LEARNING COLLOCATIONS THROUGH INTERACTION: THE EFFECTS OF THE QUALITY AND THE QUANTITY OF ENCOUNTERS

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Abstract

This study examined how short-term and long-term retention of two types of collocations (verb-noun and adjective-noun) was affected by the learning context. The experimental research design of the study involved two major experiments. In Experiment 1 (EX1), 109 male Emirati college students were randomly assigned to an experimental group (interactive activities) or a control group (non-interactive exercises). EX1 involved 20 verb-noun collocations and consisted of two sub-experiments. In experiment 1a both the control and experimental groups were exposed to 20 verb-noun collocations four times. To clarify the effects of the instructional context, a second experiment (EX1b) was conducted where participants encountered the same collocations four times for the experimental group and eight times for the control group.

As for Experiment 2 (EX2), it involved 108 male Emirati college students and targeted 20 adjective-noun collocations, and similarly, in Experiment 2a, both the control and experimental groups encountered the adjective-noun collocations 4 times, whereas Experiment 2b offered the experimental and control groups four and eight collocation encounters, respectively.

The treatment consisted of exposing participants in both experiments to the target collocations using two different teaching methods. The experimental groups used four interactive activities that presented collocations as whole units (Ellis's, 2003 chunking principle) while the control groups used non-interactive textbook exercises to learn these sequences, breaking them down into their two constituents (verb + noun and adjective + noun). The experiment was carried out over a two-hour period during students' regular English classes.

The results showed that the experimental group learners in both EX1 and EX2 who used interactive activities to learn the collocations, and were exposed to these sequences four times only as whole units, further outscored their control group peers in all collocation measurements. Statistical analysis of participants' test responses also showed that the long-term receptive knowledge category of the target verb-noun and adjective-noun collocations in both experiments was higher than the productive knowledge for all experimental groups.

This study fills a gap in the research about the importance of the quality of encounter vs. the quantity of encounter in collocation learning and identifies an instructional method that is

optimal for learning. The overall results suggest that interactive activities were superior to non-interactive exercises and that the quality of encounter appears to be more important than the number of encounter in collocation learning; four highly interactive tasks presenting collocations as whole units, with only four encounters, could be more effective to retain unknown collocations than non-interactive exercises (e.g., matching and fill-in) that offered learners eight encounters to the collocations broken down into their constituents.

The implications for teachers may be that interactive activities, exposing learners to collocations as whole units, should be part of their language instructional pedagogy if they want learners to retain collocations in their long-term memory. For material designers, a well-balanced course would be one that prioritises collocations as chunks through interactive activities.

Dedication

I dedicate this thesis to my wife Awatef, who has always been there for me and my kids during my PhD journey. I also dedicate it to the spirit of my lovely mother who passed away before I could finish this work. Last, I dedicate it to my wonderful children Alaa, Mueen, and my little angel Anas.

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Abbreviations

AFL:	Academic Formula List
AWL:	Academic Word List
CG1a:	Control Group 1a
CG1b:	Control Group 1b
CG2a:	Control Group 2a
CG2b:	Control Group 2b
CLT:	Communicative Language Teaching
COCA:	Corpus of Contemporary American English
DK:	Declarative Knowledge
EFL:	English as a Foreign Language
ELT:	English Language Teaching
EG1a:	Experimental Group 1a
EG1b:	Experimental Group 1b
EG2a:	Experimental Group 2a
EG2b:	Experimental Group 2b
EX1:	Experiment 1
EX2:	Experiment 2
EX1a:	Experiment 1a
EX1b:	Experiment 1b
EX2a:	Experiment 2a
EX2b:	Experiment 2b
FL:	Foreign Language
GAM:	Grammatical Analysis Module
HCT:	Higher Colleges of Technology
ID:	Individual Differences
IELTS:	International English Language Testing System
ILH:	Involvement Load Hypothesis
ILI:	Involvement Load Index
LA:	Lexical Approach
LTM:	Long-Term Memory

L1: First Language
L2: Second Language
MA: Master of Arts
MC: Multiple Choice
MI: Mutual Information
MWU: Multiword Unit
NS: Native Speaker
NNS: Non-Native Speaker
PK: Procedural Knowledge
SLA: Second Language Acquisition`
TBLT: Task-Based Language Teaching
TESOL: Teaching English to Speakers of Other Languages
UAE: United Arab Emirates
UREC: University Research Ethics Committee
VST: Vocabulary Size Test
WK: Word Knowledge

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CHAPTER 1 INTRODUCTION

1.1. Introduction

Over the past few decades learners' vocabulary, or lexicon, has received a lot of attention from researchers, teachers, and practitioners. One aspect of vocabulary knowledge is the knowledge of collocations, also called formulaic sequences, multiword units, etc. Many studies have reported the importance of collocations in developing both language fluency and accuracy (Boers, Eyckmans, Kappel, Stengers, & Demecheleer, 2006; Cowie, 1998; Pawly & Syder, 1983; Peters, 2009; Wray, 2000). These studies have also stressed the importance of collocation for the language learner and that they are "the very centre of language acquisition" (Nattinger & DeCarrico, 1992, p. xv). The emerging picture from collocation research is that they are essential to language use, processing, and acquisition and that it is necessary for second language (L2) learners to retain these sequences in their long-term-memory (LTM) in order to maximize their language proficiency (Nation & Webb, 2011).

Given the importance of collocations in language acquisition and production it is no surprise that collocations should be prioritized in L2 classrooms to improve learners' proficiency. If we agree with Cowie's (1992) claim that "it is impossible [for L2 learners] to perform at a level acceptable to native users, in writing or in speech, without controlling an appropriate range of multiword units" (p. 10), then one of the primary goals of L2 instruction should be to maximize learners' opportunity to work with these multiword units.

One of the most significant current discussions in formulaic language research relates to the definition of collocations. A widely accepted definition of the phenomenon of collocation is "the occurrence of two or more words within a short space of each other in a text" (Sinclair, 1991, p. 170). However, this definition gives collocations a broader sense and wouldn't be interesting for second/foreign language teachers whose aim is to help their learners master the habitual combination of words that are salient for L1-speakers of the language. For the purpose of the current study, collocations are defined as combinations of frequently co-occuring words that are compositional (Mel'čuk, 1998) and semantically transparent. That is the meaning of the collocation can be divided into the meaning of the base and the meaning of the collocate, and these are both transparent. Two types of collocations are included in this study: verb + noun (e.g., *establish rapport*) and adjective + noun (e.g., *significant contribution*) combinations.

1.2. Background of the Study

In the case of second language acquisition (SLA), two factors are reported to determine the success of vocabulary retention in general: the number of encounters or how many times a word is encountered in the input (e.g., Nation & Wang; Schmitt, 2006; Webb, 2007) and the quality of encounter, that is, the activities used to learn an unknown word (e.g., Folse, 2006; Hulstijn & Laufer, 2001; Laufer & Rozovski-Roitblat, 2011; Peters, 2012). Nation (1990) estimated that, for a word to be retained in the LTM, there should be a minimum of fourteen encounters in different contexts. Laufer (2005) also reported that when learners engaged in doing word-focused activities (the quality of encounter) their lexical knowledge improved considerably. Although many of these studies explored the effect of the amount of exposure and the quality of exposure on learning single words, surprisingly the effects of these two factors on collocation learning have not yet been closely examined.

Since collocations are one aspect of vocabulary knowledge (Nation, 2001), their instruction frequency should be no different. Therefore, for classroom instructions to be efficient, multiple encounters with unknown collocations should be provided. What is problematic, however, is that neither the teaching materials characterized by the "paucity of input" (Laufer, 2015, p. 690) nor the limited classroom time allow for repeated exposure to unknown collocations. This makes simulating the L1 incremental and basically incidental way of adding words to the lexical repertoire (cf. De Bot, Paribakht, & Wesche, 1997) more challenging for L2 learners.

From my personal experience as an EFL teacher, one of the most challenging tasks for my students is finding the correct collocate for any given word. Many of my learners fail to recognize collocations as chunks and end up producing words in their writing that do not usually occur together in English (cf. Biskup, 1992; Laufer & Waldman, 2011; Nesselhaulf, 2005). For instance, some of my students seem to rely on their Arabic first language (L1) and word-for-word translation to find collocates in some collocations they use resulting in the replication of the patterns of the Arabic language (cf. Matras & Sakel, 2007). Other students also model some verb-noun collocations on their L1 and end up falling into "the trap of the deceptive compatibility" (Laufer, 2011, p. 44). This may explain abundant errors in my students' writing of the type **open homework* instead of *do homework*, **repair a mistake* for *correct a mistake*, **run time* for *pass time*, **bring a high grade* for *obtain/get a high grade*, etc.

In an English as a foreign language (EFL) context like the United Arab Emirates (UAE), where the L2 textbook still constitutes the major source of input for learners, most textbooks of different proficiency levels approach collocations in a traditional approach that consists mainly of matching and fill-in exercises, and that "lacks systematicity and scientific rigor" (Lopez-Jimenez , 2013, p. 344). To date, there is not enough empirical evidence that makes teachers/learners adopt one type of learning activity or the other for formulaic language. Most EFL textbooks that I have used with my students so far resort to non-interactive activities such as fill in and matching exercises to teach collocations as illustrated in the following examples taken from one of textbooks (*Key Concepts 1*) my students were using:

Fill in with a verb from the list:

mutual – keep – pay – give - look

- Can you _______ a secret if I tell you?
- I don't always _________ attention to details when shopping.
- Can you _______ after my cat while I am away?
- Please, _________ me a call to let me know that you arrived safely.
- I find it much more effective and pleasant to have an atmosphere of _________ respect and appreciation than one of fear.

Match each word from column A to a word in column B.

A	**B**
bitter	a mistake
make	an opportunity
soft	experience
miss	performance
impressive	drink

Such fill-in and matching exercises may not "the most judicious pedagogical practice" (Boers, Demecheleer, Coxhead, & Webb, 2014, p. 70) and it is clear that what is needed is an alternative approach to the teaching/learning of multiword units.

1.3. Aims of the Study

According to Nation (2001), retention of a vocabulary item depends on "three important general processes [noticing, retrieval, and creative use] that may lead to a word being remembered" (p. 63). We assume that the same applies to learning collocations, and that the principle of chunk-noticing (Lewis, 1993) is part of drawing learners' attention to unknown collocations. These research findings can constitute the fundamental principles upon which teachers could base their instruction. If we adopt the task-based approach to the teaching/learning of collocations, it would maximize learners' exposure to the target collocations and give them opportunities to interact, notice, retrieve, and creatively use (Nation, 2001) these sequences in different contexts, which would in turn increase the probability of these strings of words being remembered.

If we adopt a teaching methodology that explicitly introduces collocations and engages learners with these sequences in a different variety of communicative classroom activities (Boers & Lindstromberg, 2009; Cortes, 2004; Jones & Haywood, 2004) that are cognitively engaging, we will cater for the two important criteria of adequate input and multiple encounters. To this end, task-based language teaching (TBLT) prioritising interaction, suggested by Ellis (2003), seems an attractive alternative for L2 teachers to make the learning of multiword units more effective through the use of sequenced tasks. To the best of my knowledge, and based on my review of the related collocation research literature, none of the intervention studies, with direct implications to L2 pedagogy, has investigated the potential benefits of using TBLT in EFL classroom contexts to teach collocations.

In order to address this lack of collocation-focused instruction, this study set out to investigate the effects of the instructional context (interactive vs. non-interactive) on learning verb-noun and adjective-noun collocations. Drawing upon previous vocabulary research and through contrasting the interactive and the non-interactive contexts, the study aims to explore the importance of the two key factors involved in learning new words; the quality of exposure and the amount of exposure. Since learning new collocations initially involves knowledge of the form and meaning, the study also seeks to examine the development of receptive and productive collocation knowledge over a period of one month in the interactive and the non-interactive learning contexts.

Another purpose of the study is to understand the relationship between vocabulary size and the ability to learn collocations. Vocabulary research has suggested that learners with bigger vocabulary size are more likely to achieve better results in different language skills (Meara, 1996a). It would be interesting both for researchers and language teachers to realize if this applies to collocations. Finally, since learner variables are believed to affect language learning in general, the study also intended to identify the individual variables that may be involved in learning collocations.

1.4. Significance of the Research

Despite the increasing interest in researching lexis, at the classroom instructional level, the focus has most of the time been on exploring ways of teaching/learning single words (Schmitt, 2010). Even when the lexical phrase is the focus, details of the teaching method have not always been prioritized. If we agree with Lewis (1997) that “fluency is based on the acquisition of a large store of fixed or semi-fixed prefabricated items” (p. 15), and if we want to improve learners’ overall English proficiency, then our major concern should be to try out and explore effective collocation teaching methods.

Given that previous research has not provided enough empirical evidence for language teachers to adopt a teaching method or the other, the current study would be an important step at the instructional classroom level to guide practitioners and offer them an alternative teaching method to help them when teaching collocations. Another important aspect of this study is that it can offer material designers guidance about ways of prioritising the lexical phrase. One of the main arguments throughout this thesis is that what learners do with the collocations in the classroom could be more important than how many times they encounter these collocations in the L2 input. From this perspective, both practitioners and curriculum designers might benefit from the findings of the current study.

The design of the study and the use of immediate and delayed post-tests also allow the researcher to trace the development of collocation knowledge over a period of one month. An area that is often neglected in collocation research has been the effect of the teaching method on the development of collocation knowledge. This thesis traces what happens to unknown collocations after encountering them in the written input and contrasts two different instructional contexts to understand their effects on the receptive and productive knowledge of collocation. This will have important implications for classroom instruction since it can inform practitioners about what activities might be more effective for developing receptive and productive knowledge of verb-noun and adjective noun collocations.

1.5. Organization of the Research

This study consists of seven chapters. This introductory chapter presents the context of the study highlighting major aspects of the research. The next chapter reviews the literature related to collocations with a focus on the dimensions of word knowledge and the current debate in collocation research related to their definition. It also considers the two dominant collocation acquisition models and evaluates the available empirical evidence in support of these two views of the way collocations are acquired.

Chapter 3 explores the different instructional approaches related to teaching/learning collocations and discusses issues related to their implementation in L2 classrooms. It then identifies the theoretical underpinnings of the *Task-Based Language Teaching* approach and explains the different aspects that could make it a potentially effective approach for teaching/learning collocations.

In Chapter 4, the experimental research design adopted in the current study is explained and its use is justified. The context for the two major experiments carried out in this study, as well as the instructional treatment are also presented. The final part of this chapter includes necessary details related to the research instruments that were used. The design of the pre-test and the immediate and delayed post-tests is described and the rationale behind the choice of these instruments is also presented. The motivational survey that was used to investigate the effects of individual variables on collocation learning is also explained.

The statistical analysis procedures are presented in Chapter 5. In section (5.1), data collected during Experiment 1 (verb-noun collocations) are analysed and the major findings are highlighted. Similarly, section (5.2) provides an analysis of the results of Experiment 2 (adjective-noun collocations). The following section, summarises the key findings of data analysis of both experiments. Section (5.4) includes the results of the correlational tests between the vocabulary size and different collocation measurements used in the study.

Analysis of the collected data for the two major experiments are presented separately, and then a summary of key findings is also presented in a separate section. In the last three sections of this chapter, data related to the vocabulary size and the motivational survey are analysed and the key findings are emphasised. Then, in section (5.5), results of the collocation tests for experimental and control groups are compared with reference to the instructional method (interactive vs. non-interactive), and the effects of the instructional method on collocation knowledge are identified. Finally, in section (5.6), results of the motivational survey over the two experiments are examined using correlation tests to identify the individual variables involved in learning collocations.

In Chapter 6, key research findings are discussed, with reference to each of the research questions and in relation to previous research studies. First, the introductory section contains a reminder of the research questions, and section (6.2.1) presents a detailed account of the main research question. The effects of the interactive activities on the retention of collocation are discussed in light of the Noticing Hypothesis in (6.2.1.1), the Interaction Hypothesis in (6.2.1.2) and the quality and quantity of exposure in (6.2.1.3). Section (6.2.2) answers the second research question by comparing the effects of the instructional method on the receptive and productive knowledge of collocations. The following section interprets the relationship between vocabulary size and the ability to retain collocations using Spearman's correlation test. Finally, in section (6.2.4) major findings from the survey analysis are discussed and the effects of the individual variables on collocations are accounted for.

The final chapter of this thesis (Chapter 7) highlights the key research findings of the study, focusing on the implications for pedagogical practice. Finally, limitations of the study and directions for future research are presented.

CHAPTER 2 BASIC CONCEPTS AND ISSUES IN VOCABULARY ACQUISITION LITERATURE

This chapter reviews the literature related to the main topics being investigated in this study. It first starts with an overview of issues involved in defining word knowledge including the different definitions and measurements of the aspects of this knowledge. This is fundamental for the main argument that this thesis sets out to explore, which is the most effective way of teaching/learning collocations in a foreign language context. Since collocations are often thought of as one aspect of word knowledge, the second part of the chapter embarks on a comparative analysis of how this construct has been conceptualised in two dominant traditions in collocation research, which are the frequency-based approach (Sinclair, 1991) and the phraseological approach (Cowie, 1994; Mel'čuk, 1998). Based on this discussion, the definition of collocations in the current study is suggested. The final part of the chapter reviews literature associated with the acquisition of formulaic sequences and different learner variables (individual differences) and contextual variables (input, textbooks, and amount and quality of exposