maximized results on all fronts, the two types of planning can be integrated in the same task especially for learners with limited processing capacities (Ellis, 2005). The use of the two types of task planning is the option we opt for in our study, and the manipulation of this complexity variable is further explained and illustrated in the practical part.

1.2.4.2. Number of Elements

Only few studies have examined the variable 'number of elements' till now with many directions in its operationalization among different studies. The reason for such multitude is that the Cognition Hypothesis does not specify whether the cognitive load of a task is the consequence of the increased number of elements or the more complex relationships existing between the elements of such a number. Research on task complexity has succeeded, till now, to prove that fluency is negatively affected by the large number of elements in a task, but failed to agree on the nature of its effect on complexity and accuracy (Levkina & Gilabert, 2012).

In his study, Robinson (2001) proves that increasing task complexity along the number of elements has a positive effect on lexical complexity but does not affect syntactic complexity or accuracy, measured by the number of errors, in an oral interactive task. The task elements used in his study were the landmarks of two city maps, and they were combined with another variable which was learners' familiarity with the area in the map. His participants were asked to give directions using these maps to an information-receiver. A similar study led by Gilabert (2007) proves that manipulating task complexity along the number of elements results in increased lexical complexity at the expense of fluency and syntactic complexity. As for accuracy, which was measured by self-repairs, it was positively affected.

Concerning the writing modality, Kuiken and Vedder (2007) conducted a study in which they investigated the effects of the number of task elements on L2 written production. They also studied the interaction of task complexity with learners' proficiency. The task elements were the requirements for choosing a holiday destination in a letter written to a friend. The results were found to be in line with the predictions of the Cognition Hypothesis for accuracy and to follow the opposite direction as far as syntactic and lexical complexity were concerned.

Most studies conducted till today prove that manipulating the number of elements in a task seems to draw learners' attention toward linguistic forms which results in more accuracy and lexical complexity, whereas fluency remains unaffected. However, there are some discrepancies in the results of these studies due to two reasons. The first reason is that the number of elements as a variable is underspecified by the Cognition Hypothesis. Every researcher seems to give it a different interpretation (ours will be specified in the practical part of this thesis, Levkina & Gilabert, 2012).The second reason is that different researchers have used different measures for each of fluency, accuracy and complexity, which makes comparison across studies difficult, for results are affected by the means of measure (Kuiken & Vedder, 2007).

1.2.5. Benefits and Detriments of Implementing Task-based Language Teaching

While many criticisms of TBLT and task complexity, as a criterion for sequencing tasks, are undeserved, some criticisms are real and justified. Throughout the literature, one can find many advantages and disadvantages of TBLT. Most relevant to our thesis are the ones related to learners' abilities, readiness and achievement and those related to teachers' perceptions and resourcefulness.

As its advocates suggest, TBLT has many advantages, and it is a powerful and widely applicable approach. According to Krahne (1987), TBLT is suitable for learners of different backgrounds and ages, for it offers a natural and personalized communicative context that is relevant to the learners' experience of the real world and use of language. In addition to that and most importantly, Willis (1996, p. 47) claims that TBLT is perfect for mixed ability classes, for learners must and can figure out their own levels and strategies to perform a task. Flexible grouping can also help learners of different levels take advantage of each other. Another advantage is the fact that learners have much freedom with the language they use and variety of the input they are exposed to. Learners are first introduced to the language needed for task completion, then during the task, they have total control over the language forms they may use, for the main focus is meaning. Krahne (1987) also emphasises that TBLT is highly motivating, for it is much enjoyable to engage into attaining a clear objective and being able to see the final outcome.

Because no approach is flawless, even TBLT supporters admit that it has limitations which establish the difficulty of its implementation. Firstly, TBLT imposes creativity, openness, resourcefulness and initiative on teachers which take time and effort. It incites them to let go of their traditional central role. Old-school teachers may, therefore, find it impossible to adapt to such way of teaching. Secondly, TBLT entails the use of untraditional resources that classrooms cannot provide. Such resources must go beyond simple textbooks to simulate learning the language within its natural contest.

Finally, learners may resist TBLT, for it calls for their engagement, commitment and responsibility. Learners must be totally engaged and committed to complete the task using the target language, not the mother tongue or gestures and mimes. Moreover, emphasising meaning over forms during tasks may incite learners to choose fluency over accuracy which leads them to use whatever language they already have instead of focusing on new lexis and forms, and thus progressing (Krahne, 1987; Skehan, 1996). However, Willis (1996, p. 40) suggests that the whole framework of TBL instruction defeats such weakness by focusing learners' attention on forms during the pre and post-task phases.

Conclusion

Robinson's (2001) TCF is a remarkably detailed task design model that distinguishes between three categories which are task complexity, task condition, and task difficulty. These categories comprise thirty-six different variables. Task complexity consists of resource-directing variables that affect interlanguage development and resource-dispersing variables which affect learners' performance. The task condition category involves participant variables that affect interaction. The variables of these two categories can be manipulated while those of task difficulty can be respected to design and sequence tasks. The TCF is sophisticated and advanced, for it considers learners' differences under the category of task difficulty and aims at learner-task matching so as to promote learning (Robison, 2001,2003, 2005, 2007).

In this chapter, we presented TBLT as a general framework for our research works and delved into task complexity as a criterion for sequencing tasks. We based our arguments on both theory and empirical findings that support the Cognition Hypothesis and operationalized them by choosing planning time and the number of elements as the complexity variables to be manipulated in order to be matched with task difficulty variables.

Chapter Two: Learners' Working Memory and Attention

Introduction

According to Dörnyei and Skehan (2003), the cognitive variables form a specific talent which is necessary for language learning, and it is called foreign language aptitude. This talent creates significant individual differences between learners. Since the 1930s, scholars have been arguing that learners' aptitude to learn a new language cannot be defined outside the context of a teaching approach (Spolsky, 1995). The context of the current study is the TBLT approach, as presented in the previous chapter.

According to Robinson (2007, 2012), the challenges posed by different tasks do not engage just one aptitude. They draw on different clusters of abilities which he calls 'aptitude complexes'. Therefore, for each type of pedagogic activity, the learner engages in, there is a specific group of abilities that are activated and used. The aptitude complex or the sum of cognitive abilities involved in our research is closely connected to TBLT and viewed through its spectacles.

Different learners progress in different ways; some excel before the others have even had the opportunity to grasp the increase in complexity in a given task. Partly, this is because of learners' cognitive abilities. These latter differ not only among individuals but also depend on the activity one learner is engaged in. Thus, both individual differences in cognitive endowments and task demands interact to decide the chances of learners' success. For this reason, research suggests that learners' abilities and task conditions and design should be matched to guarantee progress for all the learners (Robinson, 2002, 2005, 2007).

In the current chapter, we discuss Working Memory (WM) and Attention as the specific group of abilities that correspond to the complexity factors chosen to manipulate our task design, namely: planning time and the number of task elements.

2.1. Working Memory

Robinson (2012, p. 57) defines aptitude for L2 learning as “the ability to successfully adapt to and profit from instructed, or naturalistic exposure to the L2”. Aptitude is composed of a set of abilities or complexes like allocating attention, executive control, rehearsal in memory, self-regulation, and interpretive reasoning. These cognitive processes interact to enable learners to complete and profit from instructional tasks such as input-based learning from reading or listening (Robinson, 2012). What language aptitude consists of has not been specified yet, and it has been subject to many debates since Caroll's (1959, 1981, as cited in Kormos & Trebits, 2012) first model, which identified phonetic coding ability, grammatical sensitivity, rote learning ability and deductive learning ability as the components of aptitude. Some recent research identifies such abilities as solely associated with the more basic components, namely: Working Memory (Wen & Skehan, 2011) and attention (Skehan, 2002). These abilities can be measured and correlate with different aspects of L2 performance and development (Miyake & Friedman, 1998; Kormos & Trebits, 2012).

2.1.1. Definition of Working Memory

Psycholinguists assert through empirical inquiries that WM is directly involved in varied language learning, processing and producing activities (Cowan, 2014). Recently, an interest in the potential role of WM has been growing among SLA researchers which resulted in different views of the WM construct in the eyes of the several existing theoretical perspectives and models. Even though the importance of WM, as an aptitude component, is well established and agreed upon, debates over its nature, structure, functions and WM measurement tasks still exist (Wen, McNeill & Mota, 2015).

Several definitions have been given to the term ‘Working Memory (WM)’since it was introduced to the cognitive psychology literature by Miller, Galanter and Pribram

(1960) in their book ‘Plans and the Structure of Behavior’. All definitions emphasise manipulating information as well as storing it, which makes WM different from “short-term memory” (Tavakoli, 2012, p. 370). The word ‘working’ in itself points to the mental activity involved in processing information (Cowan, 2005). Miller et al. (1960) coined the term (WM) to depict the memory used for planning for goals, such as those of language use or learning. Following their model, WM is the part of the information-processing system that is involved in “the executive control of cognition and behavior” and can also be viewed as a “short-term storage” (Richardson, 1996, p. 4). Similar definitions have been given by subsequent models, and one of the most influential models of WM in SLA is Baddeley and Hitch’s (1974). Baddeley (2007) defines the term as “a temporary storage system under attentional control that underpins our capacity for complex thought” (p. 1). He asserts that completing cognitively demanding tasks dictates on WM to interfere in maintaining and regulating the limited amount of task-relevant information.

WM is also defined as “a limited capacity system allowing the temporary storage and manipulation of information necessary for such complex tasks as comprehension, learning and reasoning” (Baddeley & Hitch, 2000, p. 418). The ability to use this system is called the working memory capacity (WMC), also known as working memory span. Cowan (2005, p. 3) defines WMC as “the ability to remember things in an immediate-memory task (a task with no delay between the end of the presentation of items to be recalled and the period of recall itself)”. This capacity varies from one individual to another, and thus from one language learner to another (Tavakoli, 2012). It is only reasonable to suppose that differences in WMC affect learners’ performance of complex tasks since learners with high WMC have no problem engaging in complex mental processes while learners with low WMC do have a problem (Mota, 2003).

WM as a key constituent of language aptitude is argued to be the most important one. It is even suggested that it can replace language aptitude altogether. However, research investigating the relationship between WM and language aptitude remains limited (Wen, & Skehan, 2011).

2.1.2. Theories and Models of Working Memory

The way learners temporarily store and process relevant task-information is, and will always be, a controversial issue because researchers from different backgrounds or of different interests tend to emphasise different aspects of WM. Several models of WM, therefore, are proposed to reflect such various standpoints. Accounting for all those models is, according to Miyake and Shah (1999), more frustrating than enlightening. For this reason, we find it pointless to do so and choose to focus on the dominant models in the SLA research. According to Jackson (2010), those are Baddeley and Hitch's (1974), Cowan's (1988, 1995, 2005) and Engle and colleagues' (1995) models. The three models emphasise the limitations of WMC and that it differs from one individual to another, which is the point that is the most relevant to the current study.

Baddeley and Hitch (1974) introduced WM as a limited capacity workspace and divided it into three components at first then added a fourth one in a later revision of their multicomponent model. The phonological loop is the first component of WM. It temporarily maintains phonological information that is lost if not rehearsed through inner speech. The phonological loop responds to verbal stimuli and contains a phonological store and an articulatory rehearsal mechanism. The phonological store is located in the left hemisphere of the brain that is specialised for language. The second component of WM, which is the visuospatial sketchpad, is supposed to maintain visual (what) and spatial (where) information and rehearse it through the creation of brief mental images. The visuospatial store is located in the right hemisphere of the brain. The central executive is the third and most important component since it controls WM and distinguishes it from a simple storage system. It consists of general processing, but no storing, capacities whereby attention is supervised, focused, divided and switched. Executive processes intervene in problem-solving tasks and depend on the brain's frontal lobe. The last component of this model of WM is the episodic buffer which forms an interface that assimilates information from the three other components and long-term memory. It is episodic because it gathers information into coherent episodes and a buffer because it is a small capacity storage that allows different types of information to interact. All components of WM have limited capacity and differ from one person to another (Baddeley, 2007; Cowan, 2014; Henry, 2012; Jackson, 2010; Tavakoli, 2012).

The second influential model of WM is Cowan's (1988, 1995, 2005) embedded-processes model. The model emphasises the connection between memory and attention and is based on five principles. First, WM information includes three hierarchically organised faculties, which are long term memory (LTM), the activated subsection of LTM and the attention focused on subsection of the activated LTM. Second, each faculty has a different processing limit. The activated part has a time limit while the attentional focus has a capacity limit. Third, there are two systems that control attention; one is the voluntary central executive, and the second is the involuntary attentional orienting system. Fourth, habitual stimuli activate memory but do not draw attention nor stimulate awareness. Finally, awareness impacts positively both perception and memory. It provides more encoded structures for thinking and representations for explicit recollection (Cowan, 1999).

Engle, Conway, Tuholski, and Shisler's (1995) resource-dependent inhibition model introduces inhibition as the ability to neglect any activated but irrelevant task-information which is crucial for WM to work efficiently. To perform a task successfully, it is of equal importance that task-specific information are activated and irrelevant thoughts and distracting events are inhibited. This model assures that individual differences in WMC are primarily due to differences in the resource demanding process of inhibition. This means that learners differ mostly in their ability to supress distraction and control their attention. The resource-dependent inhibition model clarifies the connections between the central executive, long- and short-term memory, and procedures for maintaining activation and is also named “an executive attention theory” of WM capacity (Jackson, 2010).

A number of theoretical accounts and models supported by research exist throughout the SLA literature to explain WM. The three models presented in our study take an interest in learners’ differences concerning their limited WMC, as a common ground, though they differ in the way they perceive WM and in the aspects they emphasise. While Baddeley and Hitch’s (1974) model stresses that WM is composed of multiple separable subsystems, Cowan’s (1988, 1995, 2005) model and the one of Engle and his colleagues (1995) point to its unitary nature (Miyake & Shah, 1999). Put together, the three models offer us a bigger picture of the nature of WM and sufficient insights into its structure, principles, functions and limitations. In the following sections, we try to put those insights into work to clarify the importance of WM, as an individual difference, and its relationship with language learning.

2.1.3. Working Memory Capacity

WM is often described as a “mental scrapbook” (Watson, Michalek & Gable, 2016), a metaphor which suggests a widely agreed upon fact concerning WMC limitation. However, some controversy exists concerning the number of items WM can hold and for how long they can be held.

Capacity is measured in terms of chunks which are meaningful units of information that can consist of one or two words, depending on individual differences. The size of each chunk, however, differs from one individual to another. In the case of language learning for example, the size of a chunk depends on the learner's proficiency (Cowan, 2005). According to Ricker, AuBuchon and Cowan (2010), WMC can commonly stretch to hold a very limited number of items at one time. Individuals can only focus on seven plus or minus two meaningful chunks necessary for the task at hand, which is an estimate introduced by Miller (1956, as cited in Cowan, 2005) and widely used since then. Cowan (2005 p. 141), conversely, estimates that memory can only hold and process three to five chunks while the other ones are part of an automatic process where attention is not needed.

WM is not only limited in capacity, it is also limited in duration as stated by Cowan (1999). It can only be activated for a limited amount of time. A regular individual involved in a cognitive task (let it be writing down an idea or remembering the digits of a phone number) tends to forget relevant task-information with time or if distracted by another task. The reason for this forgetfulness caused by time is that items take the shape of activated traces in the human brain; these traces can fade away or decay after only two seconds if not rehearsed (Baddeley, 2007; Ricker et al., 2010). As for distraction, the reason is that the items of the original task are overwritten on the mental scrapbook and replaced by the distracting task information; this new task can be responding to someone suddenly calling one's name, for example. The controversy stems from the role given to time in explaining forgetfulness. While some researchers think that interference alone is responsible, and the amount of time has no role, others think that regardless of distraction, time decays information (Ricker et al., 2010).

It is true that only a small amount of information can temporarily be kept conscious in memory to be processed. Dehn (2008, p. 60), however, declares that the processing capacity of WM is of much more consequence than the number of items it can store. What is really important, therefore, is the ability to keep relevant information in an active state to retrieve it whenever needed. While Baddeley (2007) believes in WMC limitation in both processing and storage, Cowan (2005) and Hambrick, Kane, & Engle, (2005) attribute it to processing only.

2.1.4. Learners' Differences in Working Memory

WM interferes in most of our cognitive processes, which is the reason why individual differences in WMC determine the way learners perform a complex task (Ricker et al., 2010). Research drawn by individual differences in WMC brings about many speculations concerning the WM component that is responsible for these differences. Some researchers suggest that learners differ in their storage capacity (Ricker et al. (2010) while others think that variation lies in their processing span (Jackson, 2010; Ilkowska & Engle, 2010; Ricker et al., 2010). Another opinion advocates that inhibition mediates both storage and processing, and thus constitutes the responsible component (Stotzfus, Hasher & Zacks, 1996).

The variation in storage capacity between individuals seems to be trivial since the range of the capacity limits is in itself small (from three to five items). Therefore, one might wonder how significant it is to be able to hold one more or one less item in memory. Ricker et al. (2007) argue that one single item can be the key for problem-solving and thus lead to task successful completion. Nevertheless, and without dismissing this important argument, differences in WMC are primarily attributed to differences in the executive functions. These functions permit individuals to maintain information active in WM and efficiently retrieve information stored in LTM. Having high executive functions means that less attention is needed for processing and more is free to be allocated to storage (Jackson, 2010; Ilkowska & Engle, 2010; Ricker et al., 2007). Another point of view, according to Stotzfus et al. (1996), asserts that variation in WMC is due to individuals' ability to inhibit irrelevant information or automatic responses. The good functioning of WM is closely related to efficient attentional selection. In other words, learners with high WMC have a good inhibitory process, so they are more able to select the right stimulus to focus on and supress distractors. This leaves the space, otherwise occupied by distracting items, for the storage or processing of relevant information. According to many researchers (e.g., McDowd, Oseas-Kreger, & Fillion, 1995; Rabbitt, 1965, as cited in Stotzfus et al., 1996), the inhibitory process gets weaker with age, which causes variation among learners of different ages.

Behavioural research has given plenty of evidence for individual variance in WM despite the lack of consensus on which of its components hold responsibility. Other aspects like decay or interference might also have their share (Ricker et al., 2007), but the bottom line is that each component or aspect of WM contributes to individual differences in cognitive abilities. While this is a fact that serves our research, considering the mechanisms underlying this variation is beyond its scope.

2.1.5. Working Memory and Language Learning

It is well established that WM is involved in all aspects of language learning, comprehension and production. Consequently, it is believed that superiority in processing and analysing new pieces of linguistic information, like words and grammatical structures, results in high L2 performance and proficiency. From this, stems an immense interest in WM as the most important cognitive factor of individual variation in SLA research. Baddeley and Hitch's (1974) division of WM into subsystems is widely used in explaining language learning mechanisms. According to them, the phonological loop treats verbal and acoustic information while visuospatial sketchpad treats visual information, and both depend on the central executive and the episodic buffer. Each one of them plays a different role in oral and written language (Baddeley, 2002), and while our research is not concerned with the first, we estimate that a short review offers insights into the role played by WM in reading and writing.

2.1.5.1. Working Memory and Oral Language

Whether involved in listening for comprehension or for learning, the individual's WM has to endure some kind of exercise. An idea is structured from a stream of words. To grasp it, a listener needs to store the previous words long enough, then to retrieve them with their meaning, in order to combine them with coming words. Therefore, WM is paramount to spoken language comprehension. However, according to Gathercole and Baddeley (2003), WM is only called upon when sentences are complex or confusing. Then, the phonological short-term memory (PSTM) is needed to recall previous words and the central executive is needed to decode phonological input into its matching meaning. While comprehension of speech can occur through direct access to LTM when its structure is simple, speech learning depends essentially on the phonological working memory (PWM). The phonological loop is needed to retain new phonetic combinations, while the central executive matches them with their semantic representations (Dehn, 2008).

Like listening, speaking also requires a lot from WM. This latter is involved in all the phases of speech construction. Speakers must first conceptualise and formulate ideas before retrieving the sounds and words that express the exact meaning from the LTM. Afterwards, they must combine those sounds into words and those words into accurately structured sentences. Each phase needs storage space while the operations needed for the transacting information into the next phase are carried out by the central executive (Baddeley, 2003).

2.1.5.2. Working Memory and Written Language

Both reading and writing are related but different. These two language skills involve some of the same cognitive processes like WM (Abu-Rabia, Share & Mansour, 2003). WM is considered as a key limitation to the human information processing of written language (Baddeley & Hitch, 1974).

2.1.5.2.1. Working Memory and Reading

Reading comprehension depends heavily on functional WM. Koda (2005) asserts that "beyond lexical access, virtually every operation in reading relies on WM" (p. 200). WM is necessary to understand complex and/ or lengthy sentences. We use it to preserve verbal information (words, sentence, or even texts) in storage while processing new information to make sense of the whole sequence and complete a reading task. Many cognitive processes are simultaneously activated during reading which appears to be a simple task till the combination of these processes is taken to bits and scrutinised. Reading is categorised into reading decoding and reading comprehension (Young, 2000).

Reading decoding depends on phonological awareness and processing. The first is the ability to recognise phonemes while the second is the ability to manipulate them. During decoding, the reader needs the PSTM to store the accurate sequence of sounds that were converted from print until a complete word is formed (Palmer, 2000). The conversion of printed letters into sounds needs the visuospatial sketchpad to maintain visual information while the executive memory retrieves the corresponding phonetic codes (graphemes) from the LTM using the buffer. The articulated sounds are then maintained in the phonological loop. After that, sounds are synthesised and blended into recognizable words by the central executive. To succeed, readers have also to inhibit visual representations and focus on phonological ones, for it is the phonological processing that promotes reading proficiency (Dehn, 2008).

Reading comprehension requires higher cognitive operations. The reader must not only recognise the words, but also make sense of them along with the syntax then store the gist until enough information from subsequent sentences is available to form an idea. This process is repeated until a full mental model is culminated (Dehn, 2008; Olive, 2003). The ability to carry ideas across texts dictates the intensive use of WM even for good readers. To fully comprehend a text, readers must rehearse new information through subvocalisation, i.e., use the phonological loop. Additionally, since readers storage capacity is too limited to hold more than few chunks, they must create new long-term representations of the text or have access to existing ones in their LTM through the episodic buffer. The central executive is very much involved in reading comprehension. It retrieves the semantic information throughout the whole process till information is finally integrated in LTM. According to (Dehn, 2008), the visuospatial component helps readers create visual images of the text which facilitates comprehension. Inhibition also plays a role; good readers are more able to distract irrelevant content to extract the gist.

Reading decoding and reading comprehension are interrelated. Once readers have excelled the first and become fluent, comprehension is left with much more share of WMC. Furthermore, automatic decoding allows semantic items in LTM to become more accessible since they are automatically activated. For readers with high capacity, fluency is not a problem since they can use their WM resources for full comprehension (Dehn, 2008).

2.1.5.2.2. Working Memory and Writing

Writing is a complex cognitive task that places high demands on WM. According to Kellogg (1996), WM helps planning concepts and translates them into words and sentences. Before plans are transformed into verbal messages, previous knowledge and lexical, syntactic and semantic information needs to be recovered from LTM. WM is also needed during the revision phase since writers need to evaluate their product (Olive, 2003). These three operations of writing, also respectively named formulation, execution and monitoring by Kellogg (1996; see chapter Three), and each of them is divided into two sub-processes. Writing processes are activated at the same time, and writers constantly shift among them using their WM. According to Kellogg (1996), five of the six basic processes of writing make explicit demands on the central executive, verbal or phonological, and visuospatial components of WM.

Table 2.1.

WM Components and the Writing Processes

Basic Processes		**WM Components**		
		Spatial	Central Executive	Verbal
formulation	Planning	Yes	Yes	
	Translating	Yes	Yes	
execution	Programming		Yes	
	Executing			
monitoring	Reading		Yes	Yes
	Editing		Yes	

Note. Reprinted from Components of Working Memory in Text Production, by Kellogg R. T., in M. Torrance and G. C. Jeffery (Ed.), The Cognitive Demands of Writing (p. 46), 1999, Amsterdam, Amsterdam University Press.

The first process involved in producing a piece of writing is formulation, or planning, the visuospatial component of WM is responsible for visualising images and formulating them into organised ideas and concepts. Visual memory is also called upon when the definition of concrete, but not abstract, nouns is needed (Dehn, 2008). When writers are offered little time to think or have little knowledge about the topic they resolve to trade off their attention and dismiss the planning phase (Ellis, 2005).

The verbal component of WM is responsible for the execution phase. During this phase, ideas are translated into words and sentences, which is a process comparable to speaking. The PSTM stores phonological representations of the to-be-constructed utterances, while the central executive retrieves and manipulates the lexical, syntactic and semantic information necessary for production. It is also the central executive that switches from planning to translation and coordinates the visual and the verbal components (Olive, 2011).

Finally writers evaluate the accuracy and meaningfulness of what they have written. During this phase they read their text and employ all the processes involved in reading. After that, they edit the text by maintaining the right memory representations despite of the interference caused by mistakes whether semantic, linguistic or organizational. Consequently, the executive functions are involved in regulating writers' attention and keep the right information active (Olive, 2003, 2011).

Research has proven that writers with good WM are more able to produce complex and accurate sentences. However, writing proficiency also influences WM (McCutchen, 1996). Writers who have enough knowledge about the topic of the text need less cognitive effort to produce their pieces of writing. This leaves much more room in their WM for other writing processes, like organising and revising. Likewise, writers who excel in writing basics, like availability of vocabulary, spelling or punctuation, have more WM accessible too (Dehn, 2008; olive, 2003).

WM is vigorously involved in all the processes underlying the four language skills. It is, therefore, variation in WM what prompts variation in listening, speaking, reading and writing skills. People differ in their abilities to understand, learn and produce language due to their differences in remembering, dividing and selecting attention, binding information, inferring and all the other processes that WM undertakes (Linck, Osthus, Koeth, & Bunting, 2014). In the next two sections, more is said about the research that investigates the correlation between differences in WM and language skills especially writing.

2.1.6. Working Memory Measurement

Numerous tests have been developed to measure the limits of WMC. These tests take the form of tasks that try to mimic situations where individuals have to focus their attention and resist distraction (Ilkowska & Engle, 2010). A WM test can either measure only the storage capacity, or it can measure both the storage capacity and the processing capacity. The first type of tasks is called simple and the second is called complex (Mitchell, Jarvis, O'Malley, & Konstantinova, 2015). WM span tasks do not all measure the same storage or the same cognitive processes though, for WM is domain-specific according to many researchers (e.g., Baddeley, 2007 and Daneman & Carpenter, 1980). In other words, span tasks should be chosen in accordance to the studied L2 sub-skills (Wen, 2012), which is writing in our case.

2.1.6.1. Simple WM tests

Simple WM tests tap into the limits of the WM store. They only measure the amount of information that can be remembered. Such tests include tasks like the free-recall task (Unsworth & Engle, 2007) which asks participants to randomly recall a set of words previously presented to them. In their research, also Mackey and Sachs (2011, as cited in Mitchell et al. 2015) use this test but ask participants to recall non-words instead to eliminate the interference of lexical knowledge and avoid learners' reliance on their long-term semantic memory. Non- words are combinations of random syllables that have no meaning. This type of tasks is criticised to measure the short-term-memory capacity and not WMC, for they do not necessitate the involvement of executive WM (Dehn, 2008).

2.1.6.2. Complex Tests

Complex tests (dual-tasks) are designed to measure the WMC to maintain and to process information during the performance of complex tasks that involve comprehension and production. Examples of complex WM tests are the reading span test (Daneman & Carpenter, 1980) and its variant: the listening span task. The reading span task asks participants to read a series of sentences, determine whether or not they are acceptable and store the final word of each sentence. At the end, the designer asks them to randomly recall the final words of the sentences. This task is one of the most appealing tests to language researchers because it has demonstrated its success in measuring language storage and processing capacity (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005). However, it is difficult to figure out whether the task measures the participants' WMC or their reading ability when used in L2 research, especially when the correlation between WM and L2 proficiency is what needs to be investigated (Mitchell et al., 2015).

An alternative to the reading span task for SLA researchers is the operation span task, or the O-span, (Turner & Engle, 1989). In this task, participants are given a set of math problems, each followed by an L2 word to remember. After completing the math problems, participants are asked to produce the words in their initial order (Mitchell et al., 2015). This way, individuals carry out a mental activity while trying to store linguistic information. To diminish the effect of language proficiency during the O-span task, researchers give participants only high-frequency words or non-words. However, in his study, Lu (2010) finds no correlation between WMC and writing using the O-span test. He explained this rather unexpected result by the fact that WM is task dependent, which means that WM processes used in solving an O-span task are different from those used in reading and writing. Therefore, if we are to dismiss using the reading span for the interference of the reading ability variable, we should also dismiss the O-span because of Lu's (2010) argument.

2.1.6.3. The Writing Span Test

Some researchers claim that WM is domain-general (Engle et al., 1995) whereas others claim it is domain-specific (Baddeley, 2007). Those adopting the latter position choose to use specific span tasks for specific skills. The writing span test which is another complex test is used for the writing skill (Lu, 2010). As proposed by Ransdell and Levy (1999), the writing span task is one in which participants are given a list of words and asked to compose a sentence using each word. How many words they can remember represents the span's measure. According to the two researchers, WMC correlates with writing quality, fluency and reading comprehension. Of course, there exist more complex versions of this kind of task where, for example, writers are asked to find the misspelled word in each sentence of a set of sentences then to compose a written story using the recalled words. This technique is called the triple task technique (Olive, Kellogg, & Piolat, 2002).

In learning and performing complex skills like writing, where all components of WM are involved, both storage capacity and processing capacity must be put to the test, and deficiency in one of them indicates weakness in WMC (Dehn, 2008). Individuals with low WMC tend to be weak at inhibiting irrelevant information. Consequently, they process relevant information slowly with much more effort, and they are able to store fewer items when it comes to one of the span tests (Conway et al., 2005). WM complex tasks, like reading span, writing span and O-span, measure the capacity of all WM components, and help explaining how differences in WMC affect L2 production. They are, therefore, more, though not equally, efficient and useful to the current study than simple ones. There is a large body of research discussing whether WM is task relevant or irrelevant. There is also plenty of theory supporting both positions and no final verdict pronounced yet. Consequently, we are inclined to choose adopting the first position, for it serves our research the most.

2.2. Attention

The relationship between WM and attention has always intrigued SLA research. Researchers perceive them as two mechanisms that constantly interact during the encoding and manipulation of information (Mackey, Philp, Egi, Fujii & Tatsumi, 2002). It is, according to the most prominent models of WM, the executive component that controls the selection and distribution of attention when cognitive tasks are handled. This means that low WMC is associated with low levels of attention. Like WM, attention is an individual cognitive factor that is frequently used to explain learners' variation in L2 learning and the effects of instructional task demands on their performance (Robinson, Mackey, Gass, & Schmidt, 2012), which is our first reason to choose it as a second cognitive difference for our research. The other reason for doing so is the fact that the TBLT approach argues that the formal features of language are noticed according to learners' developmental readiness for them and the design features of the task. According to recent research, altering these features can draw learners' attention to chosen linguistic forms, and hence results in noticing and learning them (Robinson, 1995). From this argument stems the importance of choosing attention as a second cognitive difference within the context of TBLT. In this section, we present a review that focuses on attention with respect to its definitions, theories, measures, and the empirical evidence of its role in L2 learning.

2.2.1. Definition of Attention

One of the earliest definitions of attention is James' (1980, as cited in Schmidt, 2001, p. 15), and it states that "It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration of consciousness, are of its essence" (p. 403). For the reason that this definition seems ambiguous, recent ones suggest that attention is "a cognitive process involving the ability to select and focus on particular stimuli from the environment while ignoring others" (Tavakoli, 2012, p. 26). This definition implies that attention can be seen from four angles (Tomlin & Villa, 1994). Firstly, attention can be conceptualized as capacity. This capacity is limited not only in amount or duration but also in the number of stimuli it can respond to at a single time. Secondly, attention is seen from a selection angle. The attentional system picks the stimulus to register in WM (i.e., it detects the stimulus). Henceforth, the input becomes intake, which is the linguistic input that is noticed or consciously registered, according to Schmid's (2001) Noticing Hypothesis. Among the large amount of linguistic information that is incoming, learners detect only the features they are ready for and the ones that task demands put in the spotlight. Thirdly, attention involves focus which is a controlled rather than an automatic process. A task, like writing, that involves the effortful controlled processing of information necessitates a lot of attention. Attentional resources can be distributed on two (or more) independent tasks if one of them requires high attention while the other(s) requires low attention, i.e., can be done automatically. Finally, attention involves the effort of coordinating competing stimuli and ignoring others. Two tasks that require controlled processing can be done simultaneously sometimes, which implies that some regulation, combination and switching happens at the level of attention (Al-Hejin, 2004; Robinson et al, 2012; Tavakoli, 2012).

2.2.2. Attentional Mechanisms

According to Schmidt (2001, p. 3), “attention is not a unitary phenomenon, but refers to a variety of mechanisms. These include alertness, orientation, preconscious registration (detection without awareness), selection (detection with awareness within selective attention), facilitation, and inhibition”. The first three mechanisms are interrelated and can be traced back to the work of Posner and Petersen (1990) on the human attentional system viewed from both cognitive psychological and neurological angles.

Posner and Petersen (1990) divide attention into three subsystems that are situated in different areas of the brain and perform diverse but interrelated tasks. These three subsystems are alertness, orientation, and detection, and they are the central components of attention. Alertness is the “individual’s general readiness to deal with incoming stimuli or data” (Tomlin & Villa, 1994, p. 190). This attentional mechanism affects the speed of selecting the information to be processed. It is the executive attentional system that keeps the brain vigilant for any important information. Alertness is related to learners’ L2 motivation, interest and readiness. The second mechanism which is orientation refers to the individual’s direction of attentional resources to respond to one stimulus in particular (form or meaning). It can be voluntary or involuntary. Detection is the third mechanism, and it requires more cognitive resources than the first two, for it is the one that engages attention in processing information. It is the cognitive registration of stimuli in short-term memory. Detection does not require awareness which is the “subjective, contentful “feel” of experience that can be reported to others, to varying extents” (Robinson et al., 2012, p. 247). For example, detecting the addition of an “s” in plural nouns does not imply that a learner is aware (conscious) of it, i.e., he might not be able to use it properly, report using it and articulate the rules underlying using it. In other words, unconscious knowledge might be acquired when input is detected (Al-Hejin, 2004; Posner & Petersen, 1990; Robinson et al, 2012; Schmidt, 2001).

The three remaining mechanisms of attention are selection, facilitation, and inhibition. In accordance with the late models of attention, selection follows detection. Selection is the mechanism by which stimuli access consciousness (Schmidt, 2001). Full awareness of a stimulus that has been detected is called ‘noticing’ by Schmidt (2001). According to Robinson (1995, p. 296), noticing is “detection plus rehearsal in short-term memory, prior to encoding in long-term memory”. This conception unifies WM and attention. Another attentional mechanism is facilitation. Attention facilitates information processing. To prove this argument, facilitation studies show that if a learner is presented with a stimulus and asked to ignore it, his noticing of this ignored stimulus dissipates over time. On the other hand, if it does not dissipate completely, processing previously ignored information should be easier and faster than processing new information; this is called positive priming. Finally, the inhibition mechanism can be considered as the opposite of facilitation. As defined before, inhibition is the ability to ignore any activated but irrelevant stimulus (Engle et al., 1995). Inhibition studies that if a learner totally inhibits the processing of ignored stimulus while processing attended stimulus, later processing the ignored input would be slower and more difficult to process than new information; this is called negative priming (Schmidt, 2001).

Schmidt’s (2001) basic argument is that attention is necessary for learning to take place. He responds to critics of his Noticing Hypothesis by arguing that all attention is not deliberate. Learning can happen without learners’ intention to attend or to learn. While completely non-alert learners are more likely to learn nothing, those who depend on involuntary orientation mechanism have little chance to be successful L2 learners, and the ones who engage in voluntary orientating are to succeed. Learning is essentially the encoding of information in LTM (Robinson, 1995). This information has first to go through WM, and this cannot happen without the mechanism of detection. We can deduce, therefore, that there is no learning without alertness, orienting and detection, and hence there is no learning without attention. This argument does not include awareness, for learning can be implicit.

2.2.3. Attentional Theories

According to Robinson (1995), the different conceptions of attention and its mechanisms have influenced the development of attentional theories. He believes that there are two types of them namely the filter theories and the capacity theories. The two kinds of theories do not necessarily contradict each other. The capacity theories can rather be perceived as extensions of the late versions of the filter theories.

2.2.3.1. The Filter Theories

The filter theories, which emphasise the notion of selective attention, assume that only one limited capacity channel of attention exists. Broadbent's (1958, as cited in Robinson, 1995) model claims that the selective attention mechanism filters information from a sensory register to deliver it to a detection device. After that, the meaning of the information, not its form, is analysed for it to enter awareness and get encoded in short-term memory. Form is presumably noticed before information is filtered. Treisman (1964, as cited in Robinson, 1995) argues, in his attenuated filter model, that both meaning and form are analysed before detection. This view is criticised by the late selection theories (Norman, 1968, as cited in Robinson, 1995) by the argument that analysing information before detecting it is impossible, for it requires unavailable cognitive resources. Instead they suggest that information enters WM before being selected and rehearsed or forgotten. Therefore detection precedes noticing (Al-Hejin, 2004; Robinson, 1995).

2.2.3.2. The Capacity Theories

The capacity theories view attention as a spotlight that responds to task demands. Learners can voluntarily choose to orient and intensify or widen and dissipate the focus of this spotlight. In other words, they can choose to what and how to pay attention. Wickens (1980, as cited in Robinson, 1995) declares that instead of one channel of attention there exist many pools on which different tasks can draw. Tasks compete for attentional resources only when they draw on the same pool, like when engaging into two different conversations, for example. Learners shift, therefore, their attention from one task to the other in a serial manner depending on their abilities to do so while they tackle tasks drawing on different pools in a parallel manner (Al-Hejin, 2004).

Relevant to the research on task complexity, and thus to the current study, is the notion of attention as “capacity”, which is perceived in two different manners. Skehan (1998) adopts the same position as the filter theories. He claims that attention taps on a single pool of resources, which leads to a trade-off effect when a task is too complex for a learner to attend to fluency, accuracy and complexity at the same time. He also claims that while there is no problem with fluency, accuracy and complexity do compete. One takes place at the expense of the other. As opposed to Skehan (1998), Robinson (2007) has the same opinion as the capacity theories. He argues that attention does not fail because of its limited span but rather because of breakdowns in “action-control”. Learners’ control over their output increases with the increase of task-demands leading to greater L2 complexity and accuracy. In other words, he asserts that increasing task complexity along different dimensions results in more vigilance to notice input and better completion of the task. However, not all learners benefit from the learning opportunity that is provided by complex tasks; some fail to direct their attention towards what is important to complete the task (Robinson et al. 2012)

2.2.4. Attention and Language Learning

Despite all the controversy surrounding his Noticing Hypothesis, Schmidt (2001) asserts that besides memory, attention is the other component of human cognition that is essential for L2 learning. Some researchers like Truscott (1998, as cited in Al-Hejin, 2004) argue that associating attention to detection as its basic mechanism is sufficient to make it necessary by definition rather than being based on research, for it is well established that new items have to be detected to be learned. This argument can be challenged, for much research supports the importance of attention whether in oral or written language. Attention is proved to intensify the activation level of input in WM and to keep it long enough to be rehearsed then processed. It can be of low-level involving only alertness, orientation and detection, or it can be of high-level involving also noticing (Norris & Ortega, 2009). Therefore, while low-level attention is the minimum requirement for L2 learning to happen, noticing enhances the chances for better learning (Schmidt, 2001). While this study is about L2 writing, a quick look at the oral language gives us a fuller view about the role of attention in L2 production and development.

2.2.4.1. Attention and Oral Language

To listen is by definition to pay attention, for detecting sounds without involving enough attention for them to be deciphered is mere hearing. Listening, therefore, involves comprehension along with breaking down sounds into recognisable units from a sequence of noise and linking them to mental frameworks in LTM (Byrnes, 1984, as cited in Wallace, 1998). Decoding, comprehension, and interpretation are the three parallel processing phases of listening. It is during the first phase which is decoding that attention is used for speech perception, word recognition, and grammatical analysing. Whereas comprehension comprises the activation of prior knowledge, and interpretation includes the comparison and evaluation of discourse meanings (Rost, 2005). According to L2 listening research, input enhancement, through speed-tuning of the speech, regulating the number of new items and eliminating semantic or syntactic inconsistencies, can affect the learners' selective attention positively. Otherwise, an "attentional blink" happens and listening is negatively affected. Learners with high attentional levels can complete tasks without much input enhancement (Metsala, 1997; Osterhout and Nicol, 1999, as cited in Rost, 2005). These claims are enough emphasis on the importance of attention in L2 listening.

To speak is to voluntarily plan, select and edit utterances in accordance to a topic of discourse. Unlike listening, speaking can be perceived as a highly active skill that expresses thought and necessitates extra attention. Speaking is an exhibition of both intention and attention. The action control system is highly activated when one plans and produces speech, which is proved by brain imaging research showing activation of the frontal attentional cortex during speech (Mishra, 2015). It is also argued that attentional manipulation (through explicit or subliminal cues, for example) affects sentence construction and speech production in general (Myachykov , Garrod & Scheepers, 2009). In other words, attention affects speech in form and meaning. Learners with low attentional levels are slower in depicting cues and responding via speech and need both time and more explicit cues (Norbury, 2011).

It is true that attention can be driven and manipulated, but it is also true that it follows the learners' personal learning agenda. Orienting learners' attention towards a specific direction helps L2 comprehension and production, but what defines the learning process is how long they sustain attention and how much distraction they can inhibit. Attention is more subject to learners' differences than it is acknowledged in research.

2.2.4.2. Attention and Written Language

When writing in L2, learners need extra attentional effort in rehearsing sentences in their WM and retrieving the writing mechanics during the transcribing phase as compared with writing in L1.

Monitoring too will require more conscious effort, increasing the chances of Short-term Memory loss. This is more likely to happen with less expert learners: the attentional system having to monitor levels of language that in the mature L1-speaker are normally automatized, it will not have enough channel capacity available, at the point of utterance, to cope with lexical/grammatical items that have not yet been proceduralised. This also implies that Editing is likely to be more recursive than in L1-writing, interrupting other writing processes more often, with consequences for the higher meta-components. In view of the attentional demands posed by L2-writing, the interference caused by planning ahead will also be more likely to occur, giving rise to processing failure. Processing failure or the WSTM loss may also be caused by the L2-writer pausing to consult dictionaries or other resources to fill gaps in their L2-knowledge while rehearsing the incomplete sentence plan in WSTM. In fact, research indicates that although, in general terms, composing patterns (sequences of writing behaviours) are similar in L1s and L2s, there are some important differences (Cowan, 2008).

2.2.5. Attention Measurement in SLA Research

As mentioned earlier, attention can be perceived as a cognitive process of selection, as a capacity or as an effort (Robinson, 2008). The traditional way of measuring attention in general (as selection, as capacity and as effort) is through post-test scores. The improvement in these scores roughly indicates that some attention has been paid to the target form. However, recent SLA research uses more elaborate instruments to measure attention depending on which angle the researcher perceives it through (Medina, 2008).

2.2.5.1. Measures of Attention as Selection

The instruments or elicitation measures used to measure attention as the process of selection can generally be divided into online and offline ones, depending on whether they were taken during or after the task is completed (Fukuta, 2014). These measures include first-person reports, off-line questionnaires and learning diaries. Another elicitation measure used in some studies is to take notes or check targeted linguistic items when heard or read (Leow, 2013; Robinson et al, 2012; Schmidt, 2001).

On-line measures examine the participants' cognitive processes during the encoding of the information (Fukuta, 2014). Think-aloud protocols are one example of online elicitation measures of attention (Leow, 1997). While engaged in a learning activity learners verbalize the content of their experience in a verbal report which can include the explanation of their actions. Concurrent verbal reports are used to collect information about the cognitive processes needed for task completion with or without explanation. Other online methods of measuring attention include note taking and underlining, circling, or checking the targeted linguistic items in written texts. These measures are also called introspective, and it is argued that they can influence learners' performance either positively or negatively. This influence phenomenon is called reactivity, and it is in the case of on-line measures a problem (Jourdanais, 2001) because it also alters learners' attention and adds a burden on their cognitive resources (Fukuta, 2014).

Off-line measures examine the participants' cognitive processes during the retrieval of stored information. Learners try to recall their experiences in questionnaires, offline learning diaries, stimulated recalls, and immediate retrospective reports.

Questionnaires are the most commonly used methods to examine participants' attention to linguistic form after completing a task (Fukuta, 2014). Diary entries are also used to collect information about learners' thought processes over weeks or months (Robinson et al, 2012; Schmidt, 2001). Stimulated recalls incite learners to remember and report their thoughts during task performance. While reactivity is not a problem with offline measures, veridicality, which is the accuracy with which learners report their cognitive processes, is one. Learners may forget some parts of their experiences or try to please the researcher by adding some explanation. A solution to the inaccuracy of the introspective measures is suggested to be the immediate report method, for it is immediately administered leaving no time for veridicality. However, the method needs the learners' practice of recall which can increase the amount of attention paid to certain items (Fukuta, 2014; Robinson et al, 2012).

There are many problems with measuring attention as a cognitive process. The first problem with the first person reports (whether online or offline) is that they do not measure the exact knowledge learners attended to or noticed, nor they measure all of this knowledge (Shanks & St. John, 1994, as cited in Robinson et al, 2012). Another problem with the attention measures presented till this point is that they measure the knowledge learners think they attended to rather that their attentional capacities and the individual differences in these capacities, which does not serve our research, nor does it treat attention as an integral part of WM (Shipstead, Harrison & Engle, 2015). Therefore, other measures are necessary and more accurate in measuring attention used in the sense of capacity, and not as selection.

2.2.5.2. Measures of Attention as Capacity

As mentioned before, researchers have different opinions regarding attention as a capacity. Some argues that one finite volume of attention serves competing tasks with different demands (Skehan, 1998). Others argue that attention draws on different resource pools depending on task dimensions and that competition over attention capacity exists within the same pool, but not between separate pools (Robinson, 2007). This group of researchers argues that attention is not limited in capacity, but it is the attentional control that is limited. Complex task demands can cause a breakdown in action control through an involuntary attentional shift (Robinson & Ellis, 2008). In other words, learners lose control over their sustained attention when the task is complex to the point it requires dividing and alternating attention. Selecting the most important stimuli becomes, therefore, overburdening.

Attention as capacity is treated as a control process by SLA researchers, to whom increasing task demands influences learners' allocation of attention and measures it. However, they mostly study how attentional demands of L2 tasks affect production, comprehension, and learning. They focus more on the effects of attentional demands than on their measuring (Robinson, 2007). Furthermore, according to the multiple resources argument, performing well in a complex task is not accredited to big attentional capacity, but rather to task dimensions. Contrary to Skehan (1998), Robinson (2007) argues that increasing task complexity following separately resourced dimensions increases the attention learners pay to input and output without the constrains of capacity limits or competition for attentional resources.

To sum up, there exist two types of SLA researchers concerned by attention as capacity and task complexity. The first type perceives attention as limited and is more interested in the effects of its limits then in measuring them. The second type does not see the necessity of such measures since they do not believe in its limit. In our turn, and since we adopt Robinson's (2001, 2005, 2007, 2011) views in this study, we choose to perceive attention as unlimited capacity when drawing on different pools. However, attention as capacity is limited within the same pool of resources (Robinson & Ellis, 2008). It can, therefore, be measured through any tests. The most comprehensive and widely used of these tests is Robertson, Ward, Ridgeway, and Nimmo-Smith's (1996) Test of Everyday Attention (TEA) though it is neither the most practical nor the easiest to administer in a classroom (Peverly, Garner & Vekaria, 2014).

In our study, we use the Ruff 2 & 7 Test, developed to measure two aspects of visual attention, which are sustained attention and selective attention. As a first task, respondents are given three lines of capitalised alphabetical letters among which the digits "2" and "7" are embedded 10 times within each line. They are asked to detect the digits through 50 characters per line in a visual search task. The letters are the distractors. In a second task, other digits are the distractors. This task is called the cancellation one. Each task consists of a series of 10 trials. Participants are given 15 seconds for each trail to cross out as many 2s and 7s as possible starting from the top left side of the lines. After the time is up, respondents move to the next set of characters. The test as whole takes five minutes, and the score is the total number of 2s and 7s correctly crossed out (Ruff, Evans, & Light, 1986).

2.2.5.3. Measures of Attention as Effort

Attention is a term that can also be used to describe sustaining attention to an activity over time. Attention therefore refers to the effort or energy put onto an activity in progress. It is not much of a structural process as it is for selecting information or rehearsing it. It is the mental effort of maintaining performance on a task at a constant state (Robinson & Ellis, 2008).

According to Skehan (1996), tasks that demand a high attentional capacity also necessitate a lot of effort in sustaining this attention. Therefore, the measures of attention as capacity correlate with its measure as an effort or spent energy. Kahneman's (1973) argues that attentional effort can be physiologically measured through the observations of the heart rate, pupillary dilation and by greater declines in vigilance.

According to Robinson and Ellis (2008), the most effortful tasks in sustaining attention to L2 output and input are those that draw on resources from the same pool. Learners have, therefore, to divide their attention and coordinate it. Energy is spent on the competition for resources within the same pools. It results from time pressure and the cognitive activity of resource coordination.

Many studies suggest that the effort made to keep focus on a task at hand is usually accompanied by increases in stress, anxiety and motivation, especially in complex tasks, which affects performance (Dörnyei & Skehan, 2003).

2.2.6. The Relationship between Working Memory and Attention

Like many researchers, Shipstead et al. (2015) emphasise the interrelationship between memory and attention in their definition of WM as "the cognitive system in which memory and attention interact to produce complex cognition". According to Robinson and Ellis (2008, p. 631), "Attention is the process that encodes language input, keeps it active in WM and STM, and retrieves it from long-term memory". Attention, therefore, is part of memory.

A general point of agreement on the relationship between attention and WM does not exist yet (Miyake & Shah, 1999). Though a growing number of studies (like the one of Bailer, Tomitch & D'Ely, 2013) expose the overlap and correlation between the two constructs, researchers like Cowan (1988) draw lines between them. Attention filters the information that enters memory, and the two are, consequently, distinct mechanisms. This distinction, however, is blurred within the different models of WM. For example, the view of Engle et al. (2005) is different from the one of Baddeley and Hitch (2000). While the former claim that WM is composed of STM and controlled attention, the latter include attention in the controlling function of the central executive.

Conclusion

The relationship between learners' differences and instructional conditions and treatments has significant implications for the language learning classrooms. Therefore, by profiling the learners' cognitive strengths and weaknesses in language learning, it should be possible to match these profiles to tasks and thus improve learners' chances of success in learning an L2. On this argument, our research is based, and it is concerned with the cognitive abilities that are involved the most in writing, and those are WM and attention.

In this chapter, we presented both of WM and attention and how they influence L2 learning. In the next chapter, we will focus on L2 writing, and more intently on academic writing. We will concentrate on the types of writing tasks used in the current study and how learners' differences in cognition shape their performance and final outcome.

Chapter Three: Writing Proficiency

Introduction

By all accounts, writing is a complex task that burdens learners' cognition and stretches it to its limits. As a cognitive ability, WM is critical in every process involved in writing. In academia, it often correlates with students' academic achievement. Likewise, Attention is a cognitive ability that supports WM and hugely affects learners' success. Unfortunately, all learners do not have the same share of these two abilities. This destines the weak ones for failure unless some effort is made by the teacher and the instruction designer. In the previous chapters, we argued that within the TBLT framework, learners should have the opportunity to perform writing tasks that are suitable to their cognitive abilities if any success is hoped for.

In this chapter, we introduce writing in an academic context. This writing genre typically involves the integration of another skill which is usually reading (Lizza, 2007). Source texts are used as a resource by academics, including students, who respond to these texts in order to generate their pieces of writing in situations like taking a test, reviewing the literature, or writing a research paper. Thus, compared to ordinary writing tasks, academic tasks integrate reading into writing to provide relevant content to base one's writing on and provide topical knowledge (Gebril, 2009). Subsequently, reading-to-write has become a common task in several decisive tests such as the Test of English as a Foreign Language (TOEFL) and the International English Language Testing System (IELTS) (Weigle, 2004). For the sake of narrowing the scope of our study, we choose to investigate only two types of reading-to-write tasks which are summarising and synthesising. The two tasks are perceived as two ends of one complexity continuum. They impose different cognitive demands on learners and engage different individual abilities.

3.1. The Nature of Academic Writing

Writing in any context is a complex task that involves many mental activities and necessitates multiple cognitive resources. Flower and Hayes (1981) established a model of writing processes which is the planning-writing-reviewing framework in which writing is defined as a "non-linear, exploratory and generative process whereby writers discover and reformulate their ideas as they attempt to approximate meaning" (Zamel, 1983, as cited in Hyland, 2003, p. 11). This writing model emphasizes the cognitive processes that learners engage in rather than their creativity. It approaches writing as a problem-solving process in which writers use their intellect to deal with the task complexity.

3.1.1. A General Definition of Writing

Writing is not an instinctive skill; we rather learn it in its appropriate environment and conditions (Brown, 2001, p. 334). According to Tribble (2003, p. 1), "Writing is a technology that has to be learned". However, the nature of writing per se is debatable. Some perceive only its mechanics and define it as a set of structures, functions, or processes. Others see it as a means of expression that does not exist outside a context.

From a structural point of view, writing is "marks on a page or a screen, a coherent arrangement of words, clauses, and sentences, structured according to a system of rules" (Hyland, 2003, p. 3), and learning to write is "imitating and manipulating models provided by the teacher" (Hyland, 2003). Writing is, therefore, a product measured up against a model that meets the conventional standards of grammatical and lexical accuracy, organization and rhetorical style. This understanding of the nature of writing has drastically changed since the 60s' structuralism. Naturally, to control language systems is still important, but not as important as to control its deep features (Brown, 2001; Hyland, 2003, 2009).

Caswell and Mahler (2004, p. 3) define writing as the "vehicle of communication". Therefore, surface structures are related to communicative functions. This definition of writing also draws on structuralism, for it perceives writing as a product made of structural units like introduction, body and conclusion that communicate a certain meaning. The functional approach is widely used in academia where writers have to produce pieces of writing in which they have no personal purpose and are supposed to follow rules and patterns to represent meaning. However, writers are never entirely passive or impersonal, and writing can never be removed from its context (Hyland, 2003). According to Urquhart and McLever, "Writing fulfils the writer's intention and meets the audience's needs" (2005, p.1). However, Elbow (1973, as cited in Hyland, 2003) argues that writing is an "organic developmental process" in which writers have no predefined intentions or ideas about the final product. Writers rather discover themselves through writing (as cited in Hyland, 2009). As an expressivist, Elbow (1973, as cited in Hyland, 2003) emphasises process over product; for him writing is the creative activity that has the basic role of self-expression and where no clear criteria to define, judge or achieve good writing is necessary (Hyland, 2003).

As stated before, Flower and Hayes' (1981) model stresses the cognitive processes that learners engage in during writing. Writers, therefore, approach it as a problem-solving process and use their intellect to deal with the task complexity. This model adopts the opinion that all learners use the same strategies and all contexts are the same which is inaccurate (Hyland, 2003, 2009).

The writing context is a 'situation of expression' (Nystrand, 1987, as cited in Hyland, 2009, p. 26), and writing is "an interactive, as well as cognitive, activity which employs accepted resources for the purpose of sharing meanings in that context" (Hyland, 2009, p. 30). This means that the writing situation influences the learners' choice of writing strategies and both linguistic and cognitive resources as well as the content of their writing.

3.1.2. Writing in Academia and its Properties

For Murray and Moore (2006), writing is a vital skill for learners. Poor writers have “an academic half-life” (p. 4). Writing is a complex skill exploited to express one's ideas and respond to others’ ideas. Therefore, most academic writing tasks entail the typical use of reading sources. In academia, writing aims at demonstrating knowledge. It has conventions, and it has a particular situation that consists of the expressed ideas, the form, the learner’s and the teacher’s aims, the audience and the context (Graff & Birkenstein, 2007; Irvin, 2010).

In academia particularly, writing is never writing per se. Academic writing consists mostly in language transforming, for it relies on reading one or multiple texts composed by others and make organizational selective or connective alterations. Before proceeding into generating a text, learners have first to identify existing knowledge and information available in memory and automatically activated by the cues provided by the writing task. Then, they have to find meaning in what is new and show understanding. Next, learners have to analyse new and old concepts by breaking them into pieces, inspecting them and then see how they fit together. Finally, they have to interpret what has been read or learned via summarizing, paraphrasing, or synthesising it (Irvin, 2010).

3.1.2.1. Knowledge Telling Vs. Knowledge Transforming

Bereiter and Scardamalia's (1987, as cited in Galbraith, 2009) created a cognitive model for writing that distinguishes between the 'knowledge telling' writing approach and 'knowledge transforming'. The first is characteristically employed by novice writers while the second is employed by advanced writers or academic writers. The two writing approaches represent, therefore, the two ends of a writing expertise continuum.

The knowledge telling approach is the simple process of text producing by inscribing existing knowledge and information available in memory. During the composition, beginner writers usually rely on memory and rarely employ planning, monitoring, and revising processes. Being a novice writer and relying on memorised information does not mean that the writing skill has to be modest. On the contrary, writers can be very skilful at producing good texts using the knowledge telling approach (Scardamalia & Bereiter, 1991).

The level of cognitive demands of an academic writing task depends on the interaction between input and output (Douglas, 2000). Knowledge telling is at the lowest level of cognitive demand in which writers retrieve their stored knowledge from the LTM and retell it or reproduce the information provided in the input texts to produce their text. This does not necessitate them to use their own words and ideas or even to reorganize the structure of the initial text in order to respond to the task prompts. According to Scardamalia and Bereiter (1987, as cited in Galbraith, 2009), it is an approach that is not used in tasks involving reading external texts, for the instruction would never be to copy and paste.

In academia, the approach to writing that is mostly used is the knowledge transforming approach which consists of a complex problem-solving process. It leads to the production of new ideas rather than the telling of existing information. Academic writers are expert writers who try to align available resources and writing goals. The writing resources are either internal, i.e., retrieved from memory, or external, i.e., new pieces of information and concepts retrieved from an input text. Before actually engaging in writing, writers, therefore, have to understand the writing task, set the goal of solving the task problem and retrieve and gather the available resources. In their model, Scardamalia and Bereiter (1991) propose that in order to find out what to write and how to write, writers create a cognitive content problem space and a rhetorical problem space. This approach to writing is called the knowledge transforming because it leads to a better understanding of the task topic or of the subject knowledge.

At the higher level of transforming knowledge, writers develop a conscious interpretation of the writing task then organise the content they have retrieved from long-term memory or from the input texts to solve the rhetorical problem of the writing task. Such tasks require transformed as well as new knowledge along with some complex cognitive processes such as interpreting and evaluating new content as compared with the one existing in LTM and combining the two to create new ideas to fulfil the task goals (Scardamalia & Bereiter, 1987, as cited in Galbraith, 2009).

3.1.2.2. Expressing Ideas

Writing never does not happen in a 'vacuum'; it is entering a 'conversation' in which others' ideas are examined, evaluated and built upon (Graff & Birkenstein, 2007). Academic writing is somehow personal (DasBender, 2011). Academic writing requires learners to draw upon internal knowledge retrieved from their long-term memory, as well as, external resources, like textbooks, journal articles, websites and lecture-notes. This stated fact leads us to believe that successful academic writing necessitates the integration of the reading skill (Grabe, 2003).

Models of writing from external sources are not as prevalent as those dealing with the processes typically involved either in reading comprehension or writing production. Van Dijk and Kintsch's (1983) model of summarising writing and the one of Spivey (1984), which is related to synthesis writing, are two of the rare models that describe the integration of reading into writing. The cognitive approach based on Kintsch and Van Dijk's (1978,1983, as cited in Jordan, 2001), affirms that summarising includes three major processes which are deletion of redundant propositions; generalisation of a sequence of propositions; and the construction of the macro propositions of the text. Spivey (1984), on the other hand, developed the discourse synthesis model which includes the processes involved in writing tasks requiring the use of many reading materials and synthesising them, i.e., combining and reconciling them. Synthesising includes three major processes which are selecting important content from multiple texts, organising this content according to the writing goals and combining the content by creating connections between ideas in order to generate a new text. During the completion of a task that involves both reading and writing, reading processes interact with writing processes. How exactly they interact and how cognitively demanding this operation will be discussed in the next sections of the current chapter.

3.1.2.3. Generating a Text

The final characteristic of academic writing is the fact that generating a text is a goal-directed, problem-solving task that includes many processes. According to Hayes and Flower's (1980) model, the multiple recursive processes involved in writing are planning, translating and reviewing. They all interact with the writing context and the writer's long-term memory. The writing context is defined by Irvin (2010, p. 7) as the "writing occasion", and it is usually, the occasion of submitting an assignment or of taking an exam. Task context involves variables such as the text genre, topic and the intended audience. An academic audience shares a background knowledge that reduces what needs to be stated and explained in the text conversation (Alamargot & Chanquoy, 2001).

An updated version of the model (Hayes, 1996) integrates variables such as working memory, long-term memory resources, rhetorical resources and learners' motivation as internal factors while the kind of texts read when writing is added as a variable to the external factors. As far as the processes of planning, translating and reviewing are concerned, the new model renames them like reflection, text production and text interpretation respectively. Reflection includes problem-solving, decision making, and inferring about the audience and the writing content. Text production is the actual process of text generation which is directed by the clues developed through reflection. After reflecting on a text and generating it, the time comes for reviewing it. Reviewing or interpretation as renamed by the new model consists of reading and scanning transcriptions.

The cognitive model of writing highlights the central role of working memory and linguistic resources and acknowledges the role of reading in writing. According to Hayes (1996), reading intermingles with each of the writing processes. Learners read to outline and reflect about the writing task; they read external sources to obtain content, and read to evaluate their written production.

3.1.3. The Cognitive Phases of Academic Writing

Hayes' (1996) revised model has a downfall: it does not describe how the internal and external factors influence the writing processes and how reading interacts with writing. More recent models, like the one of Kellogg (1996), offer a better explanation of how cognitive factors affect writing processes. This model gives working memory a leading role in writing. It argues that different components of working memory are used in different processes of writing. A model that is based upon Kellogg's (1996) model and that divides writing into different phases is the one of Field (2004). These phases are conceptualisation, organisation, encoding (grammatical, lexical and graphic), execution and monitoring, and each phase implicates multiple processes.

Conceptualisation is the phase during which a mental image about the writing task is created. After reading the task prompts, writers try to understand and construct meaning in their minds. The processes involved in this phase are task representation or reflection and task planning (Field, 2004).

The second phase of academic writing is meaning and discourse construction. It is a phase during which writers use the task clues to contextualise their background knowledge and the new knowledge obtained through reading the provided materials (Field, 2004). The processes involved in this phase are selecting relevant information from long-term memory or external sources and drawing connections between these pieces of information.

Organising is the third phase of academic writing during which writers temporarily arrange their ideas and connect them to the whole text and to each other (Field, 2004). They, henceforth, determine which ideas are central and which are marginal. Spivey (1990) argues that the processes of ordering and connecting ideas are rather cognitively demanding for learners that have to use reading materials in order to complete a writing task.

Monitoring and revising is the final phase, and it is a feedback phase during which writers check the quality of their product then revise the inadequate parts. They can do that at different stages of their writing or leave it till they have produced a text. Writers focus on both the lower-level aspects of text and the higher-level ones, i.e., they monitor and revise aspects such as accuracy along with aspects such as coherence (Field, 2004). Many researchers like Field (2004) and Kellogg (1996) argue that while high level writers engage into monitoring and revising different aspects of the text simultaneously, low level ones focus on one aspect at a time. The explanation for this argument is that this phase does particularly challenge learners' short-term memory and attention.

3.1.4. Issues in Academic Writing

There are many issues faced by learners when trying to perform a writing task. The most prominent ones, and the most relevant to our research, are topic-relevant prior knowledge and the limitation of the writers' cognitive resources. The writing models we have seen in this study affirm that academic writing is not a linear act but a set of multiple overlapping and recursive processes. They also emphasise the importance of reading into writing and the cognitive variable such as attentional resources and WMC. While planning and selecting which process to employ necessitates consciousness, WM controls the execution of these processes and the learners' linguistic abilities shape the final product.

Learners have to draw upon their prior knowledge available in their LTM when performing writing tasks no matter what genre this writing belongs to (McCutchen, 1986). According to Weigle (2004), topic effect is noticeable in tasks providing no input. This leads to variation between learners where some of them undertake the task with a familiarity advantage. Hughes (2003) argues that language learners as academic writers should not be asked to demonstrate specific topic knowledge on the top of demonstrating their writing skill. Implementing tasks that provide no input may not be the most suitable method, for no fairness is offered to our learners in this case.

3.1.5. Measuring Academic Writing

TBLT research aims mainly at defining the right grading and sequencing criteria for designing and classifying tasks for task-based syllabi in order to optimise the learning experience (Long & Crookes, 1992; Robinson, 2003). To this end, it investigates the effects of task characteristics and task design on task performance (Foster & Skehan, 1996) which is measured in L2 classes via three specific dimensions. Complexity, accuracy and fluency (or CAF) are the three dimensions or components of measurement for language proficiency. Skehan (1996, 1998) collected the three measurements in one proficiency model, but before him researchers like Hunt (1965, as cited in Housen, Kuiken & Vedder, 2012) and Brown (1973, as cited in Housen et al., 2012) attempted to develop reliable measures of grammatical accuracy and complexity. After that, the CAF dimensions were defined and measured using various methods. The related literature proposes that the triad originated in research on L2 learning in the 1980s when the distinction was made between fluency and accuracy in L2 (Housen & Kuiken, 2009).

3.1.5.1. The Fluency Measure

According to Payne and Whitney (2002), fluency is the function of automatic language processing ability. Automatic processing as opposed to controlled processing does not put much demand on learners' limited WM and attentional resources. Fluency is also defined as the "learner's or user's global proficiency, particularly as characterized in terms of the ease, eloquence, 'smoothness' and native likeness of speech or writing" (Chambers, 1997, Lennon, 1990 as cited in Housen et al., 2012, pp. 4-5). Fluency has generally to do with spoken language. Consequently, most of the studies measuring the rate of fluency include spoken fluency. It is, however, 'multidimensional', and the dimensions that are concerned more with speech are 'the breakdown fluency' and 'the repair fluency', while the 'speed fluency' can also be a writing property. Speed fluency is the "rate and density of linguistic units produced" (Housen et al., 2012).

Most research measures fluency through counting the total number of words written within a specific time limit for a given task, or the number of words per T-units to measure the learners' written fluency. However, other tools are used in more recent research. In studies like the one of Wigglesworth and Storch (2009), fluency is measured by counting the total number of T-Unit (Terminable Unit), knowing that a "T-unit is defined as an independent clause and all its attached or embedded dependent clauses" (Sadeghi & Mosalli, 2012, p. 53).

Our research examines the effect of manipulating task complexity according to learners' cognitive differences on their L2 writing fluency, accuracy and complexity. Fluency in the present context is measured by counting the number of words per T-unit which is a length measure along with the number of words per clause or per sentence. It is argued by Wolfe-Quintero, Inagati and Tim (1998) and Polio (2001) that it is a good measure of fluency although Norris and Ortega (2009) think that length measures are better used for complexity. Wolfe-Quintero et al. (1998) explain their choice by the fact that the T-unit length measure increases in a linear relationship with learners' proficiency, which means that fluency measured this way is a good indicator of learners' development.

3.1.5.2. The Accuracy Measure

Skehan and Foster (1999) define accuracy as "the ability to avoid error in performance, possibly reflecting higher levels of control in the language, as well as a conservative orientation, that is, avoidance of challenging structures that might provoke error" (p. 96). Housen et al. (2012, p. 2) define it straightforwardly as "the ability to use target-like or error-free language." It is, however, not easy to decide about the nature of errors and the criteria that evaluate them, for accuracy is not just defined as correctness, but it is also defined as 'appropriateness' or 'acceptability' (Vercellotti, 2012).

When measuring accuracy, researchers target a specific structure by engaging participants in a focused task (Ellis & Barkhuizen, 2005). In other words, to measure the accuracy of a given form of language, the task given to the students must elicit this target form (Ellis, 2012). Accuracy is also measured through counting the overall number of errors in a unit that can be a clause or 100 words, or through counting the ratio of the total number of errors per the total number of words. We can also count the percentage of error-free clauses in a text (Vercellotti, 2012). Mehnert (1998), however, thinks that when using the number of error-free clauses as a measure, there is no distinction between clauses containing one or many errors.

The present study investigates the effect of manipulating task complexity according to learners’ cognitive differences on their L2 writing as measured in terms of accuracy as second aspect after fluency. Accuracy is measured using the ratio of errors to the total number of words (Kuiken et al., 2010). This includes all errors which are syntactic, morphological, and lexical.

3.1.5.3. The Complexity Measure

Complexity is elaborate and varied language (Ellis, 2003). It joined fluency and accuracy as the third L2 proficiency dimension in the 1990s following Skehan's (1989) CAF model (Housen & Kuiken, 2009). It is the use of varied and complex linguistic structures and vocabulary. Complexity is, according to Housen et al. (2012, p. 4), objective and related to “the formal and semantic-functional properties” of the language.

According to Vercellotti (2012), a countless number of language complexity measurements exist. Complexity can be measured based on sophistication or variety. For example, the research question may target measuring the use of a variety verb tenses like in Robinson, Cadierno, and Shirai (2009). Another way to measure complexity is by measuring the syntactic or grammatical complexity of a text. To do this, the researcher may use the tool of estimating the length of a sentence by counting the number of its words. Another tool for measuring grammatical complexity is to count the additional phrases in each sentence, and the third tool is one of counting the subordinate clauses. Complexity can also be measured through measuring the lexical variety. To capture such variety the number of word types is divided by the total number of words; for example, a researcher may choose to count the number of functional words to lexical words. This measure is called the type token ratio (TTR) (Ellis & Barkhuizen, 2005). Another way to measure lexical complexity is by counting the relative frequency of the sophisticated words. For example, a researcher may count the number of hard words in a unit of ten words. Some researchers focus on subordination or coordination. They count the mean length of the clause, clauses per T-unit, and dependent clauses per clause as the most satisfactory measures (Mousavi, 1999).

In the current study, along with fluency and accuracy, we also investigate the effect of manipulating task complexity according to learners' cognitive differences on their L2 writing complexity. This latter is defined by syntactic complexity. Syntactic complexity is measured by the number of clauses per T-unit (C/T) (Norris & Ortega, 2009), where a T-unit is defined as the "minimal terminable unit," (Hunt, 1965, p. 37) or as an independent clause and its dependent clauses as mentioned before.

3.2. The Nature of Academic Reading

Before diving into the nature of academic reading, it is important to define reading in general first. To accomplish this mission, many writers have tried to provide definitions of reading from different angles and points of view.

3.2.1. Definitions of Reading

Urquhart and Weir (1998, p.14) broadly and vaguely define reading as "dealing with language messages in written or printed form". It is clear that this definition does not answer all the questions about the nature of reading, nor does it specify its components. For this reason, they add that reading is "a cognitive activity; it largely takes place in the mind, and the physical manifestations of the activity, eye movements, subvocalisation, etc., are comparatively superficial" (1998, p.37). A slightly more precise definition of the nature of the skill is also given by Urquhart & Weir (1998, p.22), and it states that reading is "the process of receiving and interpreting information encoded in language". These definitions assert that the encoding medium of reading is print. According to Bernhardt (1991, p.6) as well, reading is a cognitive process that consists of the extraction of meaning, but it is also a social process that consists of the construction of meaning. Therefore, it is both a mental intrapersonal problem-solving process and a social interpretation of the contextualized meaning process.

Reading has usually been defined through taxonomies that categorise its purposes and processes. Relevant to our research is Urquhart and Weir's (1998) taxonomy of expeditious vs. careful reading. While the first type requires fast and strategic reading that aims at searching for information, the second type is slow and detailed and consists of processing the text for learning. Both types of reading are identified as important parts of academic reading.

3.2.2. Definitions of Academic Reading

Academic reading is reading within an academic context. It is different from ordinary reading, for it involves active probing and recursive strategy, and it is a rudimentary part of academic writing assignments. Reading is a key ingredient in academic success as explained by Hugo (1991) who declares that about 75 per-cent of the information needed by secondary learners is not given by teachers but found in textbooks. Therefore, reading is the doorway to learning. This applies to higher education too where learners have to read academic materials in order to acquire new knowledge, submit assignments and take tests (Carrell, 1988). Academia demands students who are able to synthesise different types of written and spoken information creatively in order to guarantee them success (Schleicher, 2012).

3.2.3. Cognitive Processes Involved in Reading

Reading is an interactive process that involves bottom-up, top-down and interactive processes (Grabe, 1991; Ur, 2012; Li & Wilhelm, 2008).

Learners use the bottom-up or the lower-level processes to attend to meaning at word and sentence level by decoding a series of written symbols into the aural equivalents and recognizing letters and words (Nunan, 1991). Text decoding does not guarantee comprehension (Nuttall, 1996). Bottom up processes include linguistic processes that engender understanding the meaning of words and sentences to form semantic units and analysing the syntactic structure of the sentences (Grabe, 2009). This type of processes can become automatic with time and results in fluent reading (Alderson, 2000).

Learners use top-down or the higher-level processes to construct meaning or comprehension. According to Crookes, Davis and Clair (1995), learners bring their individual experiences and prior knowledge to the text and add them to its meaning. Therefore, understanding differs from one learner to another. Top-down processes involve accumulating meanings from meaning units to build a mental model of the text(s) along with personal interpretations within a situation (Grabe, 2009). This type of processes remains controlled (Walczyk, 2000).

A third process is used while reading, and it is the interactive process. Reading is a dialogue between the reader and text or the reader and the author. The reader is in constant and dynamic struggle to approach the author's intended meaning. To do this, readers try to predict meaning biased by their prior knowledge of the language, of the world and the topic at hand. Therefore, reading is also an interchange between all the types of knowledge brought to the text by the readers to help them decode (linguistic knowledge) and comprehend the text (background knowledge). There is also an interaction between the various linguistic dimensions within the text which defines a written passage not as a series of unconnected sentences but as a coherent unity which is the text (Grabe, 2009).

3.3. The Connection between Reading and Writing

Reading and writing are closely connected; however, they do not overlap. The two skills are "at least as different as they are similar" (Shanahan, 1988, p. 637).

Beside the mechanical skills shared by writers and readers to encode and decode language, they share five types of knowledge according to many correlational studies that examined reading and writing products (Tierney & Shanahan, 1991). The first kind is the Information knowledge, and it includes learners' background knowledge about the world and the subject matter of the text. The structural knowledge is related to discourse structures and writing genres. Transactional knowledge involves learners' conceptualization of the text as a means of communication of a specific message. The aesthetic knowledge, on another hand, is related to style. The final type is the process knowledge, and it allows readers and writers to think consciously about the phases and strategies they use to deal with a text (Rubin & Hansen, 1984, as cited in Rocha Tavares, 1990).

Some researchers claim that reading and writing share also some underlying processes. Unlike the studies that investigate the kind of knowledge performers of the two skills share, process studies examine information from think-aloud protocols, interviews and observations. According to Squire (1984, as cited in Tierney & Shanahan, 1991), reading comprehension and writing composition reflect the same basic cognitive processes which are goal setting, knowledge mobilization, projection, perspective-taking, refinement, review, self-correction and self-assessment (Tierney & Pearson, 1983). Both skills are viewed as generative processes by which meaning is constructed from connections between the text and the learners' knowledge, beliefs and experiences (Wittrock, 1984, as cited in Tierney & Shanahan, 1991). However, Tierney and Shanahan (1991) argue that the confusion in using labels to describe the processes of writing and reading across different studies makes it difficult to generalize their findings and draw a precise connection between the two skills.

3.3.1. Definitions of Reading-to-Write

Integrated reading-into-writing tasks are widely used in academia. This type of tasks is a writing one that involves reading with the intention to write. The activity of reading-to-write is defined by Delaney (2008) as “instructional tasks that combine reading and writing for various education purposes” (p.140). From another angle, Weigle (2004) defines reading-into-writing as “a test that integrates reading with writing by having examinees read and respond to one or more source texts” (p.30). The term reading-into-writing is used when the task is regarded from a language testing point of view while the term reading-to write is used when the task is part of an instructional intervention. In short, reading-to-write tasks are writing tasks which involve drawing upon one or many reading materials to generate a text. Reading-to-write tasks consist of summary tasks, response (argumentative) essays, reports, case studies, research proposals and literature reviews among other tasks (Spivey & King, 1989).

3.3.2. The Reading-to-Write Tasks

Models of writing from external sources are not as prevalent as those dealing with the processes typically involved either in reading comprehension or writing production. Van Dijk and Kintsch’s (1983) model of summarising writing and the one of Spivey (1984), which is related to synthesis writing, are two of the rare models that describe the integration of reading into writing. The cognitive approach based on Kintsch and Van Dijk’s (1978, 1983), affirms that summarising includes three major processes which are deletion of redundant propositions; generalisation of a sequence of propositions; and the construction of the macroproposition of the text. Spivey (1984), on the other hand, developed the discourse synthesis model which includes the processes involved in writing tasks requiring the use of many reading materials and synthesising them, i.e., combining and reconciling them. Synthesising includes three major processes which are selecting important content from multiple texts, organising this content according to the writing goals and combining the content by creating connections between ideas in order to generate a new text. During the completion of a task that involves both reading and writing, reading processes interact with writing processes. How exactly they interact and how cognitively demanding this operation is will be discussed in the next sections of the current chapter.

Many correlational studies have been conducted to investigate the relationship between independent reading and reading-to-write, while others investigated the relationship between independent writing and reading-to-write. The first group of studies concluded that low correlation exists between reading proficiency scores and the scores of integrated writing tasks (Delaney, 2008). As opposed to this conclusion, studies show that independent writing and integrated writing highly correlate (Watanabe, 2001). As explained by Gebril (2009), learners may outperform their independent writing in reading-to-write tasks, for they rely on the source text(s), but still the relationship of integrated writing is much stronger with writing than it is with reading. Therefore, reading-to-write tasks are considered to be measures of writing production rather than measures of reading comprehension, (Watanabe, 2001).

3.3.2.1. Summarising

Summarising is described by (Guido & Colwell, 1987) as an invaluable type of integrated writing tasks that is required in academic settings. The ability to summarise in an L2 reflects good understanding, and thus it is closely related to successful learning and communication (Yu, 2008). According to (Johnson, 1983, p. 473), summarising is the task of writing “a brief statement that represents the condensation of information accessible to a subject and reflects the gist of the discourse". It involves condensing the substantial information in one's own words and respecting the overall meaning. A summary can include the original text propositions, main points and essential supporting details (Hidi & Anderson, 1986). A summary grants less information that is more general, and it can be confused with another skill which is conciseness which is the same information in a briefer form (Russell, 1979, as cited in Jordan, 2001).

Summarising benefits language learners in so many ways. Firstly, it helps them monitor and enhance comprehension and memorise essential information (Palinscar & Brown, 1985). Secondly, generating summaries trains learners for the good reasoning and deep processing that are involved in deciding which information is important enough to be integrated in the summary (Guido & Colwell, 1987). Thirdly, summarisation helps developing the ability to restructure texts at a morphological, syntactic, and lexical level. It is, however, important to note that low level learners opt for lexical restructuring by using synonyms, for they do not have the tools to understand an L2 text and properly summarise it (Newfields, 2001).

Writing a summary is not a regular composing activity, for writers have to focus on planning what is to be included or omitted from an existing source rather than planning how to generate new content and ideas. It starts with reading comprehension and evolves to the evaluation of what is important, be it the most convincing arguments in an argumentative text or the most informative for educational texts, for example (Jordan, 2001, Hidi & Anderson, 1986). Summary writing involves the processes of comprehension, evaluation, condensation, and transformation of ideas.

According to Brown and Day (1983, as cited in Hidi & Anderson, 1986), summary writing involves processes of a higher nature than comprehension and recall. They also plead in favour of planning as an essential process of summarising. Planning is inevitably required for information selection though it is different from the kind of planning involved in text generation. Therefore, planning is part of all the different steps of summary writing. Hidi and Anderson (1986) claim that comprehension and recall pave the way for the real processes of summarisation, which involves more active control over the source text representations. These processes are the conscious selection process and the reduction process in which the condensation and the transformation of the original material are intentionally made (Johnson, 1983).

Different names have been given to the different cognitive processes involved in summarization. Kintsch and Van Dijk (1978), for example, name the three basic processes deletion, generalization and construction whereas Brown and Day (1983, as cited in Hidi & Anderson, 1986) name them deletion, substitution and creating. Other researchers use different terminology and even divide them into sub-processes. Nevertheless, the fact is that all the names describe the same three basic operations which follow comprehension and recall. The first operation is the selection which includes the evaluation of the source text, deletion of trivial information, and retention of important information to be included in the summary. The second one is the condensation of material by substituting detailed concepts with more generalised ones. Thirdly, the retained material is integrated, combined, and transformed to generate a summary (Hidi & Anderson, 1986).

3.3.2.2. Synthesis

Synthesis or writing from different sources is a task that is common in academia and used for many purposes like writing literature reviews or research papers. It requires the selection, organization, and connection of content from multiple sources to generate a new text using different words (Spivey, 1997). Synthesising is a reading-to-write task in that it involves both reading and writing. When compared to summarisation, discourse synthesis has been neglected by research until the early 1990s (Segev-Miller, 2007).

Synthesising is similar to summarisation in process but different in cognitive load. While, in summaries, learners construct their propositions from one text, they construct them from different sources when synthesising. These sources might go as far as being contradicting each other in concepts and textual structures. Therefore, when summarising, learners are asked to build a text that is much closer to the original text as compared to the one built when synthesising. Learners base their summaries on intratextual connection and their synthesis on intertextual connections. Building the latters is much more cognitively demanding (Segev-Miller, 2007).

Cognitive skills of a higher order are a prerequisite for university students who want to succeed in completing writing tasks. These skills include language analysis and synthesis (Villalon & Calvo, 2011). Research has found that the processes involved in discourse synthesis are not specific to it. They are rather characteristic to all reading-to-write tasks. However, some processes like intertextual processing and conceptual transforming such as comparing the sources and constructing propositions are unique to synthesising. These processes are rarely employed by learners who lack the explicit instruction and training of using them (Segev-Miller, 2007). Writers select important content from the available sources. Next, they organise the selected content in a new structure using their own words. After that, they connect it by providing links between related ideas (Spivey & King, 1989).

According to Plakans (2009), three basic processes are necessary for an effective synthesis of texts. These processes are organizing, selecting, and connecting ideas to create new text. Learners engage first in intertextual processes. They organise the content from the available sources while reading; they draw relationships by comparing, contrasting and generalising ideas to create meaning. Secondly, they evaluate the relevance and importance of the material and select the most important content according to their writing purpose. Following the writing purpose of the task, learners choose a synthesis structure among the many that exist. An example–general rule, problem–solution, cause–effect, time sequence or comparison–contrast structure reveals itself to be the most appropriate to use after thorough examination of the different source texts (Boyd & Numrich, 2014). Finally, learners reorder pieces of information and connect them to create a new structure for a new text by summarizing key ideas from the original texts.

Mainly, there are two types of synthesis, namely the background synthesis and the argumentative synthesis. The two differ in many ways, but mostly background syntheses put less demand on learners' cognition than argumentative syntheses do.

In a background synthesis task, learners are asked to collect, organise and present ideas and information by topic rather than by sources following a logical pattern of connections. This type of synthesis can fall into two categories, which are the review synthesis and the explanatory one. In a review, learners present ideas from texts that treat the same topic. They decompose and recompose source texts, then, connect their propositions (Segev-Miller, 2007). On another hand, learners add clarifications and illustration that are usually the fruit of their own understanding of the source texts in the explanatory task.

In an Argumentative synthesis, learners use the different arguments found in the source texts to defend a specific opinion that can be their own opinion about a given topic. The information is, therefore, selected by opinions and presented by sources rather than as an extensive exposition of the topic. The argumentative synthesis can be divided into several categories, namely illustration, concession and comparison and contrast. In an illustration synthesis, learners support their stand using examples from several texts. In a concession task, learners use the different points of views from the texts to strengthen their arguments. Comparison and contrast synthesis writing compares the similarities and highlights the differences between authors' opinions on a given topic across source texts ("Writing an Argumentative Synthesis Essay," 2017).

The current study uses background synthesis as a writing task rather than argumentative synthesis, for we argue that argumentation is more taxing in terms of cognitive resources. As a consequence, other complexity variables such as perspective taking may interfere in predicting the results of our study while the only variables intended to be manipulated are planning time and the tasks' number of elements. This is why background syntheses are used as the complex versions of summaries rather than argumentative syntheses.

3.3.2.3. Differences between Summary and Synthesis

There are important differences between a summary and a synthesis. The first and most obvious difference is the number of sources used to generate each. The second difference is the way source texts are processed. While summaries necessitate intratextual processing, syntheses require intertextual processing as well. Finally, a synthesis might be considered as the summarisation and combination of two or more texts. The process of combination holds most of the cognitive load of a synthesis task, for some meaning must be built across the summaries depending on the writing purpose (Segev-Miller, 2007). This difference between a summary and a synthesis makes the latter much more complex and cognitively demanding.

In our study, we consider summary writing as the simple version of a synthesis task. It is the starting point of a continuum in rhetorical transforming strategies that increase in cognitive demands to reach synthesis writing as the end of this continuum (Delaney, 2008). The number of texts as task elements is the complexity variable we hypothesise to be involved in this study, and it is what we use to categorise summaries as simple tasks and syntheses as complex ones disposed to be more complex depending on the number of source texts involved.

3.3.3. Factors Affecting Reading-to-Write Tasks

One major factor affecting good performance in reading-to-write tasks is language proficiency while other factors are identified by research to be age, length and complexity of source texts, background knowledge and motivation (Yang & Shi, 2003).

Reading and writing abilities that are developed to a certain degree are necessary to complete a reading-to-write task, for this latter involves reading and understanding texts, identifying main ideas and supporting details, recognising the structure and organization of these texts (Carrell, 1989). According to a study led by Wignograd (1984, as cited in Lee, 2014), age is of little consequence over writing when compared to L2 proficiency level. Students of low level find it difficult to evaluate which piece of information is important enough to be included in their pieces of writing. They also face hard time condensing and restructuring the text using their own words (Johns, 1985, as cited in Lee, 2014). This leads us to believe that their poor performance is the result of feebleness in both writing and reading abilities.

The nature of the original source texts, their length, number and complexity are factors that influence the quality of writing. According to Hidi and Anderson (1986), learners are more likely to produce higher quality writing when texts are short, simple in vocabulary, structure and organisation, and pertaining to a straightforward genre where the important information can easily be divulged, like in narratives versus expositions. Nevertheless, it has been found that length, number and genre are more likely to affect young learners or low-level ones while complexity of the text can affect learners of all levels.

Individual differences also influence writing. Variables like motivation and background knowledge are considered influential over the writing of better quality pieces. Yang and Shi (2003) found out that learners generally follow the same pattern in summarizing and synthesising as in any regular composing task. This pattern is composed of many phases namely planning, composing, and editing. However, learners with more motivation and background knowledge seem to be more consistent in following this pattern.

The reasons that research claims to be related to poor summarisation and synthesis are, to a certain degree, not the same ones related to poor writing in general. Poor summary production appears to be more likely the result of incorrect choices as to what is important in the source texts, and the inappropriate coordination of the different parts of discourse (Hidi & Anderson, 1986). Therefore, reading-to-write tasks are not only affected by what commonly affects reading and writing abilities; they have influential factors that are unique to them.

3.3.4. Challenges of the Reading-to-Write Tasks

Reading-to-write tasks do not represent the ultimate solution for all the writing problems faced in academia (Plakans, 2008). They, actually, create their proper challenges. As a first challenge, the type of skills these writing tasks assess has for a while been hard to determine. Secondly, whether the level of difficulty of the input is of consequence is a subject of debate. Thirdly, learners' over-dependence on the source text might affect the quality of their writing. Finally, marking such tasks is a confusing matter since they assess the kind of writing that depends on reading which necessitates a marking scheme of its own. These problems related to this type of academic reading tasks are obviously not the only ones a learner, a task designer and a rater might face, but they are the ones most relevant to our study.

3.3.4.1. The Measuring Challenge

Reading and writing are two different constructs in a way that being skilled in one does not imply being good at the other. Researchers are, therefore, concerned about what reading-to-write tasks really assess. Does good performance in such tasks reflect competence in reading or in writing (Weir & Shaw, 2005)? Correlational studies show mixed results about reading and a positive relationship between reading-to-write tasks and writing. According to these studies, this type of tasks assesses the writing skill. However, new research into the relationship between the two skills suggests that reading-to-write tasks succeed in measuring integrated language skills involving both reading and knowledge transforming writing (Shin & Ewert, 2015).

3.3.4.2. The Difficulty of the Input

While providing the source texts should reduce the effect of prior knowledge and offer equity to every learner, the level of difficulty of the texts may be decisive to the good performance in reading-to-write tasks. The choice of the reading input should, therefore, respect learners' comprehension level and cognitive differences, for poor performance reflects poor basic comprehension skills (Cumming, Grant, Mulcahy-Ernt, & Powers, 2004). However, Douglas (2000) argues that the cognitive demands of a reading-to-write task do not necessarily nor entirely depend on the difficulty of the input. It rather depends on the way writers draw upon the source text(s). Cognitive demands depend on whether learners have to copy from the source(s) and recall from LTM, to organise and summarise information or have to generate new ideas through analysing, synthesizing and evaluating. The input text(s) being linguistically challenging is of little consequence.

3.3.4.3. Learners' Reliance on the Input

Using reading-to-write tasks raises the issue of copying segments from source texts by learners, especially those with low level proficiency (Cumming, Kantor, Baba, Eedosy, Eouanzoui, & James, 2005). According to Yu's (2008) study, learners prefer summary tasks because they can directly copy from the source texts while little comprehension is necessary. The support offered by source texts that learners heavily rely on has a negative effect on their cognitive and linguistic development according to Lewkowicz (1997). Weir, Vidakovic and Galaczi (2013) suggest that task instruction should warn learners about incorrect use of source texts. It should set the amount of the original text allowed to be used as in specifying the number of words that they can use in a raw to avoid plagiarism. The instruction, therefore, is what determines the cognitive demand of a task by specifying how learners interact with the input. Good academic writing tasks should require learners to transform knowledge.

3.3.4.4. The Marking Scheme

Another problem with reading-to-write tasks is the lack of discussion in the L2 literature regarding the qualities of a good performance (Weir et al., 2013). What accounts for a successful performance in a writing-only or reading-only task does not do so for an integrated reading-to write task. Therefore, a different marking system should be used to assess performance in such tasks (Cumming et al, 2005). Scoring this kind of tasks should be able to penalise copied language and reward learners' own wording (Weir et al, 2013).

Conclusion

Academic writing is never just writing. It requires the ability to recognize, understand, interpret, analyse and respond to key concepts of a given discipline (Irvin, 2010). Academic writing tasks usually consist of the production of a new text on the basis of reading one or more than one source text. A summary task involves a single text, whereas writing a synthesis involves multiple texts (Mateos, Martın, villalon & Luna, 2007).

Writing tasks that provide no input for learners test writers at a basic cognitive level. Such tasks engage in a knowledge telling endeavour rather than a knowledge transformation one (Scardamalia & Bereiter 1991, as cited in Galbraith, 2009). While depending on LTM for writing has its merits and is widely used in academia, it does not reflect real academic tasks where writers have to base their writing on others' thoughts according to Hayes' (1996) model. Therefore, they have to engage other cognitive abilities than LTM, such as WM and Attention as highlighted by the same model of writing.

In this chapter, we argued that learners' performance in reading-to-write tasks is more affected by their individual differences than by any other factor. Hence, stems the need to respect those differences and make the best of our knowledge about their influence in order to create the optimal conditions for learners to succeed.

Chapter Four: Research Design and Procedures

Introduction

Learners' differences play a fundamental role in determining their performance of different instructional tasks as much as they influence their language development and proficiency. However, teachers in general, when acting as task designers, seem to consider task difficulty to be more or less the same for all learners, and thus give a similar version of a task to all learners. Indirectly, this leads us to believe that they assume learners are more similar than different. However, we are rarely, if never, faced by homogeneous groups of students especially in terms of cognitive abilities (Gruszka, Matthews & Szymura, 2012). Learners' perception of task complexity depends on how much task information they can process with their WM and how much attention they are able to allocate. The importance of such abilities is magnified when undertaking academic writing tasks in which some material has to be read first. The current study suggests matching task complexity to learners' differences.

This chapter deals with the research design of our study and the procedures followed to collect the data. The different sources of data take the forms of two questionnaires, one for the teachers and another for the students participants, a repeated measures experiment and a pre-test post-test control group experiment.

4.1. Research Questions and Hypotheses

The study was conducted in the Department of English which is part of the Faculty of Letters and Languages, University of Larbi Ben M'hidi at OEB. The teachers are provided with guidelines for the different courses by the official recommendations. However, choosing the appropriate content remains subject to their free decisions. This also applies to the teaching approaches and methods adopted and the goals aimed at. This means that teachers are also course and task designers. Consequently, the situation gave us the necessary freedom to conduct the study without infringing the official recommendations.

Teachers, as task designers, should be more attentive to their learners' cognitive differences by creating different versions of the same writing task for different learners. To discover whether this suggestion is of any worth, the current research asks the following questions:

- What are the attitudes of EFL teachers and students at the University of Oum el Bouaghi towards differentiating writing tasks according to students' cognitive differences?
- What effect does manipulating task complexity have on the writing performance of students with different cognitive abilities?
- What effect does manipulating task complexity according to students' cognitive differences have on students' writing performance and proficiency?

Accordingly, the following hypotheses were formulated:

First, we hypothesise that EFL teachers and students at the University of Oum el Bouaghi may underestimate and disregard differentiating writing tasks according to students' cognitive differences.

Second, we hypothesise that the effects of task complexity on students' writing performance would vary among learners with different cognitive abilities.

Third, we hypothesise that manipulating task complexity according to students' cognitive differences would positively affect students' writing performance and proficiency.

To test the research hypotheses, firstly, two questionnaires were designed: one addressed to the teacher participants and the other to the student participants. The questionnaire instrument was used to examine the attitudes of EFL teachers and students at the University of Oum el Bouaghi toward differentiating writing tasks according to students' cognitive differences namely: WM and attention. Secondly, an experiment with a repeated measure design was conducted. The participants were assigned different tasks with increasing complexity at various points of the experiment (Creswell, 2009. p. 159). The aim was to compare the effects of different tasks on students' writing performance. Thirdly, a second experiment with a pre-test post-test control group design was designed. Task complexity was manipulated for the experimental group to measure the effect of such manipulation on students' writing performance and proficiency.

4.2. Population and Sampling

Teachers at the Department of English at the University of OEB form the first population of interest for the present research. The second population is composed of first-year students in the same department.

The total number of 40 confirmed teachers of the English Department at the University of OEB has received the study first questionnaire both in electronic and printed form. The entire population was chosen to be studied because of its small size (Dörnyei, 2003, p.73). However, only 20 of them have answered the questionnaires.

The body of first-year students of English at the University of OEB enrolled during the academic year of 2017-2018 consists of 300 students divided into eight groups of about 38 students each. A sample of 76 students was chosen from the already formed by the administration groups. The administration assigns good and less good students to different groups depending on their Baccalaureate results to create balance. The 6th and 8th groups constituted the research sample which was a convenience sample of the accessible subjects (Mackey & Gass, 2005). These groups were the ones we taught, and we have been cautious to work with students who attend the class during the whole year and disregard those who are repetitive ones and attend only some first-year classes. This sample forms the largest sample size for the fairly small targeted population given the confidence level we wanted to work with. The size was calculated using the following formula (Hansen & Cochran, 1953):

$$SS = \frac{Z^2 \times P \times (1 - P)/e^2}{1 + Z^2 \times P \times (1 - P)/e^2 \times N}$$

Where:

- SS is the sample size which represents the number of participants that we need to get results that reflect the target population as precisely as possible.
- Z- score is the standard deviation from the mean (1.645 is the value statistically corresponding to our confidence level which is 90%).
- The confidence level is the confidence we have that the data represents the whole population.
- p is the population proportion which is a segment of the population that has the same characteristic of interest (0.5 was used in this case which is the value used when the segment cannot be exactly estimated, and it gives the largest sample size).
- e (the margin of error) is the range of values that are outside our interval of confidence; i.e., the degree to which we believe the data may not represent the whole population (to have no error risk, we must work on the whole population. 0.1 is the value used in our research).
- N is the population size which is of 300 students in this case.

Using the aforementioned formula with the same conditions (a confidence level of 90% and a margin of errors of 0.1), we found that the sample size should be at least composed of 55 students. This size was met for the student questionnaire and the second experiment where 60 students responded to the first and 59 participated in the second. However, for the repeated measure experiment, only 44 students participated since some of them did not attend all the sessions and did not do all the tasks which made the detection of within-person change over time difficult. Consequently, their input from other tasks had to be discarded. This sample size generates a smaller confidence level (85%), which is acceptable in SLA research (Larsen-Hall, 2015).

4.3. The Questionnaires

The first instrument used is the questionnaire which is a means to collect data by translating research hypotheses into written questions (Dörnyei, 2003; Richterich & Chancerel, 1980). It is a tool that allowing the determination of people's attitudes and beliefs about the research matter.

4.3.1. Teachers Questionnaire

The questionnaire (see Appendix 1) consists of 32 questions, coded QT (Questions/ Teachers) which vary between open questions, closed questions, mixed questions and graded questions (Dörnyei, 2003). It aims to investigate how teachers deal with students' differences. Another aim behind designing the questionnaire is to examine the teachers' knowledge and perceptions of differentiated writing instruction.

4.3.1.1. Description

The questionnaire is divided into three sections. The first section which is composed of five questions for teachers (QT1-QT4) is the General Information section. It aims at giving information about the teachers: their gender, age, degrees and the teaching approach they judge themselves to be using the most. The questions asked in this section aim at having an idea about the participants' profiles to draw a relationship between the teachers' profiles and their awareness of and dealing with students' differences.

The second section is the Learners' Differences section. It is composed of 20 questions and aims at determining teachers' perceptions and attitudes toward learners' differences. The first question in this section, coded QT5, asks about the existence of differences in learners' ability to learn an L2. The questions QT6 to QT11 are about the factors determining learners' success in L2. QT12 to QT17 inquires into participants' knowledge and beliefs concerning specific cognitive abilities, namely WM and attention. The questions QT18 to QT21 are about learners' differences in reading and writing proficiency. Finally, QT22 to QT24 examine teachers' observations about students' way of dealing with complex writing tasks.

The last section is the differentiated instruction section. It aims at investigating teachers' attitudes towards differentiating writing tasks. The section contains eight questions, coded from QT25 to QT32. To start, QT25 asks teachers if giving the same writing task to all learners is fair. QT26 and QT27 examine teachers' attitudes toward the assessment of learners' cognitive differences. QT28 and QT29 are about participants' beliefs concerning their teaching and learners' cognition. Finally, QT30, QT31 and QT32 investigate whether teachers practise aspects of differentiated instruction.

4.3.1.2. Administration

Before the actual administration of the questionnaire, it was necessary to pilot it to verify its phrasing, clarity and length. Therefore, four teachers were randomly chosen from the target group of participants. Though it is not a rule, Connelly (2008) suggests that a pilot study sample should constitute approximately 10% of the total number of participants. The chosen teachers had some commentaries about the questionnaire; this led to the revision of certain items. To register their observations, the questionnaire was supplemented with a commentary sheet (see appendix 3) in which teachers were asked to mark any item whose wording they did not like, items whose meaning was not clear and items that they thought unnecessary. They were also asked to give any suggestions about the questions they thought relevant but were not asked.

The pilot administration of the teachers' questionnaire was satisfactory, for no real ambiguity was observed by any of the teachers. However, certain items were described as unnecessary or too general. QT4, which asked about the teaching approach the teachers judge themselves to be using the most, was judged to be unnecessary by one of the teachers. However, removing the item was not an option since this research is based on TBLT, and one of its objectives is to investigate whether or not the approach is used at University. The other three suggested naming other teaching approaches and the 'eclectic' approach was suggested. Therefore, the option was added to describe the process of choosing a given approach each time depending on the instructional situation. The too general items were the ones asking about task design and implementation in sections two and three. The general term 'task' was used in four questions of the initial draft. In QT22, teachers were asked if they thought that learners plan tasks. In QT23, they were asked if some learners need more time planning tasks. In QT24, they were asked if they thought learners to be equally able to focus on complex tasks. In the third section, QT25, they were asked if being fair means offering all learners the same task to do. Therefore, the term 'task' was substituted by 'writing task' for more precision, as this research is concerned with writing. The participants also suggested that the scaling in QT32 should be changed from an opinion scaling to a frequency one. In the first draft, QT32 asked teachers if they give learners different numbers of task items depending on their cognitive and proficiency levels. The targeted teachers explained that the item was more perceived as the action of giving more time to certain learners than as the belief that this is what should be done.

After the pilot study, the revised version of the questionnaire was administered. To facilitate its administration, an on-line format using Google forms was devised and sent to participants through e-mails following the suggestion of some of them when we sought advice.

4.3.2. Students Questionnaire

The questionnaire (see Appendix 2) consists of thirty-six questions, also varying between open questions, closed questions, mixed questions and graded ones. It aims at investigating students' attitudes, knowledge and perceptions of differentiating writing instruction.

4.3.2.1. Description

The questionnaire is divided into three sections. The first section composed of four questions; is the General Information section. It aims at giving information about the students: their gender, age, choice of English as a major at university and the judgment they hold about their language proficiency. The questions asked in this section are coded QS1 (Questionnaire/ Students/ Number 1) to QS4. They are used to draw a relationship between participants' profiles and how aware they are about their differences and how teaching deals with these differences.

The second section is the Learners' Differences section. It is composed of 19 questions and aims at determining students' perceptions and attitudes toward their differences. The first question in this section, coded QS5, is about the existence of ability differences in learning English as an L2. The questions QS6 to QS11 investigate learners' beliefs about the factors determining their success in L2. QS12 to QS18 look into participants' knowledge and beliefs concerning WM and attention. QS19 and QS20 ask about learners' differences in reading and writing proficiency. Finally, QS21 to QS23 examine participants' ways of performing complex tasks.

The last section is the differentiated instruction section which aims at investigating students' attitudes towards differentiating writing tasks. This section is composed of 13 questions, coded from QS24 to QS36. In QS24, participants are asked if teachers offer all of them the same writing task to do. QS25 and QS28 examine whether students have noticed any explicit assessment of their cognitive differences. QS29 and QS30 examine the participants' beliefs about the way teachers should treat their cognitive differences. Finally, QS31 to QS36 investigate whether students have noticed any aspect of differentiating instruction in the classrooms and their attitude toward teachers practicing it.

4.3.2.2. Administration

The administration of the questionnaires was held from hand to hand during a whole session for each of the 6th and 8th groups, constituting the sample of the study. Assistance was offered to students who faced difficulty with understanding the questions. The questionnaires were collected at the end of the 90-minutes session. However, before the actual questionnaire administration, it was important to test it in order to verify its phrasing, clarity and length. Henceforth, six students were randomly selected from the larger group of participants to give their insights about the first version of the questionnaire. This led to the reformulation of certain items. The same commentary sheet (appendix 3) was used for students to spot any item whose wording they did not like, items whose meaning was ambiguous and unnecessary items. They were also encouraged to give suggestions about the items they thought relevant but were not mentioned.

Almost all the participants responded to the pilot questionnaire the same way expressing the same concerns about expressions they found vague like 'Working Memory', 'reading fluency' and 'writing fluency'. Since the aim was to examine learners' understanding of the term 'working memory', clarifying it was not a possibility. Therefore, another option (I am not sure what working memory is) was added to the question QS12 which sought the students' definition of WM for them to express their uncertainty. As for the term 'fluency', some clarifying definitions were added between parentheses within the items QS19 and QS20. QS19 asked learners if they thought they were different from other learners in reading fluency and comprehension, and QS20 asked them if they thought they differ in their writing fluency and quality. The definitions added were 'reading with speed and ease' for reading fluency and 'the ability to create text without relying too much on memory' for writing fluency. QS24 also was reformulated students' commentaries. The six of them expressed lack of understanding because of the wording used. The question was changed from "My teachers offer all students the same task to do" to "When we have a writing task to do, it is the same for every one of us (students)". The participants had no specific suggestions about any additional relevant questions. However, they had questions about the meaning and objective of some items and some curiosity about the research in general.

4.4. The Cognitive Differences Tests

Both experiments of the study rely on cognitive tests to divide students into ability groups and compare them. Therefore, tests of WM and attention needed to be administered. In this section, the nature and procedures of these tests are described before tackling the two experiments.

4.4.1. Working Memory Test

The WM writing span test is a complex test used for the domain of the writing skill (Lu, 2015). It is a task in which participants are given a list of words and asked to compose a sentence using each word they can recall (Ransdell & Levy, 1999). The number of words they can remember represents the span’s measure.

4.4.1.1. Description

To conduct the first experiment of this study, a writing span test was devised based on Ransdell and Levy’s (1999) explanation and adapted from Daneman and

Carpenter's (1980) reading span test. It consists of a list of 20 words presented to participants. The words are content words taken from "The Longman Communication 3000" (Bullon, & Leech, 2007), which is a list of the 3000 most frequent words in spoken and written English. The list is made based on the statistical analysis of 390 million words found in the Longman Corpus Network. The words on this list account for 86% of the ones most used in English. They are marked in the "Dictionary of Contemporary English" by different symbols: S1, S2 and S3 for the top 1000, 2000 and 3000 most spoken words and W1, W2, and W3 for words that are the top 1000, 2000 and 3000 most frequently written.

4.4.1.2. Procedure of the Test

The words selected for the test were from the most frequently written ones since testing writing was the aim, and they were words that belonged to different categories (W1, W2 and W3) for the sake of versatility. The participants were tested in two 90-minutes sessions consisting of a single session for each group. They were divided into small groups of five students and were asked to sit on chairs facing the experimenter. They were given sheets of paper on which a blank space was devoted to the recalled word and another to the sentence (see appendix 4). After that, participants were given 20 unrelated content words at a rate of 1 per second to read silently. The words were printed on 210 x 297 mms cards using the Times New Roman font, 100 points. The initial series of presentation was of two words, one word after the other. Next, they were shown an increasing number of words to remember: three, four, five and six (see appendix 5). A blank flashcard was inserted after each series to separate the sets and to signal their end. After each series, the group of students were asked to write down the words and to form sentences using them. They were given 20 seconds for each word. The order of recollection of the words was taken into consideration, and only correct full sentences were counted as points in the final score. Students were encouraged to write simple sentences since neither sentence complexity nor length was accounted for. One point was added to the final score for each word that is recalled in the right order and used in a correct sentence. Students have been induced to practise with several items (five items) before the actual test began.

4.4.2. Attention Test

The Ruff 2 & 7 Test was adapted to complete this study. This test was developed to measure two aspects of visual attention, which are sustained attention and selective attention.

4.4.2.1. Description of the Test

The attention test (see appendix 6) consists of three lines of capitalised alphabetical letters among which the digits “2” and “7” are embedded 10 times within each line. Each line contains 50 characters of which 10 are targets (2 and 7) and 40 are distractors. The distractors are letters in the first task and digits in the second. The location of targets is randomized throughout the lines. Each task of the two consists of a series of 10 trials. Each trial consists of the same block of distractors and targets that are distributed differently each time. Two blocks from the “Ruff 2 & 7 Selective Attention Test: Professional Manual” are faithfully copied then the same set of characters is randomised in the subsequent blocks (Ruff, Evans, & Light, 1986).

4.4.2.2. Procedure of the Test

Participants were given two sheets of paper each. The first paper contained the task with letter-blocks, and the second contained the other task where distractors are digits. On the top of each sheet, there was a sample of the block of characters provided for respondents to practise the two visual-search tasks. They were given 15 seconds for each trial to cross out as many 2s and 7s as possible starting from the top left side of the first line continuing to the second and third lines in the same way. When time was up, they were instructed to move to the next block as soon as they heard the word 'next'. The test as a whole took five minutes, and the score was computed using the total number of 2s and 7s correctly crossed out (Ruff, Evans, & Light, 1986).

4.5. The Repeated Measures Experiment

The repeated measures design also called the within-group design is an experimental research design in which participants are given all the tasks or treatments in different orders. The aim is to determine whether there is a significant effect due to the interaction between the variables, which are task complexity and learners' abilities in the case of this study. The tasks or treatments refer to the levels of the same independent variable, which is task complexity. The multiple measurements in this kind of design come from each participant which reduces the error variance resulting from individual differences (Mackey & Gass, 2005).

4.5.1. Description of the Instruments

The tasks for the first experiment involve different versions of the same task which is a reading-to-write task (see appendix 8). The change between the different versions entail changing the level of complexity by increasing or decreasing the amount of planning time and the number of elements, i.e., the number of texts a participant is asked to respond to. Task planning has been operationalized according to the source of planning, which can be the teacher's guidance, collaborative planning work or solitary panning (Foster & Skehan, 1999). In this study, it was decided to combine the teacher's guidance and the group's collaborative planning that took the form of discussing ideas and techniques. The amount of time given to pre-task planning was 10 minutes, which was the amount used in most previous studies (e.g. Crookes, 1989; Foster & skehan, 1996).

The different levels of the reading-to-write task consist of a simple version, two medium versions and a complex version. Students are asked to write a summary of just one text in the simple version and are given time for planning. They are asked to write a synthesis of two texts in the complex version and given no planning time. The medium versions of this task consist of one task in which learners are given just one text to summarise but no planning time and another task in which they are given planning time and two texts to synthesise. The description of the different levels of this task is demonstrated in the following table:

Table 4.1.

Description of the Different Levels of Reading-to-Write Tasks

Version of the task	**Planning time**	**Number of elements**
Simple version	+ planning time	One text
Medium version 1	- planning time	One text
Medium version 2	+ planning time	Two texts
Complex version	- planning time	Two texts

4.5.1.1. The Texts

The texts (see appendix 8) for this experiment are taken from different IELTS practice books for students. The International English Language Testing System or the IELTS is an international proficiency test developed for non-native speakers, and it has been used since 1989. It is based on authentic texts and real-life scenarios (Hosseini et al., 2013). Learners' familiarity with the topic of the text is a variable that accounts for the complexity of the task. To control this variable, topics that are familiar to the largest possible number of students were chosen. Therefore, a familiarity test (see Appendix 7) that measures topic familiarity was designed. It was administered to a randomly chosen first-year group of students of English at the University of Oum El Bouaghi (of the same level as the experimental groups). The test was adapted from a study conducted by

Combs (2008), in which he investigated the effects of topic familiarity and text enhancement on students' acquisition of form in a reading text. The number of participants was 42. It took them five to ten minutes to complete the test.

The familiarity test asked the students to rate their degree of familiarity with the topics on a five-point Likert scale, which associates the highest score (5) to the most familiar topic and the lowest score (1) to the least familiar topic. Its aim was to measure the students' familiarity with 15 of the most prominent topics occurring in different IELTS practice books for students.

The results of students' rankings of the topic familiarity on a five-point Likert scale and the percentages of those rankings are reported in Table 4.2. To determine which topic was the most familiar, the means ($\bar{X}$) for each answer choice was calculated. The answer choice with the largest average ranking is the most familiar topic. The mean ranking is calculated using the following formula:

$$\bar{X}= \frac{1}{N} \sum_{i=1}^{i=n} n_i . x_i$$

x_i is the familiarity score ranging from 1 to 5 and n_i is the number of students who have associated a given score to a given factor.

Table 4.2.

Students' ranking of topic familiarity

Topic	The five-point Likert scale						
	5	**4**	**3**	**2**	**1**	**N**	**X̄**
The zoo protects animals	22	5	7	3	5	42	3.714
Women vs, men in jobs	19	10	8	2	3	42	3.952
The Titanic	15	8	11	1	7	42	2.83
The risks of smoking	24	13	3	2	0	42	4.357
Weather affects the mood	16	10	7	3	6	42	3.642
How do babies learn to talk?	5	11	14	5	7	42	3.048
Why do people wear uniforms at work?	16	12	8	2	4	42	3.738
The scientific method of research	4	6	12	4	16	42	2.476
Succeeding at interviews	6	7	9	12	8	42	2.786
Stepwells	0	2	6	13	21	42	1.738
The psychology of innovation	0	2	4	17	19	42	1.738
Museums of fine arts and their public	0	5	7	13	17	42	2
The context, meaning and scope tourism	0	0	2	14	26	42	1.428
The megafires of California	0	0	0	3	39	42	1.071
Second nature	2	3	5	8	24	42	1.833

According to the results in Table 4.2., respondents chose 'The risks of smoking' to be the most familiar topic to them giving it the highest mean (4.357) and claiming, therefore, to know almost everything about it. On the other hand, 'The megafires of California' was the topic they admitted being the least familiar with (X̄=1.071). The table shows that the decreasing order of familiarity of the chosen topics is as it follows: The 'The risks of smoking', 'Women vs, men in jobs', 'Why do people wear uniforms at work?', 'Zoo protects animals', 'Weather affects the mood', 'How do babies learn to talk?', 'The Titanic', 'Succeeding at interviews', 'The scientific method of research', ‘Museums of fine arts and their public’, ‘Second nature’, ‘Stepwells’, ‘The psychology of innovation’, ‘The context, meaning and scope tourism’, and finally ‘The megafires of California’. Accordingly, the first eight topics with which students are the most familiar have been chosen to work with.

According to Klare (1963; as cited in Dubay, 2004, p. 3), readability is: “the ease of understanding or comprehension due to the style of writing.” It is also defined as “the ease of reading created by the choice of content, style, design, and organization that fit the prior knowledge, reading skill, interest, and motivation of the audience” (Dubay, 2007, p. 6). Readability is another variable that creates complexity. The texts used in this study were tested using an on-line readability analyser software ("Readability Analyzer", 2018) and estimated it by the Flesch reading measure formula (1948, as cited in Dubay, 2007), which determines the reading ease of the text by counting the number of syllables and sentence lengths. Higher scores indicate more easiness to read; lower scores indicate difficulty (Pearson, Barr & Kamil, 1996). The results of the readability test are summarised in the following table:

Table 4.3.

Readability of the Texts for the First Experiment

Text	**Readability**	**Flesch-Kincaid Grade Level**
The zoo protects animals	52.98	7.4
Women vs men in job recruitment 1	63.06	6.36
Women vs men in job recruitment 2	60.5	6.85
The Titanic 1	66.42	5.98
The Titanic 2	67.18	5.97

The results of the readability test show that the easiest text to read is the second text about the Titanic while the first one about the Titanic is second easy. They correspond to the reading level of the 5^{th} grade. The two excerpts about women vs. men in job recruitment are slightly more difficult to read. They correspond to the 6^{th}-grade reading level. Finally, the text about the zoo's protection of animals is the most difficult one according to the results. It corresponds to the 7^{th}-grade English level.

Readability interferes with the complexity of tasks; thus, it had to be controlled. The readability tests showed that the four texts are above the 50 points score, which corresponds to bellow 10^{th} grade English or plain English (Pearson, Barr & Kamil, 1996).

4.5.1.2. Lesson Plans

The pre-task stage was preparatory stage. Participants were given access to the task beforehand to plan and consider the forms they need. They used the planning time to revise the different techniques of writing a summary or a synthesis and also to consider the topic of the text(s). This planning time was only given during the first and the third tasks, i.e., the simple and medium 2 versions. Students' attention was, therefore guided toward one aspect of language use to help them with the task. The time frame for this stage was of 10 minutes, during which the researcher discussed the main steps of writing a summary or a synthesis with participants and asked them prediction questions about the text content considering the title. Their prior knowledge was activated via questions and answers.

At the during-task stage, the participants were asked to read the texts and to summarise or synthesise them. The participants’ compositions on the appointed writing framework had the purpose of integrating reading into the writing skill. Learners were asked to produce individual pieces of writing but were allowed to discuss techniques or content with their peers during the simple version and the medium version 2 of the task. The teacher monitored those discussions and gave feedback. Enough time is allowed for learners to make decisions about what to write and check language forms.

After task completion, the learners were asked to proofread their compositions and use the summary and synthesis steps as an editing checklist. After that, some participants read their pieces and received feedback from their peers and teacher. According to Ellis (2009), this phase allows learners to reflect on their task performance and raises their consciousness about problematic language forms.

4.5.2. Procedure

The experiment with repeated measures design compared the effects of writing tasks with different degrees of complexity on students with different cognitive abilities (working memory and attention). After testing learners' cognitive differences using the WM test and the attention test, they were grouped into corresponding ability groups (table 4.4.). Students with high WM and high attention scores were grouped in (G1) which is the high cognitive ability group. The ones with low WM scores and high attention scores were put in a second group (G2). Participants that had high WM scores and low attention were put in group three (G3). Finally, those with low WM and low attention were gathered in group four (G4). After that, the four groups were asked to complete the tasks with different complexity degrees. The performances of the different groups were analysed and compared. The comparisons of the scores were drawn between the groups and within groups. Each performance took a whole session of 90 minutes. Therefore, the repeated measures experiment lasted six sessions including the testing sessions.

Table 4.4.

Grouping Participants According to their Working Memory and Attention

Group	**Group 1**	**Group 2**	**Group 3**	**Group 4**
Description	Low WM and low attention	Low WM and high attention	High WM and low attention	High WM and High attention

4.5.2.1. Pilot study

A pilot study was conducted to modify the tasks so that they would elicit the predicted language performance. The aim was to adjust the instructions and the texts to students' levels of comprehension, to judge the practicality of data collection procedure and to estimate the time necessary to complete it. Seven students participated in piloting the tasks. These participants were first-year students who belonged to another group that was not involved in any of the two experiments. They were asked to do a summary task then a synthesis task. For each of them we gave a different text then a different set of texts (two or three). The pilot study was done in two successive sessions. The duration of each session was of 45 minutes, for the post-task stage was not included.

Piloting the tasks revealed a need to modify the instructions. We had to separate the steps summarizing and explaining writing summaries and syntheses into bullet points for further clarification. The pilot study further revealed that participants needed more time to synthesise texts whose topics were less familiar to them, or they needed shorter texts. Therefore, the length of the texts was reduced by taking only excerpts of them. This mini-study has been used as a pilot study for both the first and second experiments of this research.

4.5.2.2. The Simple Version

In the simple version of the reading-to-write task, the 44 participants were asked to write a summary of one text. The readability of this text was estimated by the Flesch reading measure formula to be of 52.98 points, which is considered plain English and can be read by the average student in the 7th grade level.

In the pre-task stage, students were introduced to the framework of the writing task and guided to revise the steps of writing a summary. For ten minutes, they discussed the summary writing techniques. In the during-task, participants received the reading text, of which the topic was about the zoo protecting animals, which was estimated common to tackle according to the familiarity questionnaire. They were allowed to discuss the topic. This stage was followed by the learners' summary writing. In the post-task stage, participants read their pieces and received feedback from their peers and teacher.

4.5.2.3. Medium version 1

In the first medium version of the task, the students were asked to write a summary of a text about the differences between women and men in job recruitment task. The familiarity of the text was judged by the familiarity questionnaire to be fairly good. Moreover, its readability tested using the readability software was estimated to be high (63.06 points), which is considered plain English and can be read by the average student in the 6th grade level.

The students were given one reading text directly and were asked to write a summary without any time for planning. They were not allowed to discuss the instructions or their ideas. In the post-task stage, students read their pieces and received feedback.

4.5.2.4. Medium version 2

For the second medium version of the task, the participants were asked to synthesis two texts about the differences between men and women in recruitment. The first text was the same given in the second task, and it was an excerpt taken from a long text in the Cambridge IELTS practice book for students (2011). The second text was another excerpt taken from the same text. Its readability was estimated by the Flesch reading measure formula to be 60.5 points, which can be read by the average student in the 6th and 7th grade level.

The participants were first introduced to the framework of the synthesising task. The teacher guided them to revise its steps in the pre-task stage, which lasted 10 minutes.

In the during-task stage, they were given the reading texts and were allowed to discuss its ideas. In the post-reading, participants read their pieces and received feedback.

4.5.2.5. Complex Version

In the complex version of the task, students were asked to write a synthesis of two texts without any planning time. The topic of the two texts was about the reasons of Titanic sinking. The two were excerpts taken from a text. The readability of the first excerpt was estimated to be 66.42 points and the second one was 67.18. The two texts could, therefore, be read by average students in their 6th grade level.

The students received the reading texts and were asked to synthesise them without discussing or sharing ideas. This stage was followed by the learners writing their syntheses. After that participants read their pieces and received feedback.

4.6. The Pre-test Post-test Control Group Experiment

An experiment can be defined as "a prediction regarding the relationship between two variables— specifically, an *independent variable* and a *dependent variable"* (Salkind & Rasmussen, 2008, p. 374). To test the third hypothesis, a pre-test post-test control group experiment was conducted. This experiment is also known as the between-groups design. It is a type of true experimental design in which subjects are divided into an experimental group and a control group. The two groups are measured before (pre-test) and after (post-test) the experiment, where the experimental group is exposed to the treatment (Mackey & Gass, 2005).

4.6.1. Description of the Instrument

According to Mackey and Gass (2005), a pre-test post-test control group Experiment would randomly select students and assign them to two groups, provide two experimental conditions or treatments and give a pre-test and a post-test to both groups. In the case of the current study, the two groups of participants were assumed to be equivalent because they were created in a balanced way by the administration depending on their Baccalaureate results. However, Brown and Rodgers (2009) argue that already existing intact groups cannot be considered randomly selected because they have not been pre-tested. This is why such a study is more known to be called a Quasi-Experiment.

4.6.2. The Procedure of the Experiment

To complete this study, a pre-test post-test control group experiment was designed. Task complexity was manipulated according to learners' cognitive differences for the experimental group while the participants in the control group performed the same tasks without any regards to their differences in WM and attention. The participants of both groups demonstrated individual variation in their WM and attention test results. This study consisted of three fundamental stages: the pre-test, the treatment and, finally, the post-test. The pre-test was administered at the beginning of the second semester of the academic year 2017–2018. Task Based Instruction of which the core was a series of summary and synthesis tasks followed the pre-test which was spaced away from the post-test by four weeks.

4.6.2.1. Pre-test

To start this experiment, the pre-test was administered to both groups. After that, learners that were allocated to four ability groups were given tasks that progress in complexity. The task used as a pre-test in this experiment is the same simple version task of the repeated measures experiment. Students were asked to write a summary of one text in a reading-to-write task. The text was adapted from the Cambridge IELTS practice book for students (2011). In the pre-task stage, students were introduced to the framework of the writing task by engaging them to revise the steps of writing a summary. In the during-task, participants received the reading text, of which the topic was about the zoo's involvement in animal conservation. This stage was followed by the learners' writing their summaries then receiving feedback from their peers and teacher. The pre-test was done during one session of 90 minutes.

4.6.2.2. Treatment

The tasks for the second experiment consisted of versions of summary and synthesis tasks graduating in complexity. The control group had three tasks. For each task, a session of 90 minutes was allocated, and the whole class performed the same task. Like for the first experiment, the level of complexity was manipulated through increasing or decreasing the amount of planning time and the number of elements, i.e., the number of texts a participant is asked to respond to (see table 4.5.). As for the experimental group, learners were grouped according to their level of working memory and attention. Four groups were formed according to which different versions of the same task using the same text topic were designed and administered to participants of different levels during each session as it is explained in the table 4.5.

Table 4.5.

Tasks of the Pre-test Post-test Control Group Experiment

	Experimental Group Divided into Sub-Groups				**Control Group**
	Group 1	**Group 2**	**Group 3**	**Group 4**	
Simple Task (first session)	+ planning time and one text	+ planning time and two texts	less planning time and one text	Less planning time and two texts	+ planning time and one text
Medium Task (second session)	+ planning time and Two texts	less planning time and two texts	No planning time and one text	No planning time and two texts	No planning time and one text
Complex Task (third session)	Less planning time and Two texts	Less planning time and three texts	No planning time and two texts	No planning time and Three texts	No planning time and two texts

The different topics used during this experiment and the texts' readability are shown in the following table:

Table 4.6.

Readability of the Texts for the Second Experiment

Text	Readability	Flesch-Kincaid Grade Level
The risks of smoking 1	56.43	7.26
The risks of smoking 2	62.89	6.55
Weather affects the mood 1	69.5	5.43
Weather affects the mood 2	76.92	4.4
How do babies learn to talk? 1	62.4	6.38
How do babies learn to talk? 2	58.07	6.93
How do babies learn to talk? 3	82.3	3.8
Why do people wear uniforms at work?	53.88	7.33

4.6.2.3. Post-test

Students were asked to write a summary of one text in a reading-to-write task. Like for the pre-test, the text was adapted from the Cambridge IELTS practice book for students (2011). The topic was about the reasons why people wear uniforms at work. According to the Flesch-Kincaid measuring tool, the text can be read by the average student in the 7^{th} grade level, and its readability is 53.88 points ("Readability Analyzer", 2018) which makes it equivalent in difficulty to the text used in the pre-test. As for familiarity, the two topics of the pre-test and post-test scored almost the same in the familiarity test (see Table 4.2.).

In the pre-task stage, students were introduced to the framework of the writing task through engaging them in revising the steps of writing a summary. In the during-task, participants received the reading text, of which the topic was about wearing uniforms.

This stage was followed by the learners writing their summaries then reading them to their peers and teacher to receive feedback.

4.7. Measures

Measures of fluency, complexity, and accuracy were used as dependent variables to evaluate the quality of the participants' written production. Summaries and syntheses were coded for these measures. In order to assess the fluency, accuracy and complexity of the learners' summaries and syntheses, three measures were used. The first measure was the number of words per T-unit, where T-unit is the minimal terminable unit that contains an independent clause and its dependent clauses. This measuring tool is used for writing fluency. The second measure, or the accuracy measure, was the ratio of errors to the total number of words. All errors were carefully examined. Errors that are of spelling and punctuation were disregarded. We chose to determine accuracy by errors which were syntactic, morphological, and lexical. We disregarded errors that were of spelling and punctuation to limit the scope of our study. Like Bardovi-Harlig and Bofman (1989), this study was not concerned with mechanical errors. The third measure assessing syntactic complexity is the mean number of clauses per T-unit (Housen & Kuiken, 2009). Lu's (2010) computational system for automatic analysis of L2 writing (L2SCA) was used to measure syntactic complexity ("Web-based L2 Syntactic Complexity Analyzer", 2018).

Conclusion

Learners are different in their cognitive abilities. As shown through the literature review, this fact might be critical for L2 development and proficiency. Nevertheless, it has also been noticed that teachers do rarely take into account those differences. They design tasks that are supposed to fit every learner. Through the current research, we hope to prove that this approach might be defective, and a better way to cater for learners' cognitive abilities is to create different tasks in terms of complexity for different learners.

Therefore, we have designed two questionnaires and two experiments to test the research hypotheses.

In this chapter the research situation, the instruments and procedures used to carry out the research were described. The different sources of data gathering were unfolded, namely: the two questionnaires, the repeated measures experiment and the control group pre-test post-test experiment. This chapter paves the way for the next chapters which will deal with the analysis, presentation and interpretation of the findings of the current study.

Chapter Five: Analysis and Interpretation of the Questionnaires

Introduction

In order to conduct the current research, an analysis and a discussion of the data collected to test the research hyp1otheses and answer the questions are primordial. This chapter; therefore, covers the presentation, analysis and interpretation of the questionnaires findings. The analysis of both questionnaires is used as an introduction to the repeated measures experiment, and the pre-test post-test control group experiment which are presented in the next chapter (Chapter 6).

The data extracted from the two questionnaires were gathered and subjected to frequency counts. In other words, the responses for each question were added together to find the frequency of occurrence or the number of times that a particular response occurred. These responses were then transformed into percentages presented in tabular forms. Data were then analysed to identify, describe and explore the attitude of Oum el Bouaghi university teachers and students toward differentiating writing tasks according to students' cognitive differences namely: working memory and attention. We hypothesised that university teachers and students may underestimate and disregard differentiating writing tasks according to students' cognitive differences.

5.1. Analysis and Interpretation of the Teachers Questionnaire

Descriptive statistical analysis was used to identify frequencies and percentages to facilitate the analysis and interpretation of all the questionnaire items (32 items).

5.1.1. General Information

The first section's set of data was intended to describe the demographic variables of the sample though it was not part of the purpose of the study. The aim was to draw a relationship between the teachers' profiles and their awareness of students' differences.

5.1.1.1. Teachers' Profiles

The demographic data consisted of gender, age, and degrees in teaching at the university.

Table 5.1.

Teachers' Gender, Age and Degrees

Gender (QT1)	***n***	**%**	**Age (QT2)**	**n**	**%**	**Degrees (QT3)**	**n**	**%**
a) Male	8	40	**25-30**	2	10	**Magister**	15	75
b) Female	12	60	**31-40**	13	65	**Doctorate**	5	25
			41-50	4	20	**Professor**	0	00
			≥50	1	5			
N	**20**	**100**		**20**	**100**		**20**	**100**

The table above recapitulates the teachers' answers to QT1 (1st question for teachers), QT2 and QT3 about their profiles. It indicates that the majority of informants are females (60%) and only 40% are males. Table 5.1. also indicates that among the respondents, the majority of the teachers (65%) are between the age of 31 and 40. 20% are between the age of 41 and 50. Only 1 is older than 50, and Two are younger than 30. The majority of the teachers have a Magister degree (75%), and 25% of the teachers have PhD Degree while no one from the respondents is a Professor. The results show that the majority of the respondents are young females who hold high degrees in English teaching.

5.1.1.2. Teaching Approaches Used

The teachers' profile also consisted of the teaching approach they judge themselves to be using the most in their classrooms.

In QT4, the teachers were asked about the teaching approaches they use:

QT4. The teaching approach I judge myself to be using the most in my classroom is.

Table 5.2.

Teachers' Approaches

Options	n	%
a) The traditional approach	1	5
b) The communicative approach	5	25
c) The task based learning approach	0	0
d) An eclectic approach	14	70
e) Another approach	0	0
N	**20**	**100**

The results in the table show that the majority of the teachers (70%) use an Eclectic Approach which means that they select the one that appears to be the best at any moment and do not restrict themselves to one particular approach. Only 25% of them admitted using the Communicative Approach exclusively, and 5% use the Traditional Approach. The respondent teachers showed flexibility regarding their teaching practice which means that they are open to adjust it to any contextual change including learners' differences.

5.1.2. Learners' Differences

The second section of the questionnaire aims at determining the teachers' perceptions and attitudes toward learners' differences and complex skills and tasks they may engage in.

5.1.2.1. Learners' Ability to Learn a New Language

In QT5, the teachers were asked if they agreed with the following statement:

QT5. Every learner is equally able to learn a foreign language.

Table 5.3.

Learners' Ability to Learn a New Language

Options	n	%
Strongly agree	3	15
Agree	1	5
Neutral	10	50
Disagree	4	20
Strongly disagree	2	10
N	**20**	**100**

The results show that half of the teachers were neutral about the statement that all learners are equally able to learn a foreign language. Only 20% disagreed with this claim while 15% seemed to strongly support it and 10% strongly disagreed, and 5% agreed with the statement. This shows that teachers are mostly unaware of the influence of students' individual differences on their ability to learn a new language.

5.1.2.2. Factors Determining Learners' Success in L2

The table blow reiterates the results of the three questions QT6, QT7 and QT8. In these questions, the teachers were asked if they agreed with the facts that:

QT6. It is sufficient for learners to put a lot of effort to learn a foreign language.

QT7. It is sufficient to be exposed to a foreign language to learn it.

QT8. Learners need to have a special aptitude for language learning.

Table 5.4.

Factors Determining Learners' Success in L2

Options	n (QT6)	Effort (%)	n (QT7)	Exposure (%)	n (QT8)	Aptitude (%)
Strongly agree	4	20	3	15	5	25
Agree	7	35	5	25	8	40
Neutral	4	20	5	25	4	20
Disagree	5	25	7	35	3	15
Strongly disagree	0	00	0	0	0	0
N	**20**	**100**	**20**	**100**	**20**	**100**

The respondents' answers to QT6 show that the largest percentage of them (35% and 20%) thought that putting a lot of effort into learning a language is sufficient for success. 25% disagreed with this assumption while 20% remained neutral. Therefore, most of the teachers give a great deal of importance to effort in learning a new language.

In response to QT7, a percentage of 35% of the teachers thought that exposure to the foreign language is not sufficient for learning it. However, 25% of them agreed with this argument and 25% remained neutral about it while 15% strongly agreed. This shows that not all the teachers give importance to external factors and more specifically to exposure through instruction or environment in learning English.

As a response to QT8, the results show that 40% of the respondents believed that learners need a special aptitude to learn a new language, and 25% of them strongly agreed with the argument while 20% were not sure. Only 15% disagreed with this claim. This shows that the majority of the teachers are aware of the presence of a special individual talent facilitating language learning despite some of them voting for effort and exposure sufficiency and even the language learners' equal chances to learn.

In QT9, the teachers were asked to:

QT9. Rate the importance of the following factors in determining language learners' success by simply giving marks from 1 to 6. (1 being the most important and 6 the least important).

The ranking results on a six-point Likert scale and the percentages of their ranking are reported in Table 5.5. below. To facilitate the comparison between the different rankings, the means ($\bar{X}$) for each answer choice was counted so as to determine which answer choice was most preferred overall. The choice with the largest average ranking is the most important factor. The mean ranking is calculated using the following formula:

$\bar{X}= \frac{1}{N} \sum_{i=1}^{i=n} n_i . x_i$ / x_i is the importance score ranging from 1 to 6 and n_i is the number of teachers who have associated a given score to a given factor.

Importance scores are applied in reverse. In other words, the respondent's most preferred choice (which they rank as 1) is the most important, and it weighs 6. Their least preferred choice (which they rank 6) is the least important and has a weight of 1.

Table 5.5.

Teachers' Opinions about the Language Learning Factors

Options	**1**	**2**	**3**	**4**	**5**	**6**	**N**	**$\bar{X}$**
a)Linguistic intelligence	7 35%	1 5%	6 30%	6 30%	0 0%	0 0%	20	4.45
b) Language learning aptitude	7 35%	4 20%	4 20%	3 15%	2 10%	0 0%	20	4.55
c) Personality	1 0%	4 20%	4 20%	6 30%	4 20%	1 5%	20	3.45
d) Motivation	9 45%	6 30%	0 0%	1 5%	2 10%	2 10%	20	4.65
e) Attitude	5 25%	4 20%	5 25%	0 0%	5 25%	1 5%	20	4.05
f) Age of learning	4 20%	0 0%	5 25%	0 0%	3 15%	8 40%	20	2.9

The results in the table show that the respondents chose motivation to be the most important factor for language learning with the highest mean (4.65). Language aptitude ranked second with a mean of 4.55, and linguistic intelligence also ranked high (4.45). Attitude (4.05) and personality (3.45) ranked next, and age of learning was chosen to be the least important corresponding to the lowest mean (2.9). This indicates that the teachers are aware of the importance of affective and cognitive factors; furthermore, they ranked aptitude second in importance before linguistic intelligence in accordance to what the current research presumes.

In QT10, the teachers were asked to:

QT10. Add other factors that in your opinion determine success in learning an L2.

Eight teachers answered this question stating that the other factors needed for learning success are attribution style, learners' anxiety, their proficiency their cognitive abilities, a continuous involvement, consistency, the knowledge of another language (mainly French), an input rich environment, the teaching context, the type of instruction, teachers' way of teaching (including their methods and instructions), and the educational system as a whole. Accordingly, teachers were found to think that what predicts success is a combination of their teaching and students' readiness to learn.

The following results were found in response to the question:

QT11. Which factors determine success in learning an L2 the most?

Table 5.6.

Types of Factors Determining Success in Learning L2

Option	n	%
a) External factors	0	0
b) Internal factors	1	5
c) The interaction between the internal and the external factors	19	95
N	**20**	**100**

A majority of 95% of the teachers said that an interaction between the internal and the external factors is what determines language learning success, and only 5% of the teachers said that internal factors are responsible for learning These results go in accordance with their answers to QT9 and QT10.

According to the respondents, the factors that determine success in language learning are both internal and external. According to research, it is not just effort or external factors that are responsible for learning success but also cognitive variables that form a specific talent, which interacts with task demands and together they decide on the chances of learners' success (Dörnyei & Skehan, 2003).

5.1.2.3. Teachers' Beliefs Concerning Working Memory

In QT12, the teachers were asked what WM is:

QT12. Working Memory is (you can circle more than one option)

Table 5.7.

Teachers' Beliefs about What WM Is

Options	**n**	**%**
a) the same as Short Term Memory	7	25
b) part of Memory	2	7.14
c) part of the Information-Processing System	10	45.71
d) like a mental sketchbook that stores and treats information	9	32.15
N	**28**	**100**

According to the teachers' responses, 45.71% of them reflected that WM is part of the Information-Processing System, and 32.15% of them thought that it is like a mental sketchbook that stores and treats information. 25% answered that it is the same as short term memory, while 7.14% of them recognised it as part of Memory. Only 2 teachers asserted that WM is both a part of Information processing and a mental sketchbook, and 2 others answered that it is part of Information Processing, a mental sketchbook and the same as Short Term Memory. This means that not all teachers are aware of the concept despite its importance in language learning.

In questions QT13 and QT14, the teachers were asked if they agreed with the facts that:

QT13. Working Memory is limited in capacity.

QT14 .Learners differ in their Working Memory.

Table 5.8.

Teachers' opinions about the WMC and variation in WM

Options	n (QT13)	%	n (QT14)	%
Strongly agree	5	25	12	60
Agree	7	35	4	20
Neutral	4	20	0	0
Disagree	4	20	3	15
Strongly disagree	0	0	1	5
N	**20**	**100**	**20**	**100**

The results of question QT13 show that 35% of the respondents agreed with the claim that WM is limited in its capacity, and 25% strongly supported it. While 20% did not agree, another 20% remained neutral. Most of the respondents do not have a clear notion of the limitation of WMC.

In response to QT14, the majority of the teachers either strongly agreed (60%) or simply agreed (20%) on the fact that learners differ in their WM. Only 15% disagreed and 5% strongly disagreed. We presume that they were the same ones thinking that WM is not limited in capacity and it is the same for every individual. As the definition itself indicates WM is "a limited capacity system allowing the temporary storage and manipulation of information necessary for such complex tasks as comprehension, learning and reasoning" (Baddeley & Hitch, 2000, p. 418). The ability to use this system is called the working memory capacity (WMC, also known as working memory span). This capacity varies from one individual to another, and thus from one language learner to another (Tavakoli, 2012).

5.1.2.4. Teachers' Beliefs Concerning Attention

In QT15, the teachers were asked whether they agreed with the definition of attention:

QT15. Attention is the ability to select and focus on particular stimuli while ignoring others.

Table 5.9.

Teachers' Beliefs about what Attention Is

Options	n	%
Strongly agree	5	25
Agree	9	45
Neutral	3	15
Disagree	3	15
Strongly disagree	0	0
N	**20**	**100**

The results displayed in the table above show that 45% of the respondents approved the definition given by Tavakoli (2012, p. 26) to attention. 25% even strongly agreed with it, while 15% of them disagreed with it, and another 15% had no opinion about this definition. This means that most of the teachers (70%) perceived attention to be a cognitive ability, a selective system, a control process and a filter as it is defined by SLA research.

In QT16 and QT17, the teachers were asked whether they agreed with the facts that:

QT16. Attention is limited in capacity.

QT17. Learners differ in their Attention.

Table 5.10.

Teachers' opinions about attention and learners' variation

Options	n (QT16)	%	N (QT17)	%
Strongly agree	8	40	14	70
Agree	8	40	1	5
Neutral	1	5	4	20
Disagree	3	15	1	5
Strongly disagree	0	0	0	0
N	**20**	**100**	**20**	**100**

The answers to QT16 show that most of the teachers (40%) agreed with the claim that attention is limited in capacity, and 40% strongly agreed. Only 15% disagreed and 5% remained neutral. Most of the respondents have a clear notion of the limitation of attention.

Results of the next question (QT17) show that the respondents mainly (70%) believed that their learners differ in their attentional abilities. Only 20% expressed uncertainty, and 5% disagreed. As compared with WM, attention seems to be a clearer notion for the teachers. As research indicates, attention is limited not only in amount or duration but also in the number of stimuli it can respond to at a single time and it differs from one learner to another (Tomlin & Villa, 1994; Norbury, 2011).

5.1.2.5. Teachers' Beliefs about Learners' Differences in Reading and Writing Proficiency

In QT18 and in QT20, the teachers were asked if:

QT18. Learners differ in their reading fluency (which means reading with proper speed and ease) and comprehension.

QT20. Learners differ in their writing fluency (defined by Lenski and Verbruggen (2010) as the ability to create text without relying too much on memory) and writing quality.

We summed up the results of the two questions in Table 5.11.

Table 5.11.

Teachers' Beliefs about Learners' Differences in Reading and Writing Proficiency

Option	n (QT18)	%	n (QT20)	%
Yes	20	100	20	100
No	0	0	0	0
N	**20**	**100**	**20**	**100**

When asked if they thought learners differ in their reading fluency, all the teacher-respondents answered yes. They all agreed that different learners do not read with the same speed and ease. In response to QT20, all respondents asserted that their learners differ in their writing fluency. According to these affirmations, not all learners are equally able to create text without relying too much on memory. This means that they recognize their learners' differences in performing different skills.

After that, the teachers were asked to answer QT19 and QT21 if their answers to QT18 and QT20 were affirmative. In questions QT19 and QT21, they were asked if they thought:

QT19. The differences in reading fluency and comprehension are due to the learners' level of proficiency, their cognitive abilities or both.

QT21. The differences in the fluency and quality of their writing are due to the learners' level of proficiency, their cognitive abilities or both.

In Table 5.12., we report the findings.

Table 5.12.

Causes of Learners' Differences in Reading and Writing

Option	n (QT19)	%	n (QT21)	%
a) Their level of proficiency	0	0	0	0
b) Their cognitive abilities	2	10	1	5
c) Both	18	90	19	95
N	**20**	**100**	**20**	**100**

According to the results demonstrated above, most of the teachers (90%) believed that learners' differences in reading fluency are caused by both their different cognitive abilities and level of proficiency. Only 10% thought that cognitive abilities are the only responsible for such dissimilarities. The results in the table also show that the majority of teachers (95%) thought that learners' differences in writing are due to both their cognitive abilities and level of proficiency. Only 5% thought it is only due to their cognitive differences while proficiency alone as a cause was completely disregarded.

5.1.2.6. Teachers' Observations about Students' Way of Dealing with Complex Writing Tasks

In QT22, QT23 and QT24, the teachers were asked if they agreed with the following claims:

QT22. Learners plan their writing tasks.

QT23. Some learners need more time planning their writing task than others.

QT24. Learners are all equally able to focus on complex writing tasks that contain many elements.

In table 5.13., we reported the results.

Table 5.13.

Teachers' Observations about Students' Ways of Dealing with Complex Writing Tasks

Options	n (QT22)	%	n (QT23)	%	n (QT24)	%
Strongly agree	3	15	10	50	0	0
Agree	4	25	6	30	0	0
Neutral	8	40	2	20	0	0
Disagree	5	15	2	20	14	70
Strongly disagree	0	0	0	0	6	30
N	**20**	**100**	**20**	**100**	**20**	**100**

When asked if they thought learners plan their writing tasks, 40% of the respondents remained neutral while 25% agreed with the assumption, and 15% strongly agreed. Only 15% disagreed. Some of the teachers were positive about the fact that their learners plan while some others had little knowledge whether they plan or do not, or they thought not all learners did.

The majority of the teachers (50%) strongly agreed with the assumption that some learners need more time than others to plan their writing tasks, and 30% agreed. Only 20% disagreed, and another 20% remained neutral. The importance of allowing some learners more planning time was recognized by the respondents. This means that they are aware of students' differences.

The results in the Table 5.13. show that all the teachers reject the claim that learners are all equally able to focus on complex writing tasks that contain many elements. 70% disagreed with it, and 30% strongly disagreed. They were unanimous about the existence of differences in focusing ability which was not the case when they were asked about attention. Apparently, the teachers believe that cognitive abilities are defined by the task learners engage in. While they are aware of learners' differences in planning tasks and allocating attention, they do not seem to take this awareness for a further step and observe whether learners act on their differences.

5.1.3. Differentiated Instruction

The last section is the differentiated instruction section. It aims at investigating teachers' attitudes towards differentiating writing tasks.

5.1.3.1. Teachers' Beliefs about Being Fair

In QT25, we asked participants if they agreed with the fact that:

QT25. To be fair to my students, I should offer all of them the same writing task to do.

Table 5.14.

Teachers' Beliefs about Being Fair

Options	n	%
Strongly agree	4	20
Agree	1	5
Neutral	6	30
Disagree	8	40
Strongly disagree	1	5
N	**20**	**100**

The results indicate that most of the respondents (40%) did not think that being fair to one's students engenders giving them all the same writing task to do. While 30% had no stand on this point, a minority of 25% supported it. Most of the teachers are aware of the importance of differentiating tasks among learners.

5.1.3.2. The Importance of Cognitive Abilities Assessment

In QT26 and QT27, we asked them if they agreed with the facts that:

QT26. Assessing my learners' cognitive differences in Working Memory is important.

QT27. Assessing my learners' cognitive differences in Attention is important.

Table 5.15.

Teachers' Beliefs about Assessing Learners' Cognitive Differences

Options	n (QT26)	%	n (QT27)	%
Strongly agree	1	5	1	5
Agree	9	45	12	60
Neutral	7	35	4	20
Disagree	3	15	3	15
Strongly disagree	0	0	0	0
N	**20**	**100**	**20**	**100**

The table shows that the majority of the respondents (45%) thought it important to assess learners' WM. While 35% did not express their opinion about such practice, 15% disregarded its significance, and 5% thought it is very important. Most of the teachers find it important to test their learners' WM.

Through the results displayed in Table 5.15., we found that the majority of the respondents (60%) judged assessing learners' attention to be important. On the other hand, 20% of them refrained from giving any opinion, and 15% judged it to be unimportant while 5% thought it is very important . Most of the teachers find it important to test their learners' attention, and as compared to the results of the previous question (QT26), they even think that it is more important than WM.

5.1.3.3. Teachers' Beliefs about Learners' Differences and their Teaching

In QT28 and QT29, the teachers were asked whether they agreed with the statements:

QT28. My learners' cognitive abilities are fixed and teaching cannot improve them.

QT29. I can adjust my teaching to respect learners' differences.

Table 5.16.

Teachers' Beliefs about Learners' Differences and their Teaching

Options	n (QT28)	%	n (QT29)	%
Strongly agree	0	0	9	45
Agree	2	10	6	30
Neutral	0	0	3	15
Disagree	4	20	2	10
Strongly disagree	14	70	0	0
N	**20**	**100**	**20**	**100**

The results show that 70% of the teachers strongly disagreed with the claim that learners' cognitive abilities are fixed and teaching cannot improve them, and 20% disagreed. Only 10% agreed with this one. They also indicate that most of the teachers were confident in their ability and readiness to adjust their teaching in order to meet their learners' differences. 45% strongly agreed with the assertion, and 30% simply agreed with it. While 15% stayed neutral as a sign of uncertainty, only 10% expressed that they cannot adjust their teaching.

5.1.3.4. Ways to Deal with Learners' Differences

In QT30, QT31 and QT32, the teachers were asked how frequently they apply the following statements:

QT30. I offer more planning time for the learners who are slower than others.

QT31. I give different learners different amounts of time to finish the same task.

QT32. I give my learners different numbers of task items depending on their cognitive and proficiency level, for example, when asking them to narrate a short story, not all my learners are assigned with the same number of characters.

Table 5.17.

The Ways Teachers Deal with Learners' Differences

Option	n (QT30)	%	n (QT31)	%	n (QT32)	%
Always	1	5	0	0	1	5
Frequently	1	5	1	5	1	5
Sometimes	8	40	4	20	4	20
Rarely	7	35	7	35	7	35
Never	3	15	8	40	7	35
N	**20**	**100**	**20**	**100**	**20**	**100**

The results indicate that the majority (40%) of the respondents admitted to offer more planning time for the learners who are slower than others only sometimes. 35% said that they do that rarely, and 15% said that they never differentiate the planning time offered to learners according to their performance speed. Only 5% do it frequently, and another 5% do it constantly.

In response to QT31, 40% of the teachers admitted to never give different learners different amounts of time to finish the same task, and 35% said they rarely do that while only 20% said that they sometimes differentiate. Only one teacher said that he or she frequently does. While most of the teachers infrequently give slow students more pre-planning time, they never offer them more time than their peers to finish the task.

When asked whether they differentiate the numbers of task items depending on learners' cognitive and proficiency level, 35% of the teachers said they never do that, and another 35% said they rarely do. On the other hand, 20% of them said that they sometimes do and only two teachers said that they differentiate. The teachers, thus, admitted to not always work in accordance with their learners' differences.

The questionnaire revealed that the teachers are aware of the existence and importance of learners' differences. They are conscious of the influence they have on learning a foreign language. Concerning their beliefs about the factors leading to success in L2, the teachers place it high in the rank of importance. As for the specific cognitive abilities, namely WM and attention, most of the teachers seem to have a fairly good idea about their definition, their importance and their nuances from one individual to another. About differences in reading and writing proficiency, the teachers believe in individual variation. The case is the same for planning writing tasks; the teachers understand the need for planning and use it as a crucial step of writing. They also realise that the time needed for planning may differ from one individual to another, and that learners are different in performing complex writing tasks with multiple elements. However, the teachers have admitted to not always work in alliance with their learners' differences.

5.2. Analysis and Interpretation of the Students Questionnaire

5.2.1. General Information

To gather clear information about the participants' characteristics, they were asked to respond to questions related to their gender, age, motivation, and proficiency level. Answers to the questions were analysed using descriptive statistics in order to identify percentages to interpret the questionnaire.

5.2.1.1. Students' Profiles

Table 5.18.

Students' Profiles

Gender (QS1)	**n**	**%**	**Age (QS2)**	**n**	**%**
a) Male	17	28.33	**18-25**	58	96.66
b) Female	43	71.66	**26-30**	1	1.66
			31-40	1	1.66
			≥40	0	0
N	**60**	**100**		**60**	**100**

Table 5.18. shows the distribution of the respondents by gender (1st question for students: QS1). In this survey, 71.66% of them are females while only 28.33% are males. This indicates that females outnumber males, which is a typical characteristic for 2017/ 2018 class, a fact verified through a quick analysis of the lists of all the first year students delivered by the administration. We have found that out of 301 students, which constitute our population, 218 are females. This means that 72.42% of them are females while only 27.58% are males. The sample therefore represents the population accurately. And since the majority of respondents are females, the group is more or less homogeneous.

Table 5.18. shows the distribution of the respondents by age. Nearly all (96.66%) the students are between the age of 18 and 25. This implies that there is almost no age gap between participants which makes the group more homogeneous in terms of age than it is heterogeneous. The only exceptions are two students who are older than the others, and they constitute only 3.33% of the sample.

5.2.1.2. Motivation

In QS3, the students were asked about their studying choice:

QS3. Studying English at University was my first choice.

Table 5.19.

Students' Motivation to Learn English

Option	n	%
Yes	48	80
No	12	20
N	**60**	**100**

The results indicate that studying English was the first choice of a high majority (80%) of the respondents, and only 20% had to settle for English as a major at University. This means that the students did not radically differ in their initial motivation to learn English.

5.2.1.3. Proficiency

In QS4, the students were asked to judge their own language proficiency:

QS4. I judge my English proficiency to be (please rate your English proficiency by circling the appropriate letter based on the scale given below)

They were given four options. The first one was having 'minimal proficiency', which means being able to understand the essential information in very simple texts about familiar topics and to communicate basic information despite lots of errors. The second option was 'reasonable', i.e., to be able to understand the main ideas of straightforward authentic texts and to convey opinions with some errors that do not prevent the message from getting across. The third option was 'good proficiency', and it means being able to understand most authentic texts and to convey messages and read popular literature for fun. The last option was 'very good proficiency', i.e., being able to understand and produce complex language in academic and work contexts as well as social situations.

Table 5.20.

Students' Judgment of their Language Proficiency

Options	n	%
Minimal	5	8.33
Reasonable	27	45
Good	22	36.66
Very good	6	10
N	**60**	**100**

The results show that a lot (45%) of the students believed themselves reasonably proficient at English, and 36.66% believed themselves to be good. Only 10% of them were fully confident in their proficiency, and 8.33% lacked any confidence. This indicates that the majority (91.66%) of the respondents judge themselves to be able to comprehend the main ideas of authentic texts and to communicate their ideas effectively whether in writing or speaking.

According to Brown (2000), individual differences influencing foreign language learning can be divided into two domains: cognitive and affective. Ellis (1985) also notes that the division must be done between factors that cannot be modified like age, gender and aptitude, and those modifiable like attitudes, beliefs and motivation. In the first section of our questionnaire, we tried to form a picture about our participants' individual differences especially those which might interfere in our study. We found that the majority of our students are females between the age of 18 and 25. They have freely chosen to learn English, and they believe themselves to be rather competent.

5.2.2. Learners' Differences

The second section aimed at determining the students' perceptions and attitudes toward their own differences. First, we wanted to know if they were aware of the existence of differences in their ability to learn English. Second, we investigated learners' beliefs about the factors determining their success in L2. Third, the respondents were asked about their knowledge and beliefs concerning specific cognitive abilities, namely WM and attention. Fourth, they were asked about their differences in reading and writing proficiency. Finally, the ways the participants perform complex tasks were examined.

5.2.2.1. Learners' Ability to Learn a New Language

In QS5, the learners were asked if they agreed with the claim that:

QS5. Every learner is equally able to learn a foreign language.

Table 5.21.

Students' Opinions about their Ability to Learn a Foreign Language

Options	n	%
Strongly agree	9	15
Agree	35	58.33
Neutral	8	13.33
Disagree	8	13.33
Strongly disagree	0	0
N	**60**	**100**

The results show that the majority of the students (58.33% and 15%) thought that all learners can equally learn a foreign language while only 13.33% disagreed with this argument, and the rest (13.33%) chose to remain neutral about it. This shows that the students are mostly unaware of the influence of their individual differences on their success in learning a new language.

5.2.2.2. Factors Determining Learners' Success in L2

In QS6, QS7 and QS8, the students were asked if they agreed that effort, exposure and language aptitude are sufficient to learn a new language.

QS6. It is sufficient for learners to put a lot of effort to learn a foreign language.

QS7. It is sufficient to be exposed to a foreign language to learn it.

QS8. Learners need to have a special aptitude for language learning.

Table 5.22.

Student's Beliefs about Factors Influencing Language Learning

Options	n (QS6)	%	n (QS7)	%	n (QS8)	%
Strongly agree	14	23.33	8	13.33	10	16.66
Agree	32	53.33	33	55	29	48.33
Neutral	9	15	16	26.66	10	16.66
Disagree	5	8.33	2	3.33	9	15
Strongly disagree	0	0	1	1.66	2	3.33
N	**60**	**100**	**60**	**100**	**60**	**100**

The results of QS6 show that a great percentage of learners (53.33% and 23.33%) thought that putting a lot of effort into learning a language is sufficient while 15% of them remained neutral. On the other hand, 8% did not see the importance of effort. The participants, therefore, believe that hard work is sufficient for them to succeed.

Table 5.22. shows that the majority of students (55% and 13.33%) thought it is sufficient for them to be exposed to language through instruction or environment in order to learn it, and 26.66% remained neutral about it. Only 3.33% disagreed with this argument while 1.66% of them strongly disagreed. This shows that students give a lot of importance to external factors and more specifically to exposure in learning English.

The results indicate that the majority of the respondents (48.33%) agreed that learners need a special aptitude to learn a language, and 16.66% strongly agreed. However, 15% disagreed, 3.33% strongly disagreed with this claim, and 16.66% were not sure. This shows that most learners are aware of the presence of a special individual talent facilitating language learning despite their votes for effort and exposure sufficiency and even the language learners' equal chances to learn. The contradiction we note here might be due to the novelty of learning concepts and the contact with language instruction for first-year students.

In QS9, the students were asked if they thought they possess the special aptitude facilitating language learning.

QT9. I think I possess this aptitude.

Only those respondents whose answers to QS8 were 'agree' or 'strongly agree' were required to respond to this question (QS9).

Table 5.23.

Students' Opinions about Language Aptitude

Option	n (QS9)	%
Yes	21	53.85
I am not sure	17	43.59
No	01	2.56
N	**39**	**100**

Out of those students who believe in the importance of language aptitude, 53.85% trusted themselves to have this specific talent while 43.59% were not sure, and just one student confirmed not having it. We can justify these results by the fact that the participants are first-year students who relying on their previous results may have confidence in their ability to learn English, and relying on the new encounter with university studies may feel uncertain whether they have what it takes or not. Findings from QS8 and QS9 demonstrate that learners have a vague idea about the existence and nature of language aptitude.

In QS10, the students were asked to rank the importance of learning factors:

QS10. Rate the importance of the following factors in determining language learners' success by simply giving marks from 1 to 6. (1 being the most important and 6 the least important).

The results of students' rankings on a six-point Likert-scale and their percentages are reported in Table 5.24. To facilitate the comparison between the different rankings, we employed the same method and formula as in QT9 and counted the means ($\bar{X}$). The answer choice with the largest average ranking is the most important factor.

Table 5.24.

Students' Opinions about the Factors Determining Success in Language Learning

Options	1	2	3	4	5	6	N	$\bar{X}$
Linguistic intelligence	5 8.33%	9 15%	8 13.33%	11 18.33%	17 28.33%	10 16.66%	60	3.06
Language learning aptitude	9 15%	14 23.33%	11 18.33%	11 18.33%	11 18.33%	4 6.66%	60	3.78
Personality	15 25%	12 20%	8 13.33%	12 20%	9 15%	4 6.66%	60	4.16
Motivation	22 36.66%	14 23.33%	12 20%	8 13.33%	2 3.33%	2 3.33%	60	4.66
Attitude	0 0%	8 13.33%	13 20%	18 30%	15 25%	6 10%	60	3.03
Age of learning	10 16.66%	2 3.33%	4 6.66%	5 8.33%	5 8.33%	34 56.66%	60	2.41

According to the results on Table 5.24., like the teachers, the students chose motivation to be the most important factor for language learning with the highest mean (4.66). However, the students chose personality as the second factor (4.16). This indicates that contrary to the teachers, the students place affective factors higher than cognitive ones. After motivation and personality, aptitude (3.76), linguistic intelligence (3.06) and attitude (3.03) were ranked next. Age of learning was the least important one (2.41).

In QS11, the students were asked to add other factors:

QS11. Add other factors that in your opinion determine success in learning an L2.

Only 10% of the respondents answered this question stating that the other factors needed for learning success are attention, encouraging environment, exposure and efforts.

As for attention, it is part of language aptitude while encouraging environment is part of motivation. Learners believe that there are many factors that can define their language learning success.

5.2.2.3. Students' Beliefs Concerning Working Memory

In QS12, the learners were asked what they thought Working Memory is. The respondents were asked to choose more than one option if they felt the need, and the result was that they gave different sequences of answers. We are not interested in the combinations students made as much as we are interested in finding out what they consider WM to be.

QS12. Working Memory is (you can circle more than one option)

Table 5.25.

Students' Definition of Working Memory

Options	n (QS12)	%
WM is the same as Short Term Memory	7	11.66
WM is part of memory	15	25
WM is part of the information-processing system	21	35
l WM is like a mental sketchbook that stores and treats information	11	18.33
I am not sure what working memory is	23	38.33
N	**60**	**100**

In response to this question, the biggest percentage (38.33%) of the students was not sure about the definition of WM. 35% of them thought it is a part of the information-processing system probably because of the label 'working' while 25% defined it as part of memory because of the label 'memory'. While only 18.33% recognised it to be like a mental sketchbook that stores and treats information as researchers define it, 11.66% guessed that it is the same as Short Term Memory. From these responses, it can be deduced that the learners are not really aware of what WM is.

In QS13, the learners were asked if they agreed with the following statement:

QS13. Working Memory is important for foreign language learning.

Table 5.26.

The Importance of Working Memory for Foreign Language Learning

Options	n (QS13)	%
Strongly agree	16	26.66
Agree	32	53.33
Neutral	8	13.33
Disagree	3	05
Strongly disagree	1	1.66
N	**60**	**100**

The results of this question show that 53.33% of the respondents agreed with the claim that WM is important for foreign language learning and 26.66% strongly supported it. While 13.33% remained neutral, 5% did not agree and 1.66% strongly disagreed. Despite the fact that they have little grasp of what the concept means, These results show that most of the learners believe that WM is important for language learning.

In QS14 and QS15, the learners were asked if they agreed with the claims:

QS14. Working Memory is limited in capacity.

QS15. Learners differ in their Working Memory.

Table 5.27.

Students' beliefs about WM Capacity and Learners' Differences

Options	n (QS14)	%	n (QS15)	%
Strongly agree	4	6.66	15	25
Agree	22	36.66	31	51.66
Neutral	15	25	10	16.66
Disagree	15	25	4	6.66
Strongly disagree	4	6.66	0	0
N	**60**	**100**	**60**	**100**

Table 5.27. shows that 36.66% of the respondents agreed with the claim that WMC is limited while the rest of them either hesitated about it (25%) or contradicted it (25% of them disagreed and 6.66% strongly disagreed). However, 6.66% strongly agreed. This aspect of WM seems to be clear for almost half of the students (43.32%).

Results of QS15 show that 51.66% of the respondents agreed with the assertion that learners differ in their WM, and 25% even strongly agreed. Whereas 16.66% had no opinion about it, 6.66% disagreed. This means that the learners sense their cognitive differences whether they have a firm grasp of the ability involved or no grasp at all.

5.2.2.4. Students' Beliefs Concerning Attention

In QS16, the students were asked if they agreed with the following assumptions:

QS16. Attention is important for foreign language learning.

QS17. Attention is limited in capacity.

QS18. Learners differ in their Attention.

Table 5.28.

The Importance of Attention for Foreign Language Learning

Options	n (QS16)	%	n (QS17)	%	n (QS18)	%
Strongly agree	33	55	03	05	15	25
Agree	21	35	17	28.33	32	53.33
Neutral	4	6.66	12	20	11	18.33
Disagree	1	1.66	24	40	2	3.33
Strongly disagree	1	1.66	04	6.66	0	0
N	**60**	**100**	**60**	**100**	**60**	**100**

The results displayed in Table 5.28. show that 55% of the respondents were strongly in favour with the claim that attention is important for foreign language learning and 35% agreed with it. However, 6.66% had no opinion about this claim, and a small percentage did not think that attention has any significance (1.66% disagreed and 1.66%

strongly disagreed) . This means that most learners perceive the importance of attentional abilities in learning a second language.

Table 5.28. shows that 40% of the learners disagreed with the claim that attention is limited. 28.33% agreed while 20% of them hesitated about having any opinion about it, and 6.66% strongly disagreed. The rest of them strongly agreed with the limitation of attention (5%).we can deduce then that near half of the students seem to perceive attention as a limitless capacity.

Results of QS18 show that 53.33% of the respondents agreed with the statement that learners differ in their attention while 25% strongly agreed. Whereas 18.33% stayed neutral about it, 3.33% disagreed with it. This means that most of the learners are aware of their differences in attention whether they really understand its nature and limitations, or they do not.

5.2.2.5. Students' Beliefs about their Differences in Reading and Writing Proficiency

In QS19 and QS20, the students were asked if the following statements applied to them:

QS19. I differ from other learners in my reading fluency (which means reading with speed and ease) and comprehension.

QS20. I differ from other learners in the fluency (which is the ability to create text without relying too much on memory) and quality of my writing.

Table 5.29.

Learners' Differences in Reading Fluency and Comprehension

Option	n (QS19)	%	n (QS20)	%
Yes	45	75	38	63.33
No	15	25	22	36.66
N	**60**	**100**	**60**	**100**

The results displayed in Table 5.29. show that 75% of the students we asked thought that they differ from their peers in reading fluency and comprehension. On the other hand, only 25% thought that all learners are the same. This means that learners are well aware of their differences regarding the ease and speed with which they approach the task of reading and their different levels of comprehension.

Results from QS20 show that 63.33% of the respondents thought that they differ in their writing fluency and its quality from other learners whereas 36.66% thought themselves to be the same as everybody else. These findings indicate that most of the learners are conscious of their differences regarding their ability to create text without relying too much on memory which is called writing fluency and regarding the quality of their written production.

5.2.2.6. Ways Students Deal with their Writing Tasks

In QS21, the students were asked how often they plan their writing tasks:

QS21. I plan my writing tasks.

Task 5.30.

How Often Students Plan their Writing Tasks

Option	n	%
Always	9	15
Sometimes	42	70
Rarely	7	11.66
Never	2	03.33
N	**60**	**100**

When asked how often they plan their writing tasks, 70% of the respondents said that they sometimes do while 15% declared that they always do. Only 11.66% admitted they rarely plan, and 3.33% dismissed the idea of any planning. This means that most learners understand the need for planning and use it as a crucial step of writing.

In QS22, the students were asked what they need when planning a writing task:

QS22. To plan a writing task, I need.

They were given many options which are presented with their results in Table 5.31. Learners were asked to answer this question only if they have answered QS21 with either ‘always’ or ‘sometimes’.

Table 5.31.

The Amount of Time Learners Need to Plan a Writing Task

Option	n	%
More time than my peers	20	39.22
Less time than my peers	05	09.80
The same amount of time as my peers	14	27.45
More time than some of my peers and less than others	12	23.53
N	**51**	**100**

The table shows that 39.22% of the respondents, who always or sometimes plan their writing, thought they need more time than their peers while 27.45% thought they need the same amount of time. Only 23.53% were conscious that they may need more than some and less than some others, and 9.8% were confident about needing less. Learners, therefore, tend to either think they are slower or not notice the difference between themselves and others.

In QS23, the students were asked if they agreed with the fact that:

QS23. All learners are equally able to focus on complex writing tasks that contain many elements.

Table 5.32.

Learners' Attitude about their Ability to Focus on Complex Writing Tasks with many Elements

Options	n (QS23)	%
Strongly agree	01	01.66
Agree	21	35
Neutral	14	23.33
Disagree	19	31.66
Strongly disagree	05	08.33
N	**60**	**100**

The results obtained show that 31.66% and 8.33% of the students thought that they are not all equal. A slightly smaller percentage (35% and 1.66%) thought that all of them are equally able to concentrate on a complex task that contains many elements while 23.33% remained neutral about this matter. This means that the students believe they are slightly more different than similar in performing complex writing tasks with multiple elements.

5.2.3. Differentiated Instruction

The third section is the differentiated instruction section. It aims at investigating students' attitudes towards differentiating writing tasks. First, we asked them about how teachers deal with their differences. Second, we aimed at knowing how important for them the assessment of cognitive abilities is. Thirdly, we asked about their beliefs regarding their own differences and the way teaching deals with them. Finally, we investigated whether students have noticed any aspect of differentiating instruction in the classrooms and their attitude toward teachers practicing it.

5.2.3.1. Students' Beliefs about how Teachers Deal with their Differences

In QS24, the students were asked how often this statement is true:

QS24. When we have a writing task to do, it is the same for every one of us (students).

Table 5.33.

Differentiating Writing Tasks for Students

Options	n (QS24)	%
Always	13	21.66
Sometimes	33	55
Rarely	10	16.66
Never	04	6.66
N	**60**	**100**

Table 5.33. shows that 55% of the respondents answered that sometimes they have the same task where in other times they do not. 21.66% of them said they always have the same writing task to do with their peers. 16.66% said they rarely perceive any form of differentiation, and 6.66% said they never do that. According to these results, the learners seem to notice when teachers set different tasks to different learners which is not a regular routine in writing classes.

5.2.3.2. Cognitive Differences Assessment

In QS25 and QS27, the students were asked how often their differences were assessed:

QS25. My teachers assess/evaluate students' Working Memory.

QS27. My teachers assess students' Attention.

Table 5.34.

How Often Teachers Assess Working Memory and Attention

Options	n (QS25)	%	n (QS27)	%
Always	15	25	22	36.66
Sometimes	34	56.66	31	51.66
Rarely	11	18.33	05	8.33
Never	00	00	02	3.33
N	**60**	**100**	**60**	**100**

More than half of the students (56.66%) thought that teachers sometimes assess their WM, and 25% claimed they always do. Only 18.33% thought that their WM is rarely assessed. Confusing WM with memory in general, students seem to think that any evaluation of what they have retained is an assessment of their WM.

In response to QS27, more than half of the students (51.66%) reckoned that their teachers sometimes assess their attention and 36.66% asserted that they always do. While 8.33% thought that they rarely do, 3.33% said that their attention is never assessed. Students seem to believe that attention is often assessed in writing classes.

The students gave the answers displayed in Table 5.35.When asked if they agreed with the statements in QS26 and QS28:

QS26. Teachers should assess students' Working Memory.

QS28. Teachers should assess students' Attention.

Table 5.35.

Students' Attitude about Working Memory and Attention Assessment

Options	n (QS26)	%	n (QS28)	%
Strongly agree	13	21.66	18	30
Agree	30	50	32	53.33
Neutral	13	21.66	6	10
Disagree	3	5	4	6.66
Strongly disagree	1	1.66	0	0
N	**60**	**100**	**60**	**100**

Results show that 50% of the respondents agreed with the fact that teachers should assess their WM whereas 21.66% even strongly agreed. Another 21.55% expressed no opinion while 5% disagreed and 1.66% strongly disagreed. Most of the students seem to be aware of the importance that assessing their abilities has.

Results in the table also show that 53.33% of the respondents agreed with the argument that teachers should assess their attention whereas 30% strongly agreed with it. The remaining 10% and 6.66% expressed no opinion and disagreed respectively. A big majority of the students are aware of the importance of assessing their attention.

5.2.3.3. Students' Beliefs Regarding their own Differences

In QS29, the students were asked how often their teachers do the following:

QS29. My teachers take students' differences into consideration and thus adjust their teaching accordingly.

Table 5.36.

Students' Perceptions about Teachers Taking their Differences into Consideration

Options	**n**	**%**
Always	10	16.66
Sometimes	34	56.66
Rarely	13	21.66
Never	03	00
N	**60**	**100**

The table shows that 56.66% of the respondents said that their teachers sometimes do that, and 21.66% thought that they rarely do that. Only 16.66% of them affirmed that they always do. The findings show that the students consider their differences to be important and thus think that teachers must be taking them into consideration and adjusting their teaching to meet them.

In QS30, the students were asked if they agreed with the fact that:

QS30. Teachers should take students' differences into consideration and thus adjust their teaching to them.

Table 5.37.

Students' Attitudes about Whether Teachers should Respect their Differences

Options	**n**	**%**
Strongly agree	11	18.66
Agree	29	48.66
Neutral	10	16.66
Disagree	10	16.66
Strongly disagree	0	0
N	**60**	**100**

The table shows that 48.66% of the students thought that teachers should respect their differences while 18.66% agreed with it strongly, and 16.66% disagreed. 16.66%

remained neutral. The students seem to think that they should be taught according to their differences above other considerations.

5.2.3.4. Ways Teachers Deal with Learners Differences

In QS31, the students were asked how often their teachers apply the following:

QS31. My teachers offer more planning time for students who need it.

Table 5.38.

Students' Perceptions about Differentiating Planning Time

Options	n	%
Always	09	15
Sometimes	30	50
Rarely	14	23.33
Never	07	11.66
N	**60**	**100**

Half of the respondents felt that teachers offer more planning time for students who need it sometimes only, and 23.33% thought they rarely do. However, 15% asserted that they always do that, and 11.66% said they never differentiate the time allocated for them to plan task performance. From these numbers, it can be seen that the students are aware that teachers sometimes allow more time for some students, but whether this is done randomly or purposefully, the respondents cannot judge.

In QS32, the students were asked if they agreed with the statement:

QS32. Teachers should offer more planning time for students who need it.

Table 5.39.

Students' Attitudes about Whether Teachers should Differentiate Planning Time

Options	n	%
Strongly agree	12	20
Agree	32	53.33
Neutral	13	21.66
Disagree	2	3.33
Strongly disagree	1	1.66
N	**60**	**100**

In response to QS32, the majority of the participants agreed (53.33% agreed and 20% strongly agreed) with the argument that teachers should offer more planning time to students who need it and therefore less time for those who do not need it, which implies knowing them, knowing their differences and differentiate planning time accordingly. 21.66% of the respondents remained neutral about this question, and 5% disagreed with this argument.

In QS33, the students were asked how often their teachers give them time:

QS33. My teachers give different learners different amounts of time to finish the same task.

Table 5.40.

Students' Perceptions about Differentiating Performance Time

Options	n	%
Always	11	18.33
Sometimes	27	45
Rarely	10	16.66
Never	12	20
N	**60**	**100**

It is apparent from this table that 45% of the students noticed that teachers sometimes give different learners different amounts of time to finish the same task while 20% never noticed that. Only 18.33% confirmed they always do, and 16.66% said they rarely do. This means that according to the students, teachers mostly differentiate the amount of time set to perform a given task among learners.

In QS34, the students were asked if they thought:

QS34. Teachers should give different learners different amounts of time to finish the same task.

Table 5.41.

Students' Attitudes about Whether Teachers should Differentiate Performance Time

Options	n	%
Strongly agree	9	15
Agree	30	50
Neutral	9	15
Disagree	9	15
Strongly disagree	3	05
N	**60**	**100**

Data from Table 5.41. shows that the respondents mostly (50%) agreed or strongly agreed (15%) with the opinion that teachers should give different learners different amounts of time to finish the same task while 15% disagreed and 5% strongly disagreed. Only 15% of them expressed no opinion about the argument. This means that students know they are different and therefore must be taught each distinctively.

In QS35, the students were asked about the frequency of the claim that:

Q35. My teachers give learners different numbers of task items depending on their cognitive and proficiency level, for example, when asking them to narrate a short story, not all learners are assigned with the same number of characters.

Table 5.42.

Students' Perceptions about Differentiating the Numbers of Task Items

Options	n	%
Always	05	08.33
Sometimes	31	51.66
Rarely	10	16.66
Never	14	23.33
N	**60**	**100**

As Table 5.42. shows, a bit more than half of the respondents (51.66%) claimed that teachers sometimes give them different numbers of task items depending on their cognitive and proficiency level. On the other hand, 23.33% of them claimed that teachers never do so, and 16.66% said they rarely do. 8.33% said they always do, however. More than 76% of the students have noticed some form of differentiation regarding the number of task items.

The students gave the answers in Table 5.43, when asked in QS36 if:

Q36. Teachers should give learners different numbers of task items depending on their cognitive and proficiency level.

Table 5.43.

Students' Attitudes about Whether Teachers Should Differentiate the Number of Task Items

Options	n	%
Strongly agree	05	08.33
Agree	31	51.66
Neutral	13	21.66
Disagree	07	11.66
Strongly disagree	04	06.66
N	**60**	**100**

In response to QS36, 51.66% of the respondents agreed with the fact that teachers should give learners different numbers of task items depending on their cognitive and proficiency level, and 21.66% remained neutral. 11.66% disagreed while 8.33% strongly agreed. However, 6.66% strongly disagreed.

This section has exposed the facts that the students who responded to this questionnaire had noticed the way teachers try to attend to their differences through assessment. However, assessing either WM or Attention takes particular forms that the students might be confusing with assessment in general to detect learners' needs.

The questionnaire revealed that the students have little awareness of their own differences. They are neither conscious of their existence nor of the influence they have on learning a foreign language. Though the students at this level may have a vague idea about their own individual abilities to learn English, they have an erroneous idea about how important these abilities are. Concerning their beliefs about the factors leading to success in L2, the learners appear to think language aptitude is not much of a determining factor. As for the specific cognitive abilities, namely WM and attention, the learners seem to have little idea about their nature and limitations. About differences in reading and writing proficiency, students believe in individual variation. The case is the same for planning writing tasks; learners understand the need for planning and use it as a crucial step of writing. Furthermore, they mostly seem to notice that the time needed for planning may differ from one individual to another, and that they are different in performing complex writing tasks with multiple elements. However, the students observed that teachers do not always respond to their differences.

Conclusion

We can conclude from the results obtained through these two questionnaires that the answer to our first research question (What are the attitudes of EFL teachers and students at the University of Oum el Bouaghi towards differentiating writing tasks according to students' cognitive differences?) is that both the teachers and the students do not underestimate differentiating writing tasks according to students' cognitive differences. They are well aware of its importance. However, teachers disregard it and rarely practice manipulating tasks inside the classroom. This partly confirms our first hypothesis: EFL teachers and students at the University of Oum el Bouaghi may underestimate and disregard differentiating writing tasks according to students' cognitive differences. It engenders a need for studying how effective it really is to manipulate tasks according to learners' differences.

Chapter Six

Analysis and Interpretation of the Experiments

Introduction

The current chapter reports the experimental design supporting this study. The design consists of two experiments: the repeated measures experiment and the pre-test post-test control group experimental group experiment. The first one aims to determine whether there is a significant effect due to the interaction between task complexity and learners' abilities on their writing performance. Based on the results of this experiment, the influence of manipulating task complexity according to students' working memory and attention on students' writing is examined in the second experiment. Finally, the data are analysed and the results are discussed to extract pedagogical recommendations and research suggestions.

6.1. The Repeated Measures Experiment

This experimental design was carried out to determine the effects of four tasks of different complexity levels on students writing fluency, accuracy and complexity. This was carried as a first step before deciding whether there is a relationship between cognitive differences and task complexity that may or may not affect students' writing performance. The students belonged to four different groups with different levels of WM and Attention. There were 13 students in the first group, 10 in the second, 8 in the third, and 13 in the fourth one. Each student was measured at four different points in time following one of four experimental tasks: Simple version, Medium version 1, Medium version 2 and Complex version. The different levels of reading-to-write tasks are described in section 4.5.1.

6.1.1. Results of the Experiment

After conducting the study and collecting the data, two types of statistical analyses were performed: a descriptive analysis, and an inferential analysis. Following these analyses, the results were then derived and interpreted.

6.1.1.1. Descriptive Analysis

Table 6.1. displays the descriptive statistics (means: $\bar{X}$ and standard deviations: SD) for all the students regardless of the group they belong to in order to get a first-impression about the impact of manipulating task complexity on students' writing production.

Table 6.1.

Descriptive Statistics on the Students' Performance in the Four Tasks

Tasks	Fluency(N=44)		Accuracy(N=44)		Complexity(N=44)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Simple version	16.07	9.372	1.551	1.327	1.959	1.151
Medium version 1	20.869	11.293	1.174	1.163	2.382	2.099
Medium version 2	18.003	7.625	1.015	0.429	1.824	0.522
Complex version	16.217	4.17	1.137	0.649	1.742	0.446

The results of the descriptive analysis, as presented in Table 6.1. show that the participants produced more fluent (20.8694) language in the medium version 1 of the task than they did in the simple version (16.07). When provided with less planning time, students produced more language but with considerable variation in the scores (11.293). However, this did not happen with the more complex versions of the task. In the medium version 2, where students were given planning time and two texts to synthesise, they were less fluent (18.003); and they were even lesser fluent in the complex version (16.217). As for accuracy, participants performed their best in the medium version 2 (1.015) of the task and their worst in the simple version (1.551). They performed less poorly in the most complex task (1.137). On another hand, the complexity scores of the second version (2.382) were the highest with a great variation (2.099), and the scores of the complex version were the lowest (1.742). It is noticed that learners' performance declines when the task is most complex and so did the differences between learners' scores.

The descriptive statistics comparing the means of fluency, accuracy and complexity in the four tasks show significant differences among students' performances. Before conducting inferential statistics (ANOVA) to deduce the significance of those results and test the second hypothesis, the means of the different ability groups were compared separately to see whether the effect of task complexity varies among them.

6.1.1.1.1. Fluency

Table 6.2.

Descriptive Statistics on the Groups' Fluency in the Four Tasks

Tasks	Group 1(N_1=13)		Group2(N_2=10)		Group 3(N_3=8)		Group 4(N_4=13)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Simple version	19.249	13.464	14.713	7.202	11.596	6.974	16.689	6.321
Medium version 1	18.711	6.878	18.697	6.877	20.548	10.954	24.897	16.661
Medium version 2	17.094	7.785	17.368	4.570	17.653	2.543	19.614	10.699
Complex version	15.331	4.029	16.361	4.144	15.529	2.696	17.416	5.1196

The results of the descriptive statistics indicate that only the first group (low ability group) declined in fluency from the first task to the rest of the tasks. As for the other groups, learners performed better in the second task where they were given no time to plan and only one text to summarise. The results also show that learners with high abilities were the most fluent in the more complex versions of the task.

6.1.1.1.2. Accuracy

Table 6.3.

Descriptive Statistics on the Groups' Accuracy in the Four Tasks

Tasks	Group1(N_1=13)		Group2(N_2=10)		Group3(N_3=8)		Group4(N_4=13)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Simple version	2.102	1.716	1.31	0.461	0.821	0.587	1.635	1.506
Medium version 1	1.055	0.50	1.199	0.5821	0.905	0.289	1.441	2.037
Medium version 2	1.005	0.387	1.058	0.4662	0.845	0.27	1.096	0.527
Complex version	1.213	0.634	1.097	0.6004	1.083	0.405	1.127	0.855

The table shows that all the groups except for the third one (high WM and low attention group) were most accurate in the Medium version 2 of the task, where they had planning time and two texts to synthesise. Learners of group 3 scored high in the simple task with significant variance among them. Participants with high WM were the most accurate in the more complex versions of the task, and those with both high attention and high WM were less accurate.

6.1.1.1.3. Complexity

Table 6.4.

Descriptive Statistics on the Groups' Complexity in the Four Tasks

Tasks	Group1(N_1=13)		Group2(N_2=10)		Group3(N_3=8)		Group4(N_4=13)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Simple version	2.387	1.569	1.59	0.948	1.543	1.034	2.071	0.742
Medium version 1	2.873	3.436	1.962	0.573	2.09	0.577	2.393	1.756
Medium version 2	1.694	0.378	1.861	0.469	1.771	0.433	1.959	0.721
Complex version	1.775	0.448	1.671	0.428	1.585	0.432	1.859	0.478

The descriptive statistics indicate that only the first group (low ability group) performed more complex language in the first and second tasks despite the variation between scores. However, learners belonging to the high-level group performed better in the third and fourth tasks. The results also show that learners with high attention and low WM performed better than those with high WM and low attention when they are given two texts to work on, and those with high WM are better at working without planning time.

6.1.1.2. Inferential Statistics

To infer the significance of the first experiment's results and test the second hypothesis, inferential statistics (ANOVA) had to be conducted.

6.1.1.2.1. The One-way ANOVA

A repeated measure one-way ANOVA (Jackson, 2014) was conducted to investigate whether the differences between the scores as detected by the preliminary analysis were statistically significant. ANOVA analyses the variance between groups and within groups. The logic is that if the independent variable (task complexity) has an effect, the variance between the groups should be greater than the variance within the groups. The F-ratio is formed by dividing the between-groups variance by the within-groups variance. Consequently; an F-ratio that is greater than 1 indicates effect. The statistical significance (p) of 5%, which is the value used by default in human sciences research, was chosen. This value means that the observed difference between statistical results (such as means) is unlikely to have occurred by chance at a level of confidence of 95%. A p-value (probability value) that is greater than 0.05 can thus only mean that the likelihood of the results' occurrence by chance and not due to task complexity is greater than 5% (Jackson, 2014).

First, the variances in all the students' writing performances as measured by fluency, accuracy and complexity were analysed. By doing this, the following statistical hypotheses were put to the test:

H_1: There is a significant effect of task complexity on students' writing fluency.

H_2: There is a significant effect of task complexity on students' writing accuracy.

H_3: There is a significant effect of task complexity on students' writing complexity.

H_4: There is a significant effect due to the interaction between task complexity and learners' abilities on their writing fluency.

H_5: There is a significant effect due to the interaction between task complexity and learners' abilities on their writing accuracy.

H_6: There is a significant effect due to the interaction between task complexity and learners' abilities on their writing complexity.

6.1.1.2.1.1. The Effect on Fluency

To investigate whether the differences between the measures of fluency for all students were significant or not, a one-way ANOVA for treatment type was performed.

Fluency was measured for the four tasks of different complexity levels. This showed the significant effect of task complexity (F-ratio value is 3.389. The p-value is 0.0201 which is significant at $p < 0.05$) suggesting that one or more treatments are significantly different. A post-hoc test (Jackson, 2014) would likely identify which of the pairs of treatments are significantly different.

Tukey's honestly significant difference (HSD) test was chosen as a post-hoc test. This test compares each of the groups in the study to each of the other groups and identifies the smallest difference between any two means (Jackson, 2014). It "allows a researcher to make all pairwise comparisons among the sample means in a study while maintaining an acceptable alpha (usually 0.05, but possibly 0.01)" (Jackson, 2014, p.235). Table 6.5. shows the results of the test.

Table 6.5.

Results of the Tukey HSD Test for Fluency

Treatments Pair	**Tukey HSD Q statistic**	**Tukey HSD p-value**	**Tukey HSD Inference**
Task 1 vs 2	3.733	0.0445	* p<0.05
Task 1 vs 3	1.326	0.7594	insignificant
Task 1 vs 4	0.114	0.8999	insignificant
Task 2 vs 3	2.406	0.3259	insignificant
Task 2 vs 4	3.618	0.0547	insignificant
Task 3 vs 4	1.212	0.8045	insignificant

We have, therefore, been able to prove the hypothesis H_1 and reject its null hypothesis H_0:

H_1: There is a significant effect of task complexity on students' writing fluency.

H_0: There is no significant effect of task complexity on students' writing fluency.

The effect, in this case, lies mostly between the simple version of the task and the medium version where students had no planning time and one text to summarise.

6.1.1.2.1.2. The Effect on Accuracy

A one-way ANOVA for treatment type was performed to examine whether the differences between the measures of accuracy for all students for the four tasks of different complexity were significant. The statistical calculations showed that the effect is not significant for the accuracy measure (F-ratio value is. 2.6406 while the p-value is 0.05222 which is not significant at $p < .05$). However, this does not mean that all treatments are not significantly different. Therefore, we chose to do a post-hoc test in order to identify which of the pairs of task results are significantly different.

Tukey's honestly significant difference (HSD) test was used for the accuracy measure too so as to compare the accuracy means. Table 6.6. shows the results of the test.

Table 6.6.

Results of the Tukey HSD Test for Accuracy

Treatments Pair	**Tukey HSD Q statistic**	**Tukey HSD p-value**	**Tukey HSD Inference**
Task 1 vs 2	2.589	0.263	insignificant
Task 1 vs 3	3.688	0.048	* p<0.05
Task 1 vs 4	2.844	0.188	insignificant
Task 2 vs 3	1.099	0.849	insignificant
Task 2 vs 4	0.255	0.899	insignificant
Task 3 vs 4	0.844	0.899	insignificant

We have, therefore, been able to prove the statistical hypothesis H_2 and reject its null hypothesis H_0:

H_2: There is a significant effect of task complexity on students' writing accuracy.

H_0: There is no significant effect of task complexity on students' writing accuracy.

The effect lies mostly between the simple version of the task and the medium version 2 where students had planning time and two texts to synthesise (p-value is 0.048).

6.1.1.2.1.3. The Effect on Complexity

The differences between participants' measures of writing complexity in the four tasks were examined using a one-way ANOVA for treatment type to prove they were significant. The statistical calculations revealed that the effect is not significant (F-ratio value is 2.35722 while the p-value is 0.07478 which is insignificant at $p < 0.05$). Like for accuracy, a post-hoc test was run to prove that not all treatments are insignificant and identify which of the pairs of treatments are significantly different.

The results of the Tukey's honestly significant difference (HSD) test are summarised in Table 6.7.

Table 6.7.

Results of the Tukey HSD Test for Complexity

Treatments Pair	**Tukey HSD Q statistic**	**Tukey HSD p-value**	**Tukey HSD Inference**
Task 1 vs 2	2.251	0.387	Insignificant
Task 1 vs 3	0.719	0.899	Insignificant
Task 1 vs 4	1.156	0.826	Insignificant
Task 2 vs 3	2.970	0.157	Insignificant
Task 2 vs 4	3.407	0.079	Insignificant
Task 2 vs 4	0.437	0.899	Insignificant

We have, therefore, not been able to prove the statistical hypothesis H_3:

H_3: There is a significant effect of task complexity on students' writing complexity.

Instead, we proved the null hypothesis:

H_0: There is no significant effect of task complexity on students' writing complexity.

6.1.1.2.2. Two-way ANOVA

The most suitable analysis method for the current study is the two-way ANOVA because it has two different independent variables that might affect and explain the students' writing outcome. Those two variables are task complexity and cognitive ability.

The change in learners' production may depend on the interaction between these two variables together in which case it is appropriate to assume that one depends on the other to produce the observed change. If the interaction between the two is not proved then it may be assumed that neither task complexity nor cognitive ability depends on the other variable to engender effect. Like the one-way ANOVA, the two-way ANOVA (Jackson, 2014) analyses the variance between groups and within groups. The difference is that in the two-way ANOVA, the between groups variance may be attributable to task complexity (TC) and cognitive differences (CD) or attributed to the interaction between them (TC x CD).

6.1.1.2.2.1. Fluency

The SS column represents the sum of squared deviations. Each SS has a corresponding df (degree of freedom). MS is the SS divided by the df for that line, and the F-statistic is the ratio of two MS values or the MS corresponding to one variable or the between-group value (TC x CD) divided by the MS of the within-group value (also called Error). If F-statistic is bigger than 1, the interaction between groups of different cognitive abilities and variation in complexity among tasks is then significant (Brase & Brase, 2011).

Table 6.8.

Two-way ANOVA Summary of Fluency Results

Source	SS	df	MS	F	P
Task Complexity	322.87	3	107.62	1.46	0.2275
Cognitive Differences	655.68	3	218.56	2.97	0.0336
TC x CD	411.07	9	45.67	0.62	0.7788
Error	11774.54	160	73.59		
Total	13164.16	175			

According to the results above, the interaction between groups of different cognitive abilities and variation in complexity among tasks is not significant ($p=0.7788$). There is an additive relationship between the two variables in their effects on students' writing. Therefore, there is no significant interaction effect between the variation in task complexity and learners' differences in WM and attention on writing fluency as measured by the mean length of T-units. The null hypothesis has been confirmed for fluency measure while the alternative one has been rejected:

H_0: There is no significant effect due to the interaction between task complexity and learners' abilities on their writing fluency.

H_1: There is a significant effect due to the interaction between task complexity and learners' abilities on their writing fluency.

Therefore, the effects of the two factors can be analysed separately. That is, the relative impact of differences in ability ($F= 2.97 > 1$ and $p=0.0336 < 0.05$) is stronger than the one of variation in task complexity ($F= 1.46$ and $p=0.2275> 0.05$). When the effect-size: $\eta^2=SS_{\text{Between}} /SS_{\text{Total}}$ (Jackson, 2014) was calculated for each independent variable, it was deduced that task complexity can account for only 2.45 % of the total variance in students' writing fluency while their cognitive differences account for 4.99 % of it. On the other hand, the combination of the two factors accounts for 3.12% of the variance.

6.1.1.2.2.2. Accuracy

To determine whether the relationship between task complexity and students' accuracy differs by the level of their cognitive abilities, it had to be decided whether the interaction between task complexity and cognitive ability is statistically significant. Otherwise, the main effects had to be interpreted without considering the interaction effect.

Table 6.9.

Two-way ANOVA Summary of Accuracy Results

Source	SS	df	MS	F	P
Task Complexity	4.48	3	1.49	1.6	0.1915
Cognitive Differences	7.06	3	2.35	2.53	0.0592
TC x CD	6.55	9	0.73	0.78	0.6351
Error	148.89	160	0.93		
Total	166.98	175			

The results of table 6.9. show that the interaction between groups of students' cognitive abilities and task complexity is not significant ($p=0.6351$). The relationship between the two variables is additive and not interactive. The relationship between task complexity and students' accuracy does not differ by the level of students' cognitive abilities. Each of the variables has rather a separate effect on accuracy as measured by the number of errors per the number of words. The null hypothesis for interaction has, therefore, been confirmed for the accuracy measure while the alternative one has been rejected:

H_0: There is no significant effect due to the interaction between task complexity and learners' abilities on their writing accuracy.

H_1: There is a significant effect due to the interaction between task complexity and learners' abilities on their writing accuracy.

Henceforth, the effects of task complexity and cognitive differences could be analysed separately. The relative effect of the first variable ($F= 1.6 > 1$ and $p=0.1915 > 0.05$) is weaker than the one of variation in the second variable ($F=2.53$ and $p=0.0592 > 0.05$). After calculating the effect-size (η^2) for the two variables, we found that task complexity can account for only 2.68 % of the total variance in students' writing accuracy while their cognitive differences account for 4.23 % of it. On the other hand, the combination of the two factors accounts for 3.92% of the variance.

6.1.1.2.2.3. Complexity

The same analysis (two-way ANOVA) for fluency and accuracy was conducted to decipher the results of students' production as measured by writing complexity.

Table 6.10.

Two-way ANOVA Summary of Complexity Results

Source	SS	df	MS	F	P
Task Complexity	6.03	3	2.01	1.26	0.29
Cognitive Differences	10.68	3	3.56	2.23	0.0868
TC x CD	5.78	9	0.64	0.4	0.9336
Error	255.05	160	1.59		
Total	277.54	175			

According to the table above, the interaction between task complexity and cognitive ability is not significant (p=0.9336). There is an additive relationship between the two variables in their effects on students' writing complexity. The relationship between task complexity and students' writing complexity does not differ by the level of students' cognitive abilities. The two variables affect complexity as measured by the number of clauses per T-units separately. The interaction null hypothesis has been confirmed for the complexity measure while the alternative one has been rejected:

H_0: There is no significant effect due to the interaction between task complexity and learners' abilities on their writing complexity.

H_1: There is a significant effect due to the interaction between task complexity and learners' abilities on their writing complexity.

The effects of the two factors were analysed separately to conclude that the relative impact of differences in ability (F= 2.23> 1 and p=0.0868 >0.05) is stronger than the one of variation in task complexity ($F=1.26$ and $p=0.29 > 0.05$). The effect-size (η^2), on the other hand, showed that task complexity accounts for only 2.17 % of the total variance in students' writing complexity while their cognitive differences account for 3.82 % of it. The combination of the two factors accounts for 2.08 % of the variance.

6.1.2. Interpretation of the Findings

In this first experiment, the aim was to determine the effects of task complexity on the writing fluency, accuracy and complexity of students with different levels of cognitive abilities, namely, WM and Attention. We, therefore, hypothesised that there is an effect of task complexity on students' writing performance and this effect would vary among learners with different cognitive abilities. The repeated measures experiment revealed that task complexity affects students' writing fluency and accuracy, but it does not affect their syntactic complexity. It also showed that the relationship between task complexity and students' writing fluency, accuracy and complexity does not differ by the level of students' cognitive abilities. There is an additive relationship between task complexity and learners' cognitive differences rather than an interactive relationship; thus, the two variables affect students' performance separately.

Previous research has considered altering task complexity and conditions to affect learners' performance, but it has not tried to consider learners' cognitive differences while doing that. It only deduced the effects of learners' differences after having manipulated task complexity. According to Robinson (2001), increasing task complexity varies in effect among different learners. Our findings show that individual cognitive differences may determine the impacts that task complexity has on students' performance. Therefore, learners' differences must not be overlooked when designing tasks for writing classes.

The findings firstly suggest that task complexity as manipulated through planning time and the number of texts which learners have to process affects students' writing fluency as measured by the mean length of T-units. This effect was most apparent in the simplest versions of the administered tasks, especially the one where no planning time was allowed, and only one text was summarised. As for the tasks where learners were asked to synthesise two texts with or without planning time, they produced less fluent language. At this low level of L2 proficiency, complexity in planning time affects learners' fluency the most. The explanation may be the fact that learners felt pressured to produce language without planning. They wrote as they thought and thus produced more at the expense of either accuracy or complexity or both.

Skehan and Foster's (1999) study reported that pre-planning resulted in no significant change in fluency. Ten years later, however, Ellis (2009) concluded that strategic planning has positive effects on fluency, and concerning accuracy and complexity, the effects of planning are more variable. Those results are not consistent with our study. We found that increasing task complexity by providing no planning time produced more fluency. This result is consistent with that of Ong and Zhang (2010) in that omitting the pre-planning time led to significantly greater fluency of writing. Regarding online-planning, a study conducted by Ellis and Yuan (2005) found that learners given greater time to plan achieved no significant improvement at the level of fluency. However, by closely observing the results of the current study, it can be deduced that the number of elements also influenced fluency. In the tasks which learners had to work with two texts, they produced less fluency. The number of elements; thus, influenced fluency negatively but not significantly. According to Sasayama's (2015) research synthesis, the effect of ±few elements factor as a resource-directing variable on fluency was the most consistent across studies. Robinson (2001), Michel, Kuiken and

Vedder (2007, 2012) and Michel (2011), all investigated the effects of task complexity (±few elements). Their results confirmed that the effects on fluency were negative. Michel et al. (2007, 2012) and Michel (2011) increased the cognitive demands of two argumentative tasks and found consistent results.

The findings secondly show that task complexity as manipulated through planning time and the number of texts that learners must summarize or synthesise affects students' writing accuracy as measured by the ratio of errors to the total number of words. This effect was substantial in the second medium version where they had planning time and two texts to synthesise. It has also been noted that accuracy decreased when no planning time was granted to students, but the decrease was not significant. Contrary to fluency, the effect of task complexity on accuracy was more significant when the number of elements increased. This suggests that complex elements that direct learners' attention towards form affect accuracy more than planning time.

According to Ellis (2003), using planning time allows learners to compensate for their limited processing capacities and perform better in language tasks. However, they prioritize meaning over form (Ellis, 2009). Skehan and Foster (1999) found that pre-planning resulted in no significant change in accuracy. The study conducted by Ahangari and Abdi (2011) also revealed that pre-task planning has no positive effect on accuracy. This was explained by the fact that strategic planning does not ensure the availability of linguistic information for a long time due to WM limitations. Thus, accuracy is not affected. These results are contradicted by Guará-Tavares (2008) and Salimi, Alavinia and Hosseini (2012). The latter study showed that students' L2 written accuracy improved due to the interference of task structure which was investigated too in their study. The results were, thus, contrasting depending on the other task conditions that were manipulated. Yuan and Ellis' (2003, 2004) studies concluded that online planning has a substantial effect on accuracy while strategic planning has more effect on fluency. In another study, Ellis and Yuan (2005) found that learners who were given greater time to online plan produced more accurate and syntactically complex speech and written language. The current study, however, shows that planning time has no significant effect on accuracy.

Research on task complexity has succeeded, till now, to prove that fluency is negatively affected by the number of elements in a task but failed to agree on the nature of its effect on complexity and accuracy (Levkina & Gilabert, 2012). Robinson (2001) showed that increasing task complexity along the number of elements does not affect accuracy, measured by the number of errors, in an oral interactive task. A similar study led by Gilabert (2007) found that manipulating task complexity along the number of elements resulted in increased lexical complexity at the expense of fluency and syntactic complexity, and accuracy measured by self-repairs was positively affected. Kuiken and Vedder (2007) conducted a study in which they investigated the effects of the number of task elements on L2 written production and found that accuracy increases as the Cognition Hypothesis predicts. Manipulating the number of elements in a task seems to draw learners' attention toward linguistic forms which results in more accuracy.

Thirdly, the current findings were unable to demonstrate that task complexity as manipulated through planning time and the number of texts affects students' writing complexity as measured by the mean number of clauses per T-unit. However, we observed that learners performed better when they had no planning time and just one text to summarise, and they performed the worst when they had to synthesise two texts. Having more time allows learners to concentrate on few elements to produce more complex language. As Foster and Skehan (2001) argue, learners have traded one linguistic ability for another. They have traded complexity for accuracy.

Skehan and Foster (1997), Mehnert (1998) and Ortega (1999) found that pre-task planning has positive effects on fluency and syntactic complexity. A more recent study conducted by Ahangari and Abdi (2011) revealed that pre-task planning has a positive effect on complexity but no positive effect on accuracy. Yuan and Ellis (2003, 2004) studied both pre-planning and within-task planning and found the effect of the second to be positive on complexity. In Rahimpour and Safari's (2011) investigation, however, the complexity and accuracy of the texts did not differ when adding planning time. Another contrasting result was the one of Mohammadzadeh Mohammadabadi, Dabaghi, and Tavakoli (2013) who found the effect of planning time positive on accuracy but not on fluency and complexity. As for the current study, the effect of planning time on syntactic complexity was not significant.

When investigating task complexity along with the number of elements, Robinson (2001) found that increasing them does not affect syntactic complexity which is the same result we found. A study led by Gilabert (2007), however, does not support these results. Syntactic complexity has decreased. The same happened in Kuiken and Vedder's (2007) study which was concerned with the written modality. According to Sasayama's (2015) synthesis of research, the effect of increasing task complexity along the number of elements on syntactic complexity varied from one study to another. It was positive, null or negative across studies.

Results of the repeated measure experiment indicate that the low ability group declined in fluency when the tasks became more complex. The results also show that learners with high abilities were the most fluent in the more complex versions of the task. Learners with low WM and low attention could not manage to be as fluent as those from the other groups when the tasks became more demanding. Through the statistical analysis, we found that the relationship between task complexity and learners' differences is additive rather than interactive.

Regarding accuracy, participants with high WM were the most accurate in the more complex versions of the task, and those with both high attention and WM were less accurate. The interaction between groups of students' cognitive abilities and task complexity was not significant, and the relationship between the two variables revealed itself to be additive and not interactive. The relationship between task complexity and students' accuracy does not differ by the level of students' cognitive abilities. Each of the variables has rather a separate effect on accuracy.

For the syntactic complexity measure too, the relationship between the two variables was found to be additive and not interactive though it was observed that the low-ability groups performed better in the least complex task, and the high-level group performed better in the most complex tasks.

According to Robinson (2011), individual difference factors are hypothetically influential on the impact of task complexity. Working memory and attention are significantly important cognitive factors in cognitive psychology and second language acquisition (Schmidt, 2001). Empirical evidence has demonstrated the importance of WM and attention and the impact they have on learning a second language. However, few have related WM or attention to task complexity.

High ability learners were found to be better at reading, writing, listening and vocabulary development (Linck, Osthus, Koeth, & Bunting, 2014). Kormos and Sáfár (2008) found a moderate correlation between WM and speaking ability in beginner learners. Gilabert and Muñoz (2010), on the other hand, investigated the relationship between WM and English language attainment and performance and found moderate correlations between WM and lexical complexity only in the high-proficiency group.

They explained this result by claiming that WM is more effective at later stages of acquisition and beginners “may need to use more cognitive resources to store intermediate products between conceptualization and formulation than advanced learners” (Gilabert & Muñoz, 2010, p.37). Payne and Whitney (2002) studied computer-mediated communication, and they revealed a correlation between WM and learners’ L2 oral output. Regarding task complexity, Kormos and Trebits (2011) studied the role of WM across various task complexity levels and found that there was a significant effect of WM on syntactic complexity in the low complex task. This means that high WM might help students produce more complex sentences in simple tasks. This result is the opposite of what was found by the current study, however. Our study is more in alliance with Kim, Payant and Pearson's (2015) study, which found that Iearners with high WM benefited more from complex tasks. According to the Cognition Hypothesis, high demanding tasks push learners to use all their WM to process information and make decisions. Therefore, it was suggested that learners with high WM may take advantage of complex tasks while lower ability learners might not be able to keep up. Thus, learners’ differences must be taken into consideration in task design.

Cognitive differences could not be used as moderating variables since their effect combined with task complexity on students’ writing is additive and not interactive. Moderation would have indicated that the effect of task complexity on students’ writing is different for different values of cognitive abilities. In other words, different levels of WM and attention moderate (affect) distinctively the effect of task complexity on writing performance. However, after conducting the repeated measures experiment and analysing its results, we realised that this was not our case. We, therefore, used task complexity and cognitive differences as multiple independent variables, each with its separate impact on the dependent variable (students’ writing). The two just accumulate in a simple way to produce an effect. The combined effects of the two variables are the same as the sum of their individual effects (Hersen, Haynes & Heiby, 2004).

From the repeated measures experiment, we found that the effect of task complexity on students' writing does not depend on their cognitive differences, and the effect of students' cognitive differences on their writing does not depend on the level of task complexity. The two independent variables of this study do act together to produce an effect. While we have not been able to prove that task complexity and learners' cognitive differences have a pattern of interaction to affect writing performance, we proved that the two variables have the separate power to alter this performance. WM and attention may not moderate task complexity and writing in our case, but we consider that students' differences may mediate the effect of task complexity. Mediation indicates a specific causal path (Aguinis, Edwards & Bradley, 2016). It occurs when at least part of the reason task complexity affects students' performance is through cognitive differences. We decided, therefore, to combine the two in order to see whether this affects the results of our second experiment which is presented in the next section.

6.2. The Second Experiment

While the hypothesis claiming that task complexity and learners' cognitive differences have a pattern of interaction to affect writing performance has not been proved, the current research has proved that the two variables have the separate power to alter this performance. WM and attention may not moderate task complexity and writing in this case, but we decided to combine them to see whether respecting students' differences affects the results of the second experiment.

To test the third hypothesis of this research, an experiment with a pre-test-post-test control group experimental group design was designed. Task complexity was manipulated according to learners' WM and attention in the experimental group. The aim was to measure the effect of manipulating task complexity according to students' WM and attention on their writing performance and proficiency. This section reports, statistically analyses and interprets the results of both the control group and the experimental group in the pre-test and post-test.

As stated and explained before in chapter 4, the pre-test used in the second experiment is the same simple version task of the repeated measures experiment. Students were asked to write a summary of one text in a reading-to-write task. This research project is based on a case study method used to investigate a group of first-year EFL university students at Oum el Buaghi University. During the treatment phase, we set to determine whether manipulating task complexity according to students' cognitive differences positively affects students' writing performance and proficiency or not. The aim was to answer the following question:

- What effect does manipulating task complexity according to students' cognitive differences have on students' writing performance and proficiency?

Accordingly, this question has enabled the formulation of the following hypothesis:

- We hypothesise that manipulating task complexity according to students' cognitive differences would positively affect students' writing performance and proficiency.

6.2.1. Results of the Experiment

After scrutinising the results of the first experiment, data were collected for the second experiment, and two types of statistical analyses were performed: a descriptive analysis and an inferential analysis.

6.2.1.1. Descriptive Statistical Analysis

Descriptive statistical analysis was used as a first step to describe the results of the two tests. To gain an idea about the starting point for the control group and the experimental group, it was necessary to compare the pre-test results for both of them. This helped in comparing the results of the post-test. After that, a comparison was drawn between the results of the two tests (pre and post) for the control and experimental groups.

6.2.1.1.1. The Pre-Test

First, a descriptive analysis of the data obtained through the pre-test as a data collection instrument was conducted. The data were analysed descriptively in terms of measures of central tendency (mean, $\bar{X}$), which is the arithmetic average of scores, and measures of variability (standard deviation, SD) which is the index that describes the location of the scores in the distribution compared to the mean (Urdan, 2010).

Table 6.11.

Descriptive Statistics of the Results in the Pre-Test

Group	**Fluency**		**Accuracy**		**Complexity**	
	$\bar{X}$	**SD**	$\bar{X}$	**SD**	$\bar{X}$	**SD**
Control Group (N=30)	12.855	4.806	1.124	0.459	1.49	0.557
Experimental Group (N= 29)	13.009	3.532	1.098	0.53	1.536	0.465

The results show that the mean measure of fluency ($\bar{X}$=12.855) of the control group is lower than the mean of the experimental group ($\bar{X}$=13.009). The standard deviation indicates how spread apart from the mean the scores are (Urdan, 2010). According to the results, students' fluency scores are more dispersed in the control group (SD= 4.806) than they are in the experimental group (SD=3.532).

From the table above, it can be noted that the mean measure of accuracy of the control group ($\bar{X}$=1.124) is higher than the mean of the experimental group ($\bar{X}$=1.098). The calculation of the standard deviation indicates that students' accuracy scores are more spread in the experimental group (SD=0.53) than they are in the control group (SD=0.459).

The results of the pre-test also show that the complexity mean measure of the control group ($\bar{X}$=1.49) is lower than the mean of the experimental group ($\bar{X}$=1.536). Students' complexity scores are more dispersed in the control group (SD= 0.557) than they are in the experimental group (SD=0.465).

These results show that the control group and the experimental group started from slightly different points when it came to fluency, accuracy and complexity. The written productions of the experimental group students were more fluent, accurate and syntactically complex. The experimental group had more consistent scores in fluency and complexity while its accuracy results varied more.

6.2.1.1.2. The Post-Test

Table 6.12.

Descriptive Statistics of the Post-Test Results

Group	Fluency		Accuracy		Complexity	
	$\bar{X}$	**SD**	**$\bar{X}$**	**SD**	**$\bar{X}$**	**SD**
Control Group (N=30)	14.016	4.252	1.454	0.896	1.353	0.429
Experimental Group (N= 29)	15.901	3.759	1.435	0.517	1.763	0.435

As shown in the table above, the mean measure of fluency of the control group ($\bar{X}$=14.016) is lower than the one of the experimental group ($\bar{X}$=15.901). The standard deviation indicates that students' fluency scores in the post-test are more dispersed in the control group (SD= 4.252) than they are in the experimental group (SD=3.759).

From the table displaying the post-test results, it can be deduced that the mean measure of the accuracy of the control group is $\bar{X}=1.454$ while the mean of the experimental group for the same measure is $\bar{X}=1.435$. This shows that the experimental group demonstrated more accuracy than the control group. The standard deviation points out that students' accuracy scores are more spread in the control group (SD=0.896) than they are in the experimental group (SD=0.517).

The results also show that the mean measure of complexity ($\bar{X}=1.353$) of the control group is still lower than the mean of the experimental group ($\bar{X}=1.763$). However, the complexity scores become slightly more dispersed in the experimental group (SD=0.435) than they are in the control group (SD=0.429).

These results indicate that the ending points of the control group and the experimental group were different from the starting ones for the different measures of fluency, accuracy and complexity. While the written production of the experimental group students remained more fluent, accurate and syntactically complex in the post-test, the consistency of the accuracy results had increased and became more prominent in the experimental group.

6.2.1.1.3. Pre-test vs. Post-test

6.2.1.1.3.1. Fluency

Table 6.13.

Descriptive Statistics of the Fluency Results

Group	Test	$\bar{X}$	SD	Improvement	
Control	**Pre-test**	12.855	4.806	$\bar{X}$	**SD**
	Post-test	14.016	4.252	1.161	-0.554
Experimental	**Pre-test**	13.009	3.532	$\bar{X}$	**SD**
	Post-test	15.901	3.759	2.892	0.227

According to the table above, there was an improvement in the fluency results of both the control and experimental groups, and this improvement was greater in the experimental group (2.892>1.161). On the other hand, the indicator of how the scores are spread out from the mean or the standard deviation declined in the control group while it increased in the experimental group. This means that the post-test fluency values became closer to the mean or less dispersed in the control group while they deviated further from the mean in the experimental group.

6.2.1.1.3.2. Accuracy

Table 6.14.

Descriptive Statistics of the Accuracy Results

Group	**Test**	**$\bar{X}$**	**SD**	**Improvement**	
Control	**Pre-test**	1.124	0.459	**$\bar{X}$**	**SD**
	Post-test	1.454	0.896	(-)0.33	0.437
Experimental	**Pre-test**	1.098	0.53	**$\bar{X}$**	**SD**
	Post-test	1.435	0.517	(-)0.337	-0.013

The table above shows that there was no improvement in accuracy for both groups. On the contrary, there was a decline indicated by the minus (-) sign added between brackets. For accuracy, which is measured by the number of errors per the total number of words, any increase in the mean ($\bar{X}$) indicates a decline in the accuracy. This deterioration was slightly greater in the experimental group (-0.337). On the other hand, the scores were less spread out from the mean in the experimental group while they were noticeably more dispersed in the control group.

6.2.1.1.3.3. Complexity

Table 6.15.

Descriptive Statistics of the Complexity Results

Group	Test	$\bar{X}$	SD	Improvement	
Control	**Pre-test**	1.49	0.557	$\bar{X}$	**SD**
	Post-test	1.353	0.429	-0.137	-0.128
Experimental	**Pre-test**	1.536	0.465	$\bar{X}$	**SD**
	Post-test	1.763	0.435	0.227	-0.03

The results in the table show that there was a deterioration in student's performance as measured by syntactic complexity in the control group (-0.137) while there was an improvement in the experimental group (0.227). The change in dispersion was more prominent in the post-test results of the control group. While the scores of the control group became less dispersed, the improvement in the experimental group was barely noticeable (-0.03).

We deduce that there has been an improvement in fluency and complexity for the experimental group while accuracy has deteriorated for both groups. To sum up the results of the descriptive statistical analysis, it can be said that students of the experimental group have outperformed those of the control group in both fluency and complexity. As for accuracy, it is the control group which outperformed the experimental group. To have a deeper analysis of the students' scores and to find out whether the observed differences between them are statistically significant or not, it is wise to appeal to a more complex statistical analysis.

6.2.1.2. Inferential Statistics for Hypothesis Testing

Complex inferential statistical analysis was used as a second step to test the hypothesis and generalize results to the population as a whole. The t-test is "A parametric inferential statistical test of the null hypothesis for a single sample where the population variance is not known” (Jackson, 2014, p. 155). In plain words, the t-test is a statistical tool that is used to compare two means to see if they are significantly different from each other.

From this, the one-tailed statistical test (calculated t-test) is defined as the mean difference ($\boldsymbol{X}_1-\boldsymbol{X}_2$) between groups divided by their variances ($\sqrt{\boldsymbol{\sigma}_{12}\boldsymbol{n}_1+\boldsymbol{\sigma}_{22}\boldsymbol{n}_2}$). Many versions of this test exist in practice according to different situations. The best version suiting a small sample size with an equal number of participants in the experimental and control conditions is the following simple formula: $\boldsymbol{t}_c=\boldsymbol{X}_1-\boldsymbol{X}_2/\sqrt{\boldsymbol{\sigma}_{12}\boldsymbol{n}_1+\boldsymbol{\sigma}_{22}\boldsymbol{n}_2}$

6.2.1.2.1. Paired T-test for Pre-test vs. Post-test

The paired t-test or within-subjects test is an inferential statistical tool used to compare the means of the two samples of related data. The data are related, in the case of the current study, because they belonged to the same group of students (control or experimental group). This test has been applied to compare the pre-test and post-test scores of the control group and to compare those of the experimental group. The aim was to test the following directional hypotheses:

H: Manipulating task complexity according to students’ cognitive differences would have a significant positive effect on students’ writing performance.

A set of paired t-tests were performed for academic writing to examine whether the differences in mean scores of the fluency, accuracy and complexity measures reached statistically significant levels or not.

6.2.1.2.1.1. Paired T-test for Fluency

The first t-test conducted on the fluency measure served the aim of discovering whether there was a significant difference between the results of the pre-test and those of post-test or not. This led to the decision about manipulating task complexity according to students’ cognitive differences. The aim was to prove or reject the first null hypothesis:

H_1: Manipulating task complexity according to students' cognitive differences affects students' fluency positively.

H_0: Manipulating task complexity according to students' cognitive differences does not affect students' fluency positively.

Table 6.16.

Within Subjects Test for Fluency

Groups	**t-crit**	**df**	**t**	**p**
Control group (N=30)	1.699	29	1.048885	0.15145
Experimental Group (N=29)	1.701	28	4.971185	0.00002

The control group results for the repeated measures t-test shown in the table above indicate that for a degree of freedom df= 29, the value of $t(29) = 1.048885$ and the significance level p is 0.15145. Therefore, $p > 0.05$ and $t <$ t-crit (1.699), which is the tabulated critical value of t. The result is not significant as a consequence. This suggests that the change in fluency for the control group is not statistically significant, and thus the fact that students' writing performance did not enhance significantly in the post-test can be confirmed.

The experimental results for the first t-test conducted show that for a df= 28, the value of $t(28) = 4.971185$ and the significance level p= 0.00002, which means that $p < 0.05$ and $t >$ t-crit (1.701). The result is, therefore, statistically significant and there is little than 5% chance that it occurred randomly and not as a result of the treatment if compared with the results of the control group. Thus, it can be confirmed that students' writing fluency enhanced significantly in the post-test. The null hypothesis can be rejected in favour of the experimental hypothesis, thus; manipulating task complexity according to students' cognitive differences affects students' fluency positively. However, this must be confirmed using an independent t-test.

6.2.1.2.1.2. Paired T-test for Accuracy

The paired t-test conducted on the accuracy measure served the aim of discovering whether there was a significant difference between the results of the pre-test and those of the post-test or not. Its aim was to prove or reject the second null hypothesis:

H_2: Manipulating task complexity according to students' cognitive differences affects students' accuracy positively.

H_0: Manipulating task complexity according to students' cognitive differences does not affect students' accuracy positively.

Table 6.17.

Within Subjects Test for Accuracy

Groups	t-crit	Df	t	p
Control group (N=30)	1.699	29	1.865877	0.0361
Experimental Group (N=29)	1.701	28	2.373485	0.01236

The accuracy results for the repeated measures t-test in the table above show that for a df= 29 for the control group, the value of t (29) = 1.865877 and p= 0.0361which is inferior to the value 0.05 and t > t-crit (1.699). The result is, therefore, significant. This means that the change in accuracy is statistically significant, and students' writing performance changed significantly in the post-test. The results are measured by the number of errors per the total number of words though. This means that the students' accuracy has significantly declined for the control group.

As for the experimental group, the results of the first t-test indicate that for a df= 28, the value of t (28) = 2.373485 and p= 0.01236 which is < 0.05 and t > t-crit (1.701) in this case. Therefore, the accuracy results are statistically significant. Students' writing accuracy declined significantly in the post-test for this group too. The null hypothesis can be rejected because the means of the accuracy results are not the same in the pre-test and the post-test. However, based on the descriptive statistics conducted above and the t-test results of the control group, it can be deduced that the change in accuracy between the two tests is not the result of the treatment. Therefore, manipulating task complexity according to students' cognitive differences cannot be claimed to positively affect students' accuracy until conducting an independent t-test.

6.2.1.2.1.3. Paired T-test for Complexity

The paired t-test conducted on the complexity measure allowed the researcher to know whether there is a significant difference between the results of the pre-test and post-test for the two groups or not. Its aim was to prove or reject the third null hypothesis:

H_3: Manipulating task complexity according to students' cognitive differences affects students' complexity positively.

H_0: Manipulating task complexity according to students' cognitive differences does not affect students' complexity positively.

Table 6.18.

Within Subjects Test for Complexity

Groups	t-crit	df	t	p
Control group (N=30)	1.699	29	-1.153613	0.12904
Experimental Group (N=29)	1.701	28	2.735017	0.00535

In the table above, the results of the t-test show that for a df= 29, the value of t (29) = -1.153613 and the significance level p= 0.12904. Thus, p is superior to 0.05 and t < t-crit (1.699). The result is not significant for the control group which indicates that the change in complexity is not statistically significant. Furthermore, the minus sign in the t value indicates that there is a decline in students' performance.

The experimental results for the complexity measure show that for a df= 28, the value of t(28) = 2.735017 and the significance level p= 0.00535, which means that p < 0.05 and t > t-crit (1.701). The result is statistically significant and it occurred as a result of the treatment. Consequently, it can be confirmed that students' writing complexity enhanced significantly in the post-test for the experimental group. The null hypothesis is rejected in favour of the experimental hypothesis. Therefore, manipulating task complexity according to students' cognitive differences positively affects students' syntactic complexity. To confirm this, an independent t-test must be conducted.

6.2.1.2.2. Independent T-test for Control Group Vs. Experimental Group

The independent t-test is a statistical tool used when the study has a between-participants design and studies two separate groups (Gliner, Morgan & Leech, 2011). In the current research, the independent t-test was used to compare the two groups' (control and experimental) performances in the pre-test and post-test separately. The aim is to further test the same directional hypotheses:

H_1: Manipulating task complexity according to students' cognitive differences would have a significant positive effect on students' writing performance.

A set of independent t-tests were performed for the three measures of academic writing: fluency, accuracy and complexity. The aim was to examine whether the differences in mean scores between the control group and the experimental group were statistically significant.

6.2.1.2.2.1. Independent T-test for Fluency

The second t-test conducted on fluency measure was the independent t-test. It helped decide whether there was a significant difference between the results of the control group and the experimental group. Its aim was to prove or reject the first null hypothesis:

H_1: Manipulating task complexity according to students' cognitive differences affects students' fluency positively.

H_0: Manipulating task complexity according to students' cognitive differences does not affect students' fluency positively.

Table 6.19.

Independent T-test for Fluency

Test	t-crit	df	T	p
Pre-test	1.676	57	-0.13936	0.444827
Post-test	1.676	57	1.80088	0.038506

When comparing the t-test results of the control group and the t-test results of the experimental group for the pre-test, we found that for a degree of freedom df= 57 the value of t(57) = -0.13936 and the significance level p is 0.444827. Therefore, p is superior to 0.05 and t < t-crit (1.676) which is the tabulated critical value of t for 57 as a degree of freedom. The result is not statistically significant consequently. This suggests that the change in fluency in the pre-test was not statistically significant, and thus there was no significant difference between the writing performance of students belonging to the control group and experimental group before the treatment.

The table above shows that in the post-test, the change in fluency means between the control group and the experimental group is statistically significant (p=0.038506). For a df= 57 the value of t(57) = 1.80088 and the significance level p <0.5, and t> t-crit (1.676). This led to the rejection of the null hypothesis (H_0) in favour of the experimental hypothesis (H_1). Therefore; manipulating task complexity according to students' cognitive differences positively affects students' fluency, for the change in means occurred in the experimental group and not in the control group.

6.2.1.2.2.2. Independent T-test for Accuracy

The significance of the difference between the results of the control group and the experimental group in terms of accuracy was investigated using the independent t-test on this measure. Its aim was to prove or reject the second null hypothesis:

H_2: Manipulating task complexity according to students' cognitive differences affects students' accuracy positively.

H_0: Manipulating task complexity according to students' cognitive differences does not affect students' accuracy positively.

Table 6.20.

Independent T-test for Accuracy

Test	t-crit	df	T	p
Pre-test	1.676	57	0.19936	0.421346
Post-test	1.676	57	0.10038	0.460199

In Table 6.20., the t-test results of the control group and those of the experimental group show that in the pre-test, for a degree of freedom df= 57 the value of t(57) = 0.19936 and the significance level p is 0.421346. Therefore, p is superior to 0.05 and t < t-crit (1.676). Therefore, the result is not statistically significant which indicates that the change in accuracy in the pre-test was not statistically significant, and thus it can be confirmed that there was no significant difference between the writing performance of students belonging to the control group and experimental group before the treatment.

The table also shows that in the post-test, the change in accuracy means between the two groups is not statistically significant (p=0.460199). For a df= 57 the value of t(57) = 0.10038, the significance level p <0.5 and t< t-crit (1.676). As a consequence, accept the null hypothesis (H_0) was accepted and the experimental hypothesis (H_2) rejected. Manipulating task complexity according to students' cognitive differences does not positively affect students' accuracy because no change in means occurred in both groups.

6.2.1.2.2.3. Independent T-test for Complexity

The independent t-test conducted on the complexity measure allowed us to know if there was a significant difference between the results of the two groups. Its aim was to further prove or reject the third null hypothesis:

H_3: Manipulating task complexity according to students' cognitive differences affects students' complexity positively.

H_0: Manipulating task complexity according to students' cognitive differences does not affect students' complexity positively.

Table 6.21.

Independent T-test for Complexity

Test	t-crit	df	t	p
Pre-test	1.676	57	-0.34912	0.364142
Post-test	1.676	57	3.63966	0.000295

The above results in Table 6.21. show that for a degree of freedom df= 57, the value of t(57)= -0.34912 and the significance level p is 0.364142. Therefore, for the pre-test scores, p is superior to 0.05 and t < t-crit (1.676). The result is not statistically significant which means that the change in complexity in the pre-test was not statistically significant, and thus it can be confirmed that before the treatment there was no significant difference between the writing complexity of students belonging to the control group and the experimental group.

Concerning the post-test, the results reveal that the change in complexity mean scores between the control group and the experimental group is statistically significant (p=0.000295). For a df= 57, the value of t(57) = 3.63966 which is superior to t-crit (1.676), and the significance level p is inferior to 0.5. We can, therefore, reject the null hypothesis (H_0) and accept the experimental hypothesis (H_3) according to which manipulating task complexity according to students' cognitive differences positively affects students' syntactic complexity because the change in mean scores occurred in the experimental group and not in the control group.

The results of the inferential statistical tests supported those of the descriptive statistical tests. From the statistical analyses of the results, it is possible to deduce that there has been a positive change in fluency and syntactic complexity for the experimental group while accuracy has deteriorated in both groups. We, therefore, conclude that the final hypothesis of this thesis is accepted when writing performance is measured in terms of fluency and syntactic complexity, and it is rejected when students' performance is measured in terms of accuracy.

6.2.2. Interpretation of the Findings

As stated before, research suggests that learners' abilities and task conditions and design should be matched to guarantee progress for all the learners (Robinson, 2002, 2005, 2007). Learners should practice task performance at their level. For that, we hypothesized that respecting students' cognitive differences in terms of WM and attention, and manipulating task complexity accordingly would have a significant positive effect on their writing performance as measured by fluency, accuracy and syntactic complexity. A series of t-tests were conducted to test this prediction. Consistent with this hypothesis, the experimental group has shown significant improvement in performance when compared to the control group. However, this improvement has not extended to include all the measures of the dependent variable. Only students' fluency and syntactic complexity have shown enhancement while their accuracy declined. Therefore, the third hypothesis of this thesis was accepted for the fluency and syntactic complexity measures of writing performance, and it was rejected for the accuracy measure.

Very few studies address the interactive or the additive influence of learners' cognitive differences and task complexity. However, research is consistent about the fact that in the classroom setting, learners with lower WM capacity and attention may find it very challenging to complete a complex task (De Jong, 2010).

Regarding fluency, and as opposed to Robinson's (2001) Cognition Hypothesis, it increased with the increase of task complexity and it developed too. Foster and Skehan (2001) argue that learners trade form for content when task complexity is increased. This hypothesis was emphasised in the current case as it was in Ishikawa (2006). This result can be explained by the fact that respecting the level of students' cognitive abilities and matching it with the increasing cognitive demands of pedagogic tasks has an influence on learning. These cognitive demands which burden students' WM and attention drive them to stretch their interlanguage system to produce more language (Rahimpour, 1999). Foster and Skehan (1999) explain this result by claiming that more complex tasks incite learners to allocate their attention to context and to neglect form leading to more fluency. The repeated measures experiment showed that augmenting task complexity affects students' writing fluency positively, and the second experiment showed that taking learners' cognitive differences in WM and attention into consideration also benefits the development of their linguistic ability.

In terms of accuracy, students' production was not significantly better. According to Foster and Skehan (2001), increasing the complexity of the task induces learners to focus on meaning first then form. Robinson's (2001) model, on the other hand, predicts that increasing task cognitive complexity induces learners to focus on form and produce more accurate and complex language; learners use all their cognitive resources to do so. However, this hypothesis was thwarted in this research as it was in Hosseini and Rahimpour (2010) and Levkina and Gilabert (2012). Their studies disproved that increasing the cognitive task complexity via combining resource-dispersing and resource-directing dimensions has any effect, whether positive or negative, on linguistic accuracy. Our results regarding accuracy can be explained by the fact that matching the task to the level of students' cognitive abilities does not ensure the availability of the linguistic information necessary to produce accurate language, nor it helps to develop it. Proficiency is an important variable that must be considered and which is low at this level (first-year students). Linguistic accuracy seems to be more influenced by individual learners' ability to produce accurate sentences and the development of their interlanguage than cognitive task difficulty. While the repeated measures experiment showed that augmenting task complexity affects students' writing accuracy positively, the second experiment showed that respecting learners' differences in working memory and attention does not benefit their linguistic attainment.

As for syntactic complexity, the results contradict Robinson's (2001) Cognition Hypothesis which suggests that students' production increases in complexity as tasks grow in cognitive complexity. However, the second experiment shows that students' writing has developed in complexity after their cognitive abilities have been matched with the designs of the tasks. This result seems supportive of Foster and Skehan's (2001) Trade-off hypothesis, and attentional resources appear to have been allocated only to linguistic complexity but not to accuracy. We can argue that respecting the level of students' cognitive abilities and matching it with the increasing cognitive demands of pedagogic tasks influences language learning. Foster and Skehan (2001) explain this result by claiming that it is possible that "tasks with difficult content will prompt learners into trying to express themselves through complex language forms because it makes them realize that simple language will not do" (p. 197) and this helps them develop the complexity of their interlanguage. We suggest, therefore, that augmenting task complexity does not affect students' writing complexity, but taking learners' cognitive differences in WM and attention into consideration benefits the development of their linguistic ability.

Conclusion

This chapter dealt with the analysis, discussion and interpretation of the results of the two research experiments. The repeated measures experiment showed that increasing task complexity affects students' writing positively, and the effect of task complexity on students' writing does not depend on their cognitive differences. However, the two variables accumulate to produce an effect on writing. This conclusion incited us to conduct the second experiment which showed that taking learners' cognitive differences in WM and attention into consideration while manipulating task complexity benefits the development of students' writing ability.

General Conclusion

1. Summary of the Research

SLA research has long been trying to answer the question of why students vary in their language learning success, and it has resolved that individual differences are the first responsible for such variation. Learning happens as a result of the optimal interaction between learners' variables and learning environment. Prior to this study, research has assumed that increasing task complexity varies in effect among different learners but has not tried to determine the impact it has by matching task complexity with learners' cognitive differences. Considering learners' cognitive differences while trying to design tasks is not a common practice in the Oum el Bouaghi's EFL writing classes. There stems the need to investigate the effects of manipulating task complexity according to learners' cognitive differences on their writing performance and ultimate attainment. The aims for conducting this study were reviewing the literature relevant to TBLT and learners' cognitive differences, filling the gap in research concerning task complexity and calling for adopting writing tasks that respect learners' differences in cognition in the Algerian context.

We also aimed at discovering the attitudes of the teachers and students of Oum el Bouaghi University towards manipulating task complexity according to students' cognitive differences through administering two questionnaires: one for the teachers and one for the students. The results of the questionnaires were used as an introduction to the experimental part of the study whose purpose was to find the exact effect of task complexity on the writing performance of students with different cognitive abilities, and the effect that manipulating task complexity according to students' cognitive differences has on students' writing performance and proficiency. To attain this aim, we conducted a repeated-measures experiment and a pre-test post-test control group experimental group experiment.

The results of this research demonstrated that the English Department teachers at the University of Oum el Bouaghi and its first-year students acknowledge the value of differentiating writing tasks according to students' cognitive differences. On the other hand and contrary to what was predicted, the results demonstrated that the effects of task complexity on students' writing performance do not vary among learners according to their differences in WM and attention. However, this does not mean that the two cognitive variables do not contribute to affect students' performance along with task complexity. Quite the contrary, we found that they accumulated to create an impact. At least part of the reason task complexity affects students' performance is through cognitive differences. Subsequently, we decided to conduct the second experiment which resulted in showing that manipulating task complexity according to students' cognitive differences positively affects students' writing as measured by fluency and syntactic complexity but not when it is measured by accuracy. For the final attainment of students, the small period of the experiment did not help them develop their accuracy but it helped them learn to produce more complex and fluent language.

2. Limitations of the Research

Though any decision regarding the design and the procedures of this study was thoroughly considered, several limitations should be acknowledged.

Firstly, the research focused on two cognitive variables (WM and attention) without taking into account other variables such as anxiety or motivation, which also may play a significant role in task performance. The scope of this research has been limited to only two cognitive complexity variables (planning time and the number of elements). These two task manipulation variables are the ones closely related to WM and attention according to Robinson (2001), and they are also related to the nature of the tasks used (summary and synthesis writing).

Secondly, the non-random selection of the sample, which has an impact on the external validity or generalizability of the findings, is another limitation of any study. In this situation, randomization is not practical or even feasible since pedagogical groups are formed by the administration and it was difficult to access other universities in Algeria. The internal validity of the study was also affected by the number of absences in participants. Some of those have missed only one task, but they had to be counted as dropouts which decreased the size of the sample. This latter became a biased sample of only diligent students who were always present.

Thirdly, other limitations of the current study might be related to data collection and measuring instruments. Though the WM writing span test and the Ruff 2 & 7 attention test have proved their reliability throughout research, administering them in a classroom has been an alternative for doing so in a language laboratory where conditions, especially timing, could have been more controlled. Hence, results could have been more precise.

Other limitations regarding testing include the writing measures of fluency, accuracy and complexity as they measure linguistic forms only and not meaning. As far as comprehension is involved in reading-to- write tasks, writing quality could have been another measure used in this research. We could have used Head et al.'s (1989; as cited in Sung, Liao, Chang, Chen & Chang, 2016) proportion of important idea units (IMUPIU/IU) which corresponds to the ratio of the number of important idea units (IMUPIU) divided by the total number of idea units (IU) in the summary. Although this measure would have been a good one for writing a summary, we could not assume that it is as valuable for synthesis writing. Therefore, we opted for not using it.

3. Implications of the Research

The inconsistent findings of previous research about how differences in task complexity affect writing performance have inspired the current research. The rationale was that task performance might differ for individuals with differences in WM and attentional capacities due to these differences and not due to increased task complexity. As a result, the effect of sequencing tasks following cognitive complexity might not be as efficient as planned to be. We assumed that grouping learners into homogeneous groups and giving them the appropriate tasks might make the effect of increasing task complexity more predictable and rewarding.

Although the fact that task complexity interacts with learners' differences to affect their writing was not confirmed, the results showed that they accumulate to influence performance. The consequence is that task performance varies among learners with individual differences, and this may affect the comparability of the results in repeated measures experiments. This is what we presume accounts for some of the inconsistencies in previous task complexity research.

As for the potential pedagogical implications of the findings in this study, the most direct one is for syllabus design and task sequencing. Robinson (2001) argues that sequencing decisions can be based on task complexity for its "robust and manipulable influence on learners' production" (p. 51). Moving from simple to more complex tasks might incite learners to produce better language. Robinson (2001) also argues that task complexity is preferred over task difficulty, which is learners' abilities and perception of the task because it can be diagnosed in advance (before a language program starts), and it is more stable. Nevertheless, task difficulty should be taken into account by teachers for they can assess learners' factors in the classroom and, therefore, predict the results their task sequencing would have. This possibility would help task and syllabus designers to apply the TBLT methodologies in more effective and resourceful ways. As for learners, administering tasks that cater for their similarities and differences gives them better learning opportunities. Finally, task complexity also has implications for exams since different outcomes can be predicted depending on the type of the task given. Using this strategy also informs testing, for teachers will be more informed about what fits different students and what allows them to demonstrate learning without extra load; therefore, they can balance test expectations and test design.

The most important finding of this study is the recognition of WM and attention as predictors for good writing. Considering this, differences in cognition among learners need to be taken into account while making decisions about instruction design. As a consequence, teachers may use the results of this study to gain a better view of their learners' profiles, and thus design better lessons and writing tasks to enhance their writing ability. By profiling the learners' cognitive strengths and weaknesses in language learning, it should be possible to match these profiles to tasks and thus improve their chances of success in learning an L2.

4. Future Research Suggestions

Based on the results and limitations of this study, we have some suggestions for future research. These suggestions are related to the research design, the research variables, the instruments of measuring writing and the cognitive differences of the participants, and the duration of the experiment.

Creating tasks that cater for learners' differences gives them better learning opportunities. However, for each cognitive difference, an associated task complexity must be manipulated, and this can be done by excessive research on how different cognitive abilities affect different manipulable task complexities. Learners with different abilities also approach task completion in different ways. Therefore, future research may be interested in the strategies learners use and whether those with the same cognitive profile use the same strategies. Furthermore, other components of written production could be considered. As reading-to-write tasks involve text comprehension, lexical complexity and lexical variety should be examined. Future research may also choose to test learners' WMC using other WM span tests and choosing other environments for these tests. A holistic measure of writing quality might be used to further depict learners' comprehension, for it is primordial for high performance. In addition to the suggestions already commented on for future research, longitudinal studies could show the effects of task complexity and difficulty on L2 learning.

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APPENDICES

Appendix 1: Teachers Questionnaire

Appendix 2: Students Questionnaire

Appendix 3: Pilot Study for the Questionnaire

Appendix 4: Working Memory Test

Appendix 5: Words for the Working Memory Test

Appendix 6: TEST RUFF 2 & 7: Parallel Search (ADAPTED)

Appendix 7: Topic Familiarity Test

Appendix 8: Writing Tasks

Appendix 1

Teachers Questionnaire

Dear Teacher,

It would be generous of you to help us by answering the following questionnaire. It is part of our research study, and it aims at examining the teachers' attitudes and perceptions of learners' cognitive differences at the university level and how responsive they are to these differences. The data collected will help us make future recommendations about matching instruction to learners' differences in the Algerian EFL classroom.

To answer the questions, please circle the appropriate answer (you may choose more than one answer when suitable) and give a complete answer when necessary.

We are interested in your personal opinion. Please give your answers sincerely as only this will guarantee the success of our investigation. We are much obliged for your help; thank you very much.

Miss Belghoul Hassina

Faculty of Letters and Languages

Department of English

University of Constantine 1

Section One: General Information

1) I am a a) male b) female

2) I belong to the age group
   a) 25-30 b) 31-40 c) 41-50 d) ≥50

3) I hold the degree of

....

4) The teaching approach I judge myself to be using the most in my classroom is
   a) The traditional approach.
   b) The communicative approach.
   c) The task based learning approach.
   d) An eclectic approach.
   e) Another approach: *(Please, name it)* …………………………………

Section Two: Learners' Differences

5) Every learner is **equally** able to learn a foreign language.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

6) It is sufficient for learners to put a lot of effort to learn a foreign language.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

7) It is sufficient to be exposed to a foreign language to learn it.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

8) Learners need to have a **special** aptitude for language learning.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

9) Rate the importance of the following factors in determining language learners' success by simply giving marks from 1 to 6. *(1 being the most important and 6 the least important).*

a) Linguistic intelligence	
b) Language learning aptitude	
c) Personality	
d) Motivation	
e) Attitude	
f) Age of learning	

10) Add other factors that in your opinion determine success in learning an L2.

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11) Which factors determine success in learning an L2 the most?

a) External factors (environmental: like the type of instruction).

b) Internal factors (like personality, motivation and aptitude).

c) The interaction between the internal and the external factors.

12) Working Memory is (you can circle more than one option)

a) the same as Short Term Memory.

b) part of Memory.

c) part of the Information-Processing System.

d) like a mental sketchbook that stores and treats information.

13) Working Memory is limited in capacity.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

14) Learners differ in their Working Memory.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

15) Attention is the ability to select and focus on particular stimuli while ignoring others.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

16) Attention is limited in capacity.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

17) Learners differ in their Attention.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

18) Learners differ in their reading fluency (which means reading with proper speed and ease) and comprehension.

a) Yes b) No

If your answer to 18 is yes, please answer 19.

19) The differences in reading fluency and comprehension are due to.

a) Their level of proficiency

b) Their cognitive abilities

c) Both

20) Learners differ in their writing fluency (defined by Lenski and Verbruggen (2010) as the ability to create text without relying too much on memory) and writing quality.

a) Yes b) No

If your answer to 20 is yes, please answer 21.

21) The differences in the fluency and quality of their writing are due to.

a) Their level of proficiency

b) Their cognitive abilities

c) Both

22) Learners plan their writing tasks.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

23) Some learners need more time planning their writing task than others.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

24) Learners are all equally able to focus on complex writing tasks that contain many elements.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

Section Three: Differentiated Instruction

25) To be fair to my students, I should offer all of them the same writing task to do.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

26) Assessing my learners' cognitive differences in Working Memory is important.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

27) Assessing my learners' cognitive differences in Attention is important.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

28) My learners' cognitive abilities are fixed and teaching cannot improve them.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

29) I can adjust my teaching to respect learners' differences.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

30) I offer more planning time for the learners who are slower than others.

a) Always b) Frequently c) Occasionally d) Rarely e) Never

31) I give different learners different amounts of time to finish the same task.

a) Always b) Frequently c) Occasionally d) Rarely e) Never

32) I give my learners different numbers of task items depending on their cognitive and proficiency level, for example, when asking them to narrate a short story, not all my learners are assigned with the same number of characters.

a) Always b) Frequently c) Occasionally d) Rarely e) Never

This is the end of the questionnaire.

Thank you very much for your cooperation!

Appendix 2

Students Questionnaire

Dear Student,

It would be generous of you to help us by answering the following questionnaire. It is part of our research study, and it aims at examining your attitudes and perceptions of learners' cognitive differences at the university level and how responsive you think instruction is to these differences. The data collected will help us make future recommendations about matching instruction to learners' differences in the Algerian EFL classroom.

To answer the questions, please circle the appropriate box (you may pick more than one answer when suitable) and give a complete answer when necessary.

We are interested in your personal opinion. Please give your answers sincerely as only this will guarantee the success of our investigation. We are much obliged for your help; thank you very much.

Miss Belghoul Hassina

Faculty of Letters and Languages

Department of English

University of Constantine 1

Section One: General Information

1) I am a   a) male   b) female

2) I belong to the age group
   a) 18-25   b) 26-30   c) 31-40   d) ≥40

3) Studying English at University was my first choice
   a) Yes   b) No

4) I judge my English proficiency to be *(please rate your English proficiency by circling the appropriate letter based on the scale given below)*

a) Minimal   b) Reasonable   c) Good   d) Very good

a) ***Minimal****: able to understand the* ***essential information*** *in very simple and predictable texts about* ***familiar topics*** *and to* ***communicate basic*** *information despite* ***lots of errors****.*

b) ***Reasonable****: able to understand the* ***main ideas*** *of straightforward and fairly predictable* ***authentic texts*** *and to* ***convey opinions*** *with* ***some errors*** *that do not prevent the message from getting across.*

c) ***Good****: able to understand most* ***authentic texts*** *and to* ***convey messages*** *and read* ***popular literature*** *for fun.*

d) ***Very good****: able to* ***understand*** *and* ***produce complex language*** *in* ***academic*** *and work contexts as well as* ***social*** *situations.*

Section Two: Learners' Differences

5) Every learner is **equally** able to learn a foreign language.

a) Strongly agree   b) Agree   c) Neutral   d) Disagree   e) Strongly disagree

6) It is sufficient for learners to put a lot of effort to learn a foreign language.

a) Strongly agree   b) Agree   c) Neutral   d) Disagree   e) Strongly disagree

7) It is sufficient to be exposed to a foreign language to learn it.

a) Strongly agree   b) Agree   c) Neutral   d) Disagree   e) Strongly disagree

8) Learners need to have a **special** aptitude for language learning.

a) Strongly agree   b) Agree   c) Neutral   d) Disagree   e) Strongly disagree

If your answer to 8 is strongly agree or agree, please answer 9.

9) I think I possess this aptitude.

a) Yes b) I am not sure c) No

10) Rate the importance of the following factors in determining language learners' success by simply giving marks from 1 to 6. *(1 being the most important and 6 the least important).*

a) Linguistic intelligence	
b) Language learning aptitude	
c) Personality	
d) Motivation	
e) Attitude	
f) Age of learning	

11) Add other factors that in your opinion determine success in learning an L2.

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12) Working Memory is *(you can circle more than one option)*

a) the same as Short Term Memory.

b) part of memory.

c) part of the information-processing system.

d) like a mental sketchbook that stores and treats information.

e) I am not sure what working memory is.

13) Working Memory is important for foreign language learning.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

14) Working Memory is limited in capacity.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

15) Learners differ in their Working Memory.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

16) Attention is important for foreign language learning.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

17) Attention is limited in capacity.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

18) Learners differ in their Attention.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

19) I differ from other learners in my reading fluency (which means reading with speed and ease) and comprehension.

a) Yes b) No

20) I differ from other learners in the fluency (which is the ability to create text without relying too much on memory) and quality of my writing.

a) Yes b) No

21) I plan my writing tasks.

a. Always b. Sometimes c. Rarely d. Never

If your answer to 21 is always or sometimes, please answer 22.

22) To plan a writing task, I need

a) More time than my peers

b) Less time than my peers

c) The same amount of time as my peers

d) More time than some of my peers and less than others

23) All learners are **equally** able to focus on complex writing tasks that contain many elements.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

Section Three: Differentiated Instruction

24) When we have a writing task to do, it is the same for every one of us (students).

a. Always b. Sometimes c. Rarely d. Never

25) My teachers assess/evaluate students' Working Memory.

a. Always b. Sometimes c. Rarely d. Never

26) Teachers **should** assess students' Working Memory.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

27) My teachers assess students' Attention.

a. Always b. Sometimes c. Rarely d. Never

28) Teachers **should** assess students' Attention.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

29) My teachers take students' differences into consideration and thus adjust their teaching accordingly.

a. Always b. Sometimes c. Rarely d. Never

30) Teachers **should** take students' differences into consideration and thus adjust their teaching.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

31) My teachers offer more planning time for students who need it.

a. Always b. Sometimes c. Rarely d. Never

32) Teachers **should** offer more planning time for students who need it.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

33) My teachers give different learners different amounts of time to finish the same task.

a. Always b. Sometimes c. Rarely d. Never

34) Teachers **should** give different learners different amounts of time to finish the same task.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

35) My teachers give learners different numbers of task items depending on their cognitive and proficiency level, for example, when asking them to narrate a short story, not all learners are assigned with the same number of characters.

a. Always b. Sometimes c. Rarely d. Never

36) Teachers **should** give learners different numbers of task items depending on their cognitive and proficiency level.

a) Strongly agree b) Agree c) Neutral d) Disagree e) Strongly disagree

This is the end of the questionnaire.

Thank you very much for your cooperation!

Appendix 3

Pilot Study for the Questionnaire

Mark any items whose wording you do not like. If you have any suggestions, please indicate them in here.

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Mark any items whose meaning is not 100 per-cent clear. If you have any suggestions, please indicate them in here.

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Mark any item that you consider unnecessary. Put its number in here.

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If you can think of anything else that might be worth asking about, we would be grateful.

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Appendix 4

Working Memory Test

Name: ……………………………………..   Group: ………………………………….

Instruction:

- Write down the word you can remember.
- Form a simple sentence using this word.
- Start writing when you see the blank sheet of paper.
- Stop writing and raise your head when you hear the word '**stop'**.

1. Word: ………………………………………..
Sentence: ……………………………………………………………………………

2. Word: ………………………………………..
Sentence: …………………………………………………………………………………

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3. Word: ………………………………………..
Sentence: ………………………………………………………………………………

4. Word: ………………………………………..
Sentence: ……………………………………………………………………………

5. Word: ………………………………………..
Sentence:. …………………………………………………………………………

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6. Word: ………………………………………..
Sentence: ………………………………………………………………………………

7. Word: ………………………………………..
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8. Word: ………………………………………..
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10. Word: ………………………………………..
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11. Word: ………………………………………..
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12. Word: ………………………………………..
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14. Word: ………………………………………..
Sentence: ………………………………………………………………….

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15. Word: ………………………………………..
Sentence: ……………………………………………………………………

16. Word: ………………………………………..
Sentence: …………………………………………………………………….

17. Word: ………………………………………..
Sentence: …………………………………………………………………………

18. Word: ………………………………………..
Sentence: ………………………………………………………………………….

19. Word: ………………………………………..
Sentence:

20. Word: ………………………………………..
Sentence: ……………………………………………………………………

Appendix 5

Words for Working Memory Test

Honour	Repeat	School	
True	Where		
Accept	Mystery	Opportunity	Jump
Factory	Problem	Interview	Extreme
Champion	Suggest	Badly	President
Sympathy	Violent	Responsible	Usually
History	Describe	Shopping	Wonderful

Appendix 6

TEST RUFF 2 & 7: Parallel Search (ADAPTED)

Name: …………………………………….. Group: ………………………………….

Instructions:

- You have **15 seconds** to detect and cross the **2s and 7s** in each block.
- Start from the top left side of the first line and continue to the second and third lines in the same way.
- When time is up, and you hear the word '**next'** move to the next block.

Sample for practice:

2 G O X C 7 M J 7 H Z R N G A S 2 Y W Q 2 L H B Z G J N V 7 E T 2 P R V M J H S T Q 2 C 7 K L W C 7 X M T 7
K T R 2 A V P I W O C 2 G J 7 L S 2 B N V W 7 T O X R 2 P H 7 F D A B M 2 W G K A S T 2 O P H W E D 2 T R
N E Q X 2 P K L 7 P K 7 Z C V 7 2 Z 7 E T G H L K S D L N 7 S 2 W L S N 7 T B M O P W

Blocks:

I W O 2 G O X C 7 M R Q 2 L H B 7 H N G J W Z 7 Z 7 K L G A S J N V 7 E M J 2 Y H T 2 P R V S T Q 2 C X 2 A
W C V 7 L S W M T 7 K T R P C 2 G J 7 T I X R 2 P 7 F D T 2 O M 2 W G P 2 B N V H A B K A S
E D 2 H W T R Z 7 E Q X 2 P K L 7 P K 7 Z C V 7 T G H L 2 W L S K N E 2 S D L N 7 S N O P W7 T B M

C 7 V P I W M J 7 N 2 H Z R G O X G V M W A S 2 Y W Q 2 L H B V 7 E T Q 2 T 2 P R C 7 J H S C 7 K L X M T 7
K A Z G S 2 B J N 7 E T O C 2 G J 7 L N R 2 P H 7 V W 7 T O X F D A B M 2 W G K A S T 2 O P H D 2 2 Z T R C
V 7 N 7 Z T R 2 E Q X 2 P K L 7 P K G H L K W E S D L N 7 S 2 W L S N 7 T B M O P W

X C 7 M J 7 H Z O C 2 R N G A S 2 Q 2 L H B Z 2 P R V T O X 2 G O L K M J H S T Q 2 C 7 K L W C 7 X M T R 2
A V P I W G J 7 L S 2 B G J N V 7 E T N V W 7 R 2 P H 7 F D A B M 2 W G K A S V 7 2 P H W E D 2 N 7 S T R N
T 7 K E Q X 2 P K L 7 P K 7 Z Y W C Z 7 E T T 2 O G H S D L 2 W L S N 7 T B M O P W

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7 M J 7 H Z R L K S D L N G A S 2 Y W Q 2 L H B Z G J N V 7 E T 2 P R V 7 T O X M J H S T Q 2 C 7 K L W C 7
X M T 7 K T R 2 A V P I W O C 2 G J 7 L S 2 B N V W R 2 P H 7 F D A B M 2 W G K A 2 S T 2 O P H W E D 2 2
G O X C T R N E Q X P K L 7 P K 7 Z C V 7 B M O 2 Z 7 E T G H N 7 S 2 W L S N 7 T P W

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2 G O X C 7 M J 7 H Z R N G A S 2 Y 2 Z 7 E T G H L W Q 2 L H B Z G J N 7 S 2 W L S N 7 T B M O P W V V M
J H S T Q 2 W C 7 X M T 7 K T R 2 A V P C 7 K L I W O C 2 G J 7 L S 2 B N V W 7 T O X R 2 P H 7 F D A B M 2
W G K A S T 2 O P H W E D 2 T R N E Q X 2 P K L 7 P K 7 Z C V 7 K S 7 E T 2 P R D L N

P H W E 2 G O X C 7 M J 7 H 2 P K L 7 P K 7 Z C V 7 2 Z 7 E T Z R M O P W N G A S 2 Y W Q P R V M J H S T
Q 2 C 7 K L W C 7 X M T 7 K T R 2 A V P I W O C 2 G J 7 L S 2 B N V W 7 T O X R 2 P A B W G K A S T 2 O D
2 T R N H 7 F D E Q X 2 L H B Z G J N V 7 E T 2 G H L K M 2 S D L N 7 S 2 W L S N 7 T B

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2 G O X C 7 M J 7 H Z R N G A S 2 Y W Q 2 L H B Z G J N V 7 E T 2 P R V M J H S T Q 2 C 7 K L W C 7 X M T 7
K T R 2 A V P I W O C 2 G J 7 L S 2 B N V W 7 T O X R 2 P H 7 F D A B M 2 W G K A S T 2 O P H W E D 2 T R
N E Q X 2 P K L 7 P K 7 Z C V 7 2 Z 7 E T G H L K S D L N 7 S 2 W L S N 7 T B M O P W

C 7 M J 7 H L H B Z G J N V 7 E T 2 P R V M 2 G O X O C 2 J H S T Q 2 C 7 K L W C 7 X M T 7 K T R V P Z R N
G A S 2 T 2 Y W Q 2 D W G J 7 L S 2 B N 7 E T G H 2 Z L 2 A K O V W 7 T O X G K A S T 2 O P H W E I R N E
Q X 2 P K L 7 P K 7 Z C V 7 D L N 7 S 2 W L S N 7 T B S M P W R 2 P H 7 F D A B M 2 W

X C 7 M J 7 H Z R N G A S 2 Y W Q 2 L H B X R 2 Z G O N V 7 E T 2 P R V M J H S T Q 2 C 7 K L W C 7 X M T
7 K T R 2 A V P I W O C L S 2 B N V W 7 T 7 Z J P H 7 F D V 7 2 A B M 2 W G K O P S N 7 W A S T 2 O P H W E
D 2 T R 2 G O N E Q X 2 P K L 7 P K C Z 7 E T G H 2 G J 7 L K S D L N 7 S 2 W L T B M

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2 B N V W 7 T X R 2 P H 7 F Y D A 2 G S B M 2 W G K A S T 2 O P H W E D 2 T R O C 2 N E Q X 2 P K O X C 7
M J 7 H Z O R N G A S 2 W Q 2 L H B Z G J N V 7 E T 2 P R C V 7 2 Z 7 V M W L S N 7 T B M O P W J H S T Q 2
C 7 K L W C 7 X M T 7 K T R 2 A V P I W G J 7 L L 7 P K 7 Z E T G H L K S D L N 7 S 2

TEST RUFF 2 & 7: Serial Search (ADAPTED)

Name: …………………………………….. Group: ………………………………….

Instructions:

- You have **15 seconds** to detect and cross the **2s and 7s** in each block.
- Start from the top left side of the first line and continue to the second and third lines in the same way.
- When time is up, and you hear the word '**next'** move to the next block.

Sample for practice:

3 1 0 7 8 9 4 4 7 0 5 3 7 6 3 8 1 5 2 3 6 5 6 9 7 0 8 9 1 5 7 8 4 3 6 2 8 6 3 2 8 6 7 5 4 2 8 0 9 1
2 9 1 8 9 2 8 1 3 7 6 4 5 3 7 8 0 4 6 7 9 6 2 9 1 2 8 3 9 1 8 3 7 8 9 4 6 5 9 1 4 7 0 8 6 7 1 3 0 3
9 1 0 2 3 3 8 9 4 1 2 6 5 5 3 5 7 6 8 9 5 7 0 5 9 6 1 7 3 2 8 5 9 2 8 3 1 2 8 3 3 7 4 3 8 9 4 6 2 5

Blocks:

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8 9 5 7 0 5 9 6 9 1 0 2 3 3 8 9 4 1 2 6 5 5 3 5 7 6 1 7 3 2 8 5 9 2 8 3 1 2 8 3 3 7 4 3 8 9 4 6 2 5
2 9 1 8 9 2 8 1 3 7 6 4 5 3 7 8 0 6 5 9 1 4 7 0 8 6 7 1 3 0 3 4 6 7 9 6 2 9 1 2 8 3 9 1 8 3 7 8 9 4
2 3 6 5 6 9 7 0 8 9 1 5 7 8 4 3 6 2 8 6 3 2 8 6 7 5 4 2 8 0 9 1 3 1 0 7 8 9 4 4 7 0 5 3 7 6 3 8 1 5

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7 8 9 4 4 7 0 5 3 7 6 3 8 1 5 2 3 6 5 6 9 8 6 7 5 4 2 8 0 9 1 2 9 1 2 8 3 9 1 8 7 3 7 8 9 4 6 5 9 1
5 3 5 7 6 8 9 5 7 0 1 5 7 8 4 3 6 2 8 6 3 2 0 4 6 7 9 6 2 3 1 0 9 1 8 9 2 8 1 3 7 6 4 5 3 7 0 8 0 3
9 1 0 2 3 3 5 9 6 1 7 3 2 8 5 9 2 8 3 1 2 8 3 3 7 4 3 8 9 4 6 2 5 7 8 7 0 8 9 8 9 4 1 2 6 5 6 1 3 4

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3 2 8 5 1 9 8 3 1 2 8 3 3 7 4 3 8 9 4 6 2 5 3 1 0 7 8 9 4 4 7 0 5 3 7 6 3 8 1 6 3 2 8 6 7 5 4 2 9 1
2 9 1 8 9 2 8 1 3 7 6 4 5 3 7 8 0 4 6 7 9 6 2 9 1 2 8 3 9 1 8 3 7 8 9 4 6 5 9 1 4 7 0 8 6 7 1 3 0 3
7 9 0 2 3 3 8 9 4 1 2 6 5 5 3 5 7 6 8 9 5 7 0 5 9 6 2 1 5 2 3 6 5 6 9 7 0 8 9 1 5 7 8 4 3 6 2 8 8 0

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7 8 4 3 6 2 8 6 3 3 7 1 0 7 8 9 4 4 0 5 3 7 6 3 7 6 8 9 5 7 0 5 7 6 8 1 5 2 3 6 5 6 9 7 0 8 9 1 5 5
9 1 8 9 2 8 1 3 7 6 9 1 9 4 2 5 3 7 8 0 3 9 1 8 3 7 8 9 4 6 5 9 1 4 7 0 8 6 7 1 0 3 7 4 3 8 2 4 6 2
8 6 5 4 2 8 9 0 1 0 2 3 3 8 9 4 1 2 6 4 6 7 9 6 2 2 9 1 2 8 5 5 3 5 1 7 3 2 8 5 9 2 8 3 1 3 8 3 3 9

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9 1 0 2 3 3 8 9 4 1 2 6 5 5 3 5 7 6 8 9 5 7 0 5 9 0 8 6 1 3 6 2 8 6 3 2 8 6 7 5 4 2 8 0 9 7 1 3 0 7
2 9 1 8 9 2 8 1 3 7 6 4 5 3 7 8 0 4 6 7 9 6 2 9 1 2 8 1 5 8 4 9 1 8 3 7 8 9 4 6 2 5 9 1 4 7 0 8 6 3
7 3 2 8 5 9 2 8 3 1 2 8 3 3 7 4 3 8 3 9 9 4 6 2 5 3 1 0 7 8 9 4 4 7 0 5 3 7 6 3 8 1 5 3 6 5 6 9 7 1

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3 1 0 7 8 9 4 4 7 0 6 4 5 3 7 8 0 4 6 7 9 6 1 2 9 2 8 3 9 1 5 3 7 6 8 3 7 7 8 9 4 6 5 9 1 4 7 0 8 6
2 1 3 3 0 3 9 1 3 3 8 9 4 1 2 6 5 5 3 5 7 6 8 9 5 7 0 7 5 9 6 1 7 3 2 8 5 9 2 8 3 1 2 8 3 3 7 4 3 8
9 4 6 2 5 8 1 5 2 3 6 5 0 6 9 7 0 8 9 7 1 5 8 4 3 6 2 8 6 3 2 8 6 5 4 2 8 0 9 1 2 9 1 8 9 2 8 1 3 7

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1 2 6 5 5 3 5 7 6 8 9 5 7 6 9 7 0 8 9 1 5 7 8 4 3 6 2 8 6 3 2 8 6 7 5 4 2 8 0 9 1 7 0 8 6 1 3 0 3 4
2 9 1 8 9 2 8 1 3 7 6 4 5 3 7 8 0 4 6 7 9 6 2 9 1 2 9 1 0 2 3 3 8 9 4 8 3 9 1 8 3 7 8 9 7 4 6 5 9 1
0 5 9 6 1 7 3 2 2 8 5 9 8 3 1 2 8 3 3 7 4 3 8 9 4 6 5 3 1 0 7 8 9 4 4 7 0 5 3 7 6 3 8 1 2 5 3 6 5 2

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3 1 0 7 8 9 3 7 6 6 4 5 3 7 8 0 4 6 7 9 6 2 9 1 2 8 3 9 1 8 3 7 8 9 4 6 5 9 1 4 7 0 8 6 7 4 3 6 2 8
6 3 8 6 7 5 4 2 8 0 9 5 1 1 3 8 1 5 2 3 6 5 6 9 7 0 8 7 3 2 8 5 9 9 1 5 7 8 2 9 1 8 9 2 8 1 3 7 3 0
9 4 2 8 3 3 7 4 3 2 8 9 4 6 2 5 1 2 6 5 3 5 7 6 8 9 5 7 0 5 4 4 7 0 5 9 6 1 2 8 3 1 9 1 0 2 3 3 8 3

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4 7 0 5 3 7 6 3 8 1 5 2 3 6 5 6 9 7 0 8 9 9 1 2 8 3 9 3 1 5 7 8 4 3 6 2 8 6 3 2 8 6 7 5 4 2 8 0 9 1
2 9 1 8 9 2 8 1 3 7 6 4 5 3 7 8 0 4 6 7 9 6 6 7 4 3 8 1 8 9 4 6 2 5 5 9 1 4 7 0 8 6 7 1 3 0 3 2 8 3
2 7 8 9 4 9 1 0 2 3 3 8 9 4 1 2 6 5 3 1 0 7 8 9 4 5 3 5 7 6 8 9 5 7 0 5 9 6 1 7 3 3 2 8 5 9 2 8 3 1

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5 3 1 8 2 3 0 3 1 5 2 3 6 5 6 9 7 0 8 7 9 1 5 7 8 9 4 6 7 4 3 6 2 8 6 3 2 8 6 7 5 4 2 8 0 9 1 1 3 0
9 1 8 3 7 8 6 8 9 5 7 0 0 7 6 3 7 8 9 1 8 4 6 7 9 6 2 9 1 2 8 2 8 5 9 2 8 3 8 1 3 5 9 1 4 7 0 8 6 3
9 2 1 0 2 3 3 8 9 4 1 2 6 5 9 2 8 1 3 7 6 4 5 3 5 7 5 9 6 1 7 3 8 3 9 4 4 7 0 5 3 7 4 3 8 9 4 6 2 5

Appendix 7

The Topic Familiarity Test

<u>First task</u>:

How much do you know about the topic?

Directions:

- A number 5 means that you know almost everything about the topic.
- A number 4 means you know a lot about the topic.
- A number 3 means that you know something about the topic.
- A number 2 means that you know a little about this topic.
- A number 1 means that you do not know anything about the topic.

1) The zoo protects animals	1	2	3	4	5
2) Women vs, men in jobs	1	2	3	4	5
3) The Titanic	1	2	3	4	5
4) The scientific method of research	1	2	3	4	5
5) Succeeding at interviews	1	2	3	4	5
6) Stepwells	1	2	3	4	5
7) The psychology of innovation	1	2	3	4	5
8) Museums of fine arts and their public	1	2	3	4	5
9) The context, meaning and scope tourism	1	2	3	4	5
10) The megafires of California	1	2	3	4	5
11) Second nature	1	2	3	4	5

Appendix 8

Writing Tasks

TASK 1 (*Simple version)*

Name: …………………………………….. Group: …………………………………

There are simple steps to summarization.

- Read the text first to understand the author's intent.
- Pick out important details that are necessary/ Highlight the important details using keywords.
- Delete extraneous descriptors, details, and examples.
- List keywords in the order they appeared in the passage.
- Trim the list of keywords down to one topic sentence.
- In your own words, write the thesis and main ideas in point form (change only the changeable keywords).
- Reread the original work to ensure that you have accurately represented the main ideas in your summary.

ZOO CONSERVATION PROGRAMMES

One of London Zoo's recent advertisements caused me some irritation, so patently did it distort reality. Headlined "Without zoos you might as well tell these animals to get stuffed", it was bordered with illustrations of several endangered species and went on to extend the myth that without zoos like London Zoo these animals "will almost certainly disappear forever". With the zoo world's rather mediocre record on conservation, one might be forgiven for being slightly sceptical about such an advertisement.

Zoos were originally created as places of entertainment, and their suggested involvement with conservation didn't seriously arise until about 30 years ago, when the Zoological Society of London held the first formal international meeting on the subject. Eight years later, a series of world conferences took place, entitled "The Breeding of Endangered Species", and from this point onwards conservation became the zoo community's buzzword. This commitment has now been clearly defined in The World Zoo Conservation Strategy (WZGS, September 1993), which although an important and welcome document does seem to be based on an unrealistic optimism about the nature of the zoo industry.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

SUMMARY:

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TASK2 (Medium version 1)

Name: …………………………………….. Group: ………………………………….

Read the following text carefully, and then try to summarise it.

Recruitment

The course is tougher but women are staying the distance, reports Andrew Crisp. Women who apply for jobs in middle or senior management have a higher success rate than men, according to an employment survey. But of course far fewer of them apply for these positions. The study shows that while one in six men who appear on interview shortlists get jobs, the figure rises to one in four for women.

The study concentrated on applications for management positions and found that women are more successful than men in both the private and public sectors. Dr. Elisabeth Marx from London-based NB Selection described the findings as encouraging for women, in that they send a positive message to them to apply for interesting management positions. But she added, "We should not lose sight of the fact that significantly fewer women apply for senior positions in comparison with men."

Reasons for higher success rates among women are difficult to isolate. One explanation suggested is that if a woman candidate manages to get on a shortlist, then she has probably already proved herself to be an exceptional candidate. Dr. Marx said that when women apply for positions they tend to be better qualified than their male counterparts, but they are more selective and conservative in their job search. Women tend to research thoroughly before applying for positions or attending interviews. Men, on the other hand, seem to rely on their ability to sell themselves and to convince employers that any shortcomings they have will not prevent them from doing a good job.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

SUMMARY:

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TASK 3 (Medium version 2)

Name: …………………………………….. Group: ………………………………….

To synthesise follow these steps:

- Read each text very carefully, several times if necessary.
- Identify the type of text.
- Identify the text's topic and purpose.
- Identify the author's main idea or argument.
- Identify the reasons and evidence the author uses to support or explain the main idea.
- Clarify any unknowns about the text.
- Jot down some notes. Then repeat the process with the second text.
- A systematic preliminary comparison will help.
- Begin by summarizing briefly the points, themes, or traits that the texts have in common.
- Explore different ways to organize the information depending on what you find or what you want to demonstrate.

TEXT 1: Recruitment

The course is tougher but women are staying the distance, reports Andrew Crisp. Women who apply for jobs in middle or senior management have a higher success rate than men, according to an employment survey. But of course far fewer of them apply for these positions. The study shows that while one in six men who appear on interview shortlists get jobs, the figure rises to one in four for women.

The study concentrated on applications for management positions and found that women are more successful than men in both the private and public sectors. Dr. Elisabeth Marx from London-based NB Selection described the findings as encouraging for women, in that they send a positive message to them to apply for interesting management positions. But she added, “We should not lose sight of the fact that significantly fewer women apply for senior positions in comparison with men.”

Reasons for higher success rates among women are difficult to isolate. One explanation suggested is that if a woman candidate manages to get on a shortlist, then she has probably already proved herself to be an exceptional candidate. Dr. Marx said that when women apply for positions they tend to be better qualified than their male counterparts, but they are more selective and conservative in their job search. Women tend to research thoroughly before applying for positions or attending interviews. Men, on the other hand, seem to rely on their ability to sell themselves and to convince employers that any shortcomings they have will not prevent them from doing a good job.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

TEXT 2: Women Are Less Likely to Apply for Executive Roles If They’ve Been Rejected Before

Although women make up 40% of the global workforce, they hold only 24% of senior management roles around the world, a figure that has not changed significantly over the past decade. Of chief executive officers of 500 firms, only about 5% are women. Why aren't more talented women moving up? Researchers have pointed to an array of reasons, from explicit discrimination to promotion processes that quietly favour men, but one of the most perplexing is that women themselves aren't as likely as men to put themselves forward for leadership roles. The reason, many assume, is because women are risk averse or lack confidence, or maybe because they have different career preferences. But our research suggests another reason.

We recently conducted a study of more than 10,000 senior executives who were competing for top management jobs in the UK. We found that women were indeed less likely than men to apply for these jobs, but here's the interesting part: We found that women were much less likely to apply for a job if they had been rejected for a similar job in the past. The implications here are not trivial, because rejection is a routine part of corporate life. To reach the top of the organization, people need to keep playing the game, over and over again, even after repeated disappointments. So even small differences between how men and women respond to rejection could lead to big differences over time. Men are less likely to take rejection as a signal that they do not belong in the corner offices, and therefore such disappointments had less of a negative impact on their willingness to apply again.

Study by Raina Brands and Isabel Fernandez-Mateo FEBRUARY 07, 2017

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

SYNTHESIS:

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TASK 4 (Complex version)

Name: …………………………………….. Group: ………………………………….

Text 1: A Disaster of Titanic Proportions

At 11:39 p.m. on the evening of Sunday, 14 April 1912, lookouts Frederick Fleet and Reginald Lee on the forward mast of the Titanic sighted an eerie, black mass coming into view directly in front of the ship. Fleet picked up the phone to the helm, waited for Sixth Officer Moody to answer, and yelled "Iceberg, right ahead!" The greatest disaster in maritime history was about to be set in motion.

What or who was responsible for the scale of this catastrophe? Explanations abound, some that focus on very small details. Due to a last-minute change in the ship's officer line-up, iceberg lookouts Frederick Fleet and Reginald Lee were making do without a pair of binoculars that an officer transferred off the ship in Southampton had left in a cupboard on board.

Less than an hour before the Titanic struck the iceberg, wireless operator Cyril Evans on the California, located just 20 miles to the north, tried to contact operator Jack Philips on the Titanic to warn him of pack ice in the area. "Shut up, shut up, you're jamming my signal," Philips replied. "I'm busy." Philips was clearing a backlog of personal messages that passengers had requested to be sent to family and friends in the USA.

Captain Smith had maintained the ship's speed of 22 knots despite multiple earlier warnings of ice ahead. It has been suggested that Smith was under pressure to make headlines by arriving early in New York, but maritime historians such as Richard Howell have countered this perception, noting that Smith was simply following common procedure at the time, and not behaving recklessly.

One of the strongest explanations for the severe loss of life has been the fact that the Titanic did not carry enough lifeboats for everyone on board. Furthermore, with lifeboats being lowered less than half full in many cases; more lifeboats would not have guaranteed more survivors in the absence of better training and preparation. Many passengers were confused about where to go after the order to launch lifeboats was given; a lifeboat drill scheduled for earlier on the same day that the Titanic struck the iceberg was cancelled by Captain Smith in order to allow passengers to attend church.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2: Lessons from the Titanic

With limited communication facilities, and shipping technology still in its infancy in the early nineteen hundreds, we consider ocean travel to have been a risky business. But to the people of the time it was one of the safest forms of transport. At the time of the Titanic's maiden voyage in 1912, there had only been four lives lost in the previous forty years on passenger ships on the North Atlantic crossing. And the Titanic was confidently proclaimed to be unsinkable. But still she did sink on April 14, 1912, taking 1,517 of her passengers and crew with her. It was largely as a result of this confidence in the ship and in the safety of ocean travel that the disaster could claim such a great loss of life.

The lack of formal procedures for dealing with information from a relatively new piece of technology, the wireless, meant that the danger was not known until too late. This was not the fault of the Titanic crew. Procedures for dealing with warnings received through the wireless had not been formalised across the shipping industry at the time.

Captain Smith's seemingly casual attitude in increasing the speed on this day to a dangerous 22 knots or 41 kilometres per hour, can then be partly explained by his ignorance of what lay ahead. But this only partly accounts for his actions, since the spring weather in Greenland was known to cause huge chunks of ice to break off from the glaciers. Captain Smith knew that these icebergs would float southward and had already acknowledged this danger by taking a more southerly route than at other times of the year. So why was the Titanic travelling at high speed when he knew of the general risk of icebergs in her path? It was simply standard operating procedure at the time. He believed, wrongly as we now know, that the ship could turn or stop in time if an iceberg was sighted by the lookouts.

After the Titanic sank, investigations were held in both Washington and London. In the end, both inquiries decided that no one could be blamed for the sinking. However, they did address the fundamental safety issues which had contributed to the enormous loss of life. As a result, international agreements were drawn up to improve safety procedures at sea. The new regulations covered 24 hour wireless operation, crew training, proper lifeboat drills, lifeboat capacity for all on board and the creation of an international ice patrol.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

SYNTHESIS:

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Simple Task (Control Group)

Summarise the following text:

Name: …………………………………..   Group: ………………………………….

There are simple steps to summarization.

- Read the text first to understand the author's intent.
- Pick out important details that are necessary/ Highlight the important details using keywords.
- Delete extraneous descriptors, details, and examples.
- List keywords in the order they appeared in the passage.
- Trim the list of keywords down to one topic sentence.
- In your own words, write the thesis and main ideas in point form (change only the changeable keywords).
- Reread the original work to ensure that you have accurately represented the main ideas in your summary.

The Risks of Cigarette Smoke

Discovered in the early 1800s and named 'nicotianine', the oily essence now called nicotine is the main active ingredient of tobacco. Nicotine, however, is only a small component of cigarette smoke, which contains more than 4700 chemical compounds, including 43 cancer-causing substances. In recent times, scientific research has been providing evidence that years of cigarette smoking vastly increases the risk of developing fatal medical conditions. Passive smoking, the breathing in of the side-stream smoke exhaled by a smoker, also causes a serious health risk. Research argues that the type of action needed against passive smoking should be similar to that being taken against illegal drugs and AIDS. They maintain that the simplest and most cost-effective action is to establish smoke-free work places, schools and public places.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Summary:

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Medium Task (Control Group)

Summarise the following text:

Name: ……………………………………..   Group: ………………………………….

Text: HIGHS & LOWS

Our moods may be affected by the weather. Gloomy weather can cause depression, but sunshine appears to raise the spirits. In Britain, for example, the dull weather of winter drastically cuts down the amount of sunlight that is experienced which strongly affects some people. They become so depressed and lacking in energy that their work and social life are affected. This condition has been given the name SAD (Seasonal Affective Disorder). Sufferers can fight back by making the most of any sunlight in winter and by spending a few hours each day under special, full-spectrum lamps. Some Russian scientists claim that children learn better after being exposed to ultraviolet light. In warm countries, hours of work are often arranged so that workers can take a break during the hottest part of the day. Scientists are working to discover the links between the weather and human beings' moods and performance.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Summary:

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Complex Task (Control Group)

Synthesise the following texts:
Name: ……………………………………….
Group:……………………………………….

How Babies Acquire Language

Text 1:

During the first year of a child's life, parents and carers are concerned with its physical development; during the second year, they watch the baby's language development very carefully. It is interesting just how easily children learn language. Children who are just three or four years old, who cannot yet tie their shoelaces, are able to speak in full sentences without any specific language training. The current view of child language development is that it is an instinct - something as natural as eating or sleeping. According to experts in this area, this language instinct is innate - something each of us is born with. But this prevailing view has not always enjoyed widespread acceptance. In the middle of last century, experts regarded child language development as the process of learning through mere repetition. Language "habits" developed over time like a dog might learn to behave properly through training.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2:

The modern view holds that language is instinctive. Experts like Assistant Professor Lise Eliot are convinced that the interaction a child has with its parents and caregivers is crucial to its developments. The parents and caregivers act as models for the developing child. People are born to speak, and have the capacity to learn language from the day they are born. This ability is enhanced if they are involved in conversation. And, significantly, Dr Eliot reminds parents that babies and toddlers need to feel they are communicating. Clearly, sitting in front of the television is not enough; the baby must be having an interaction with another speaker.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:

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Simple Task (Experimental Group/ Sub-Group 1)

Summarise the following text:

Name: …………………………………..   Group: ………………………………….

There are simple steps to summarization.

- Read the text first to understand the author's intent.
- Pick out important details that are necessary/ Highlight the important details using keywords.
- Delete extraneous descriptors, details, and examples.
- List keywords in the order they appeared in the passage.
- Trim the list of keywords down to one topic sentence.
- In your own words, write the thesis and main ideas in point form (change only the changeable keywords).
- Reread the original work to ensure that you have accurately represented the main ideas in your summary.

The Risks of Cigarette Smoke

Discovered in the early 1800s and named 'nicotianine', the oily essence now called nicotine is the main active ingredient of tobacco. Nicotine, however, is only a small component of cigarette smoke, which contains more than 4700 chemical compounds, including 43 cancer-causing substances. In recent times, scientific research has been providing evidence that years of cigarette smoking vastly increases the risk of developing fatal medical conditions. Passive smoking, the breathing in of the side-stream smoke exhaled by a smoker, also causes a serious health risk. Research argues that the type of action needed against passive smoking should be similar to that being taken against illegal drugs and AIDS. They maintain that the simplest and most cost-effective action is to establish smoke-free work places, schools and public places.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Summary:

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Simple Task (Experimental Group/ Sub-Group 2)

Synthesise the following texts

Name: …………………………………..   Group: ………………………………….

To synthesise follow these steps:

- Read each text very carefully, several times if necessary.
- Identify the type of text.
- Identify the text's topic and purpose.
- Identify the author's main idea or argument.
- Identify the reasons and evidence the author uses to support or explain the main idea.
- Jot down some notes. Then repeat the process with the second text.
- Compare the two texts to avoid repetition and find links.
- Begin by summarizing briefly the points, themes, or traits that the texts have in common.
- Explore different ways to organize the information depending on what you find or what you want to demonstrate.

Text 1:

The Risks of Cigarette Smoke

Discovered in the early 1800s and named ‘nicotianine’, the oily essence now called nicotine is the main active ingredient of tobacco. Nicotine, however, is only a small component of cigarette smoke, which contains more than 4700 chemical compounds, including 43 cancer-causing substances. In recent times, scientific research has been providing evidence that years of cigarette smoking vastly increases the risk of developing fatal medical conditions. Passive smoking, the breathing in of the side-stream smoke exhaled by a smoker, also causes a serious health risk. Research argues that the type of action needed against passive smoking should be similar to that being taken against illegal drugs and AIDS. They maintain that the simplest and most cost-effective action is to establish smoke-free work places, schools and public places.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press

Text 2: In addition to being responsible for more than 85 % of lung cancers, smoking is associated with cancers of, amongst others, the mouth, stomach and kidneys, and is thought to cause leukaemia and cervical cancers. Smoking is responsible for 30 % of all deaths from cancer and clearly represents the most important preventable cause of it. A report published in 1992 by the US Environmental Protection Agency (EPA) emphasized the health dangers, especially from side-stream smoke. In the case of a married couple where one partner is a smoker and one a non-smoker, the latter is believed to have a 30 % higher risk of death from heart disease because of passive smoking.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:……………………………………………………………………………………

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Simple Task (Experimental Group/ Sub-Group 3)

Summarise the following text:

Name: …………………………………….. Group: ………………………………….

The Risks of Cigarette Smoke

Discovered in the early 1800s and named 'nicotianine', the oily essence now called nicotine is the main active ingredient of tobacco. Nicotine, however, is only a small component of cigarette smoke, which contains more than 4700 chemical compounds, including 43 cancer-causing substances. In recent times, scientific research has been providing evidence that years of cigarette smoking vastly increases the risk of developing fatal medical conditions. Passive smoking, the breathing in of the side-stream smoke exhaled by a smoker, also causes a serious health risk. Research argues that the type of action needed against passive smoking should be similar to that being taken against illegal drugs and AIDS. They maintain that the simplest and most cost-effective action is to establish smoke-free work places, schools and public places.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Summary:

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Simple Task (Experimental Group/ Sub-Group 4)

Synthesise the following texts

Name: …………………………………….. Group: ………………………………….

Text 1:

The Risks of Cigarette Smoke

Discovered in the early 1800s and named ‘nicotianine’, the oily essence now called nicotine is the main active ingredient of tobacco. Nicotine, however, is only a small component of cigarette smoke, which contains more than 4700 chemical compounds, including 43 cancer-causing substances. In recent times, scientific research has been providing evidence that years of cigarette smoking vastly increases the risk of developing fatal medical conditions. Passive smoking, the breathing in of the side-stream smoke exhaled by a smoker, also causes a serious health risk. Research argues that the type of action needed against passive smoking should be similar to that being taken against illegal drugs and AIDS. They maintain that the simplest and most cost-effective action is to establish smoke-free work places, schools and public places.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2: In addition to being responsible for more than 85 % of lung cancers, smoking is associated with cancers of, amongst others, the mouth, stomach and kidneys, and is thought to cause leukaemia and cervical cancers. Smoking is responsible for 30 % of all deaths from cancer and clearly represents the most important preventable cause of it. A report published in 1992 by the US Environmental Protection Agency (EPA) emphasized the health dangers, especially from side-stream smoke. In the case of a married couple where one partner is a smoker and one a non-smoker, the latter is believed to have a 30 % higher risk of death from heart disease because of passive smoking.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:

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Medium Task (Experimental Group/ Sub-Group 1)

Synthesise the following texts

Name: …………………………………….. Group: ………………………………….

To synthesise follow these steps:

- Read each text very carefully, several times if necessary.
- Identify the type of text.
- Identify the text's topic and purpose.
- Identify the author's main idea or argument.
- Identify the reasons and evidence the author uses to support or explain the main idea.
- Jot down some notes. Then repeat the process with the second text.
- Compare the two texts to avoid repetition and find links.
- Begin by summarizing briefly the points, themes, or traits that the texts have in common.
- Explore different ways to organize the information depending on what you find or what you want to demonstrate.

Text: HIGHS & LOWS

Our moods may be affected by the weather. Gloomy weather can cause depression, but sunshine appears to raise the spirits. In Britain, for example, the dull weather of winter drastically cuts down the amount of sunlight that is experienced which strongly affects some people. They become so depressed and lacking in energy that their work and social life are affected. This condition has been given the name SAD (Seasonal Affective Disorder). Some Russian scientists claim that children learn better after being exposed to ultraviolet light. Scientists are working to discover the links between the weather and human beings' moods and performance.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2:

It is generally believed that tempers grow shorter in hot weather. There is no doubt that crimes rise in the summer when the weather is hot as compared to winter. Research in the USA has shown a relationship between temperature and street riots. But is this effect really due to a mood change caused by the heat? Some scientists argue that trouble starts more often merely because there are more people in the street when the weather is good. Psychologists have also studied how being cold affects performance. Researchers compared divers working in icy cold water at 5°C with others in water at 20°C. The colder water made the divers worse at simple mental tasks. This suggests that the feeling of cold distracted the divers from their tasks.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:……………………………………………………………………………………

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Medium Task (Experimental Group/ Sub-Group 2)

Synthesise the following texts

Name: …………………………………..   Group: ………………………………….

Text: HIGHS & LOWS

Our moods may be affected by the weather. Gloomy weather can cause depression, but sunshine appears to raise the spirits. In Britain, for example, the dull weather of winter drastically cuts down the amount of sunlight that is experienced which strongly affects some people. They become so depressed and lacking in energy that their work and social life are affected. This condition has been given the name SAD (Seasonal Affective Disorder). Some Russian scientists claim that children learn better after being exposed to ultraviolet light. Scientists are working to discover the links between the weather and human beings' moods and performance.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2:

It is generally believed that tempers grow shorter in hot weather. There is no doubt that crimes rise in the summer when the weather is hot as compared to winter. Research in the USA has shown a relationship between temperature and street riots. But is this effect really due to a mood change caused by the heat? Some scientists argue that trouble starts more often merely because there are more people in the street when the weather is good. Psychologists have also studied how being cold affects performance. Researchers compared divers working in icy cold water at 5°C with others in water at 20°C. The colder water made the divers worse at simple mental tasks. This suggests that the feeling of cold distracted the divers from their tasks.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:

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Medium Task (Experimental Group/ Sub-Group 3)

Summarise the following texts
Name: …………………………………….. Group: ………………………………….

Text: HIGHS & LOWS

It is generally believed that tempers grow shorter in hot weather. There is no doubt that crimes rise in the summer when the weather is hot as compared to winter. Research in the USA has shown a relationship between temperature and street riots. But is this effect really due to a mood change caused by the heat? Some scientists argue that trouble starts more often merely because there are more people in the street when the weather is good. Psychologists have also studied how being cold affects performance. Researchers compared divers working in icy cold water at 5°C with others in water at 20°C. The colder water made the divers worse at simple mental tasks. This suggests that the feeling of cold distracted the divers from their tasks.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Summary:

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Medium Task (Experimental Group/ Sub-Group 4)

Synthesise the following texts

Name: …………………………………….. Group: ………………………………….

Text: HIGHS & LOWS

Text 1:

Our moods may be affected by the weather. Gloomy weather can cause depression, but sunshine appears to raise the spirits. In Britain, for example, the dull weather of winter drastically cuts down the amount of sunlight that is experienced which strongly affects some people. They become so depressed and lacking in energy that their work and social life are affected. This condition has been given the name SAD (Seasonal Affective Disorder). Some Russian scientists claim that children learn better after being exposed to ultraviolet light. Scientists are working to discover the links between the weather and human beings' moods and performance.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2:

It is generally believed that tempers grow shorter in hot weather. There is no doubt that crimes rise in the summer when the weather is hot as compared to winter. Research in the USA has shown a relationship between temperature and street riots. But is this effect really due to a mood change caused by the heat? Some scientists argue that trouble starts more often merely because there are more people in the street when the weather is good. Psychologists have also studied how being cold affects performance. Researchers compared divers working in icy cold water at 5°C with others in water at 20°C. The colder water made the divers worse at simple mental tasks. This suggests that the feeling of cold distracted the divers from their tasks.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:

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Complex Task (Experimental Group/ Sub-Group 1)

Synthesise the following texts:
Name: ……………………………………….
Group:……………………………………….

How Babies Acquire Language

Text 1:

During the first year of a child's life, parents and carers are concerned with its physical development; during the second year, they watch the baby's language development very carefully. It is interesting just how easily children learn language. Children who are just three or four years old, who cannot yet tie their shoelaces, are able to speak in full sentences without any specific language training. The current view of child language development is that it is an instinct - something as natural as eating or sleeping. According to experts in this area, this language instinct is innate - something each of us is born with. But this prevailing view has not always enjoyed widespread acceptance. In the middle of last century, experts regarded child language development as the process of learning through mere repetition. Language "habits" developed over time like a dog might learn to behave properly through training.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2:

The modern view holds that language is instinctive, experts like Assistant Professor Lise Eliot are convinced that the interaction a child has with its parents and caregivers is crucial to its developments. The parents and caregivers act as models for the developing child. People are born to speak, and have the capacity to learn language from the day they are born. This ability is enhanced if they are involved in conversation. And, significantly, Dr Eliot reminds parents that babies and toddlers need to feel they are communicating. Clearly, sitting in front of the television is not enough; the baby must be having an interaction with another speaker.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:

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Complex Task (Experimental Group/ Sub-Group 2)

Synthesise the following texts:

Name:……………………………… Group:………………………………………….

How Babies Acquire Language

Text 1:

During the second year of a child's life, parents and carers watch the baby's language development very carefully. It is interesting just how easily children learn language. Children who are just three or four years old, who cannot yet tie their shoelaces, are able to speak in full sentences without any specific language training. The current view of child language development is that it is an instinct - something as natural as eating or sleeping. According to experts in this area, this language instinct is innate - something each of us is born with. But this prevailing view has not always enjoyed widespread acceptance. In the middle of last century, experts regarded child language development as the process of learning through mere repetition. Language "habits" developed over time like a dog might learn to behave properly through training.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2:

The modern view holds that language is instinctive, experts like Assistant Professor Lise Eliot are convinced that the interaction a child has with its parents and caregivers is crucial to its developments. The parents and caregivers act as models for the developing child. People are born to speak, and have the capacity to learn language from the day they are born. This ability is enhanced if they are involved in conversation. And, significantly, Dr Eliot reminds parents that babies and toddlers need to feel they are communicating. Clearly, sitting in front of the television is not enough; the baby must be having an interaction with another speaker.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 3:

One of the unique talents that mark us as humans is our ability to express our thoughts to others in a way that can be understood, even if the subject is complex and abstract. Thus it is not surprising that scholars have struggled for centuries to understand how an infant can learn language in an incredibly brief period. It begins with a single word, like "Da" or "Ma." A few days later, it seems, they are asking for the keys to the family car. Plato thought he had the answer. The infant comes with a built-in play book. Learning to speak is innate, like learning to walk. All these years later, scientists are still not sure if Plato got it right, but he has been supplanted by new explainers, especially MIT's linguist Chomsky, who argues that infants are born with some understanding of syntax, which makes it easier for them to know if the language structure of grammar is right or wrong.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:………………………………………………………………………………

Complex Task (Experimental Group/ Sub-Group 3)

Synthesise the following texts:

Name: ……………………………………….

Group:……………………………………….

How Babies Acquire Language

Text 1:

During the first year of a child's life, parents and carers are concerned with its physical development; during the second year, they watch the baby's language development very carefully. It is interesting just how easily children learn language. Children who are just three or four years old, who cannot yet tie their shoelaces, are able to speak in full sentences without any specific language training. The current view of child language development is that it is an instinct - something as natural as eating or sleeping. According to experts in this area, this language instinct is innate - something each of us is born with. But this prevailing view has not always enjoyed widespread acceptance. In the middle of last century, experts regarded child language development as the process of learning through mere repetition. Language "habits" developed over time like a dog might learn to behave properly through training.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2:

The modern view holds that language is instinctive, experts like Assistant Professor Lise Eliot are convinced that the interaction a child has with its parents and caregivers is crucial to its developments. The parents and caregivers act as models for the developing child. People are born to speak, and have the capacity to learn language from the day they are born. This ability is enhanced if they are involved in conversation. And, significantly, Dr Eliot reminds parents that babies and toddlers need to feel they are communicating. Clearly, sitting in front of the television is not enough; the baby must be having an interaction with another speaker.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:

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Complex Task (Experimental Group/ Sub-Group 4)

Synthesise the following texts:

Name:……………………………… Group:………………………………

How Babies Acquire Language

Text 1:

During the second year of a child's life, parents and carers watch the baby's language development very carefully. It is interesting just how easily children learn language. Children who are just three or four years old, who cannot yet tie their shoelaces, are able to speak in full sentences without any specific language training. The current view of child language development is that it is an instinct - something as natural as eating or sleeping. According to experts in this area, this language instinct is innate - something each of us is born with. But this prevailing view has not always enjoyed widespread acceptance. In the middle of last century, experts regarded child language development as the process of learning through mere repetition. Language "habits" developed over time like a dog might learn to behave properly through training..

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 2:

The modern view holds that language is instinctive, experts like Assistant Professor Lise Eliot are convinced that the interaction a child has with its parents and caregivers is crucial to its developments. The parents and caregivers act as models for the developing child. People are born to speak, and have the capacity to learn language from the day they are born. This ability is enhanced if they are involved in conversation. And, significantly, Dr Eliot reminds parents that babies and toddlers need to feel they are communicating. Clearly, sitting in front of the television is not enough; the baby must be having an interaction with another speaker.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Text 3:

One of the unique talents that mark us as humans is our ability to express our thoughts to others in a way that can be understood, even if the subject is complex and abstract. Thus it is not surprising that scholars have struggled for centuries to understand how an infant can learn language in an incredibly brief period. It begins with a single word, like "Da" or "Ma." A few days later, it seems, they are asking for the keys to the family car. Plato thought he had the answer. The infant comes with a built-in play book. Learning to speak is innate, like learning to walk. All these years later, scientists are still not sure if Plato got it right, but he has been supplanted by new explainers, especially MIT's linguist Chomsky, who argues that infants are born with some understanding of syntax, which makes it easier for them to know if the language structure of grammar is right or wrong.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Synthesis:…………………………………………………………………………………

Post-Test

Summarise the following texts:

Name:……………………………… Group:………………………………

Uniforms

Text 1:

Traditionally uniforms were - and for some industries still are - manufactured to protect the worker. When they were first designed, it is also likely that all uniforms made symbolic sense - those for the military, for example, were originally intended to impress and even terrify the enemy; other uniforms denoted a hierarchy. For example, chefs wore white because they worked with flour, but the main chef wore a black hat to show he supervised. Corporate clothing does have potentials for further growth. Police forces are researching a complete new look for the 21st century. And many employees now welcome a company wardrobe. A recent survey of staff found that 90 % welcomed having clothing which reflected the corporate identity.

Cambridge ESOL. (2011). Cambridge IELTS. Cambridge [England]: Cambridge University Press.

Summarize:

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Résumé

L'enseignement des langues basé sur les tâches a acquis sa juste place dans la recherche linguistique. Il suggère de séquencer les tâches du simple au complexe pour la conception du programme. Toutefois, peu de recherches ont considéré les différences cognitives des apprenants comme un facteur intervenant dans leurs performances et leurs compétences en écriture. Cette étude visait à examiner les effets qu'a la manipulation de la complexité des tâches sur la performance écrite en L2, en utilisant le nombre de textes comme variable de direction des ressources et le temps de planification comme variable de dispersion des ressources en fonction de la mémoire de travail des apprenants et de leur attention. L'objectif secondaire de cette recherche était d'étudier les perceptions des enseignants et des étudiants quant à la conception de tâches qui respectent les différences entre les apprenants. Pour atteindre ces objectifs, nous avons collecté des données à partir de deux questionnaires: un pour les enseignants du Département d'Anglais de l'Université d'Oum El Bouaghi, et un autre pour les étudiants de première année dans le même département. Les données de l'expérience de mesures répétées et de l'expérience du groupe témoin groupe expérimental post-test pré-test ont été collectées à partir de résumés et de synthèses de texte des étudiants de première année en ALE (Anglais comme Langue Etrangère). Les données écrites ont été mesurées en termes de fluidité, de précision et de complexité. Un test ANOVA unidirectionnel, un test post-hoc, un test ANOVA bidirectionnel, un test T apparié et un test T indépendant ont été utilisés pour l'analyse statistique. L’étude a tout d’abord révélé que les enseignants du département d’anglais de l’université d’Oum el Bouaghi et ses étudiants de première année ne sous-estiment pas la différenciation des tâches d’écriture en fonction des différences cognitives des étudiants. Cependant, les enseignants pratiquent rarement la manipulation des tâches en fonction des différences cognitives à l’intérieur de la classe. Deuxièmement, elle a révélé que les effets

de la complexité des tâches ne varient pas entre les apprenants en fonction de leur mémoire de travail et de leur attention. Cependant, ces deux derniers s'accumulent avec la complexité des tâches et ont un impact sur les performances des apprenants. Troisièmement, la manipulation de la complexité des tâches en fonction des différences cognitives affecte positivement la fluidité d'écriture et la complexité syntaxique des étudiants, mais n'influence pas la précision d'écriture. Par conséquent, les enseignants peuvent utiliser les résultats de cette étude pour avoir une meilleure vision des profils de leurs apprenants, et ainsi concevoir de meilleures leçons et tâches pour améliorer leur capacité d'écriture.

ملخص

اكتسب تدريس اللغة القائم على المهام مكانة مهمة في البحث اللغوي و يقترح هذا النوع من البحث تسلسل المهام من البسيط إلى المعقد لتصميم المنهج الدراسية، ومع ذلك اعتبر القليل من الأبحاث بأن الاختلافات المعرفية لدى المتعلمين عاملا يتدخل في أدائهم في الكتابة وكفاءتهم. و قد هدفت هذه الدراسة إلى التحقق من آثار معالجة تعقيد المهام باستخدام عدد النصوص ووقت التخطيط وفقًا لذاكرة عمل المتعلمين وانتباههم أثناء الكتابة. يوجد هدف آخر لهذه الدراسة ألا وهو التحقق من تصورات الأساتذة وطلاب السنة الأولى في قسم اللغة الإنجليزية عن اخذ اختلافات المتعلمين بعين الاعتبار أثناء تصميم المهام. لتحقيق هذه الأهداف قمنا بجمع البيانات من استبيانين: أحدهما للأساتذة قسم اللغة الإنجليزية بجامعة أم البواقي ، والآخر لطلاب السنة الأولى في نفس القسم ثم تم جمع البيانات الخاصة بتجربة القياسات المتكررة والتجربة الثانية ذات الفوجين والاختبارين: القبلي والبعدي من كتابات طلاب السنة الأولى في اللغة الإنجليزية كلغة أجنبية. تم بعدها قياس البيانات المكتوبة من حيث الطلاقة والدقة والتعقيد ثم تم استخدام اختبار **ANOVA** الأحادي الاتجاه واختبار **Post-Hoc** واختبار **ANOVA** الثنائي الاتجاه واختبار **T** المقترن واختبار **T** المستقل للتحليل الإحصائي. كشفت الدراسة أولاً أن أساتذة قسم اللغة الإنجليزية بجامعة أم البواقي وطلابه لا يقللون من شأن معالجة مهام الكتابة وفقاً للاختلافات المعرفية لدى الطلاب ولكنهم يتجاهلونها ونادرًا ما يمارس الأساتذة معالجة المهام وفقًا للاختلافات المعرفية للطلاب داخل الفصل الدراسي. ثانيًا، كشفت الدراسة أن تأثيرات تعقيد المهام لا تختلف بين المتعلمين وفقًا لذاكرة العمل الخاصة بهم وانتباههم ومع ذلك، فإن هذين الأخيرين يتراكمان مع تعقيد المهام للتأثير على أداء الطلاب. ثالثًا، تؤثر معالجة تعقيد المهام وفقًا للاختلافات المعرفية لدى الطلاب بشكل إيجابي على طلاقة الطلاب في الكتابة والتعقيد النحوي ولكن لا تؤثر على الدقة وبالتالي، يمكن للمدرسين استخدام نتائج هذه الدراسة للحصول على لمحة أكثر دقة عن المتعلمين، وبالتالي تصميم دروس ومهام كتابية أفضل لتعزيز قدرتهم على الكتابة.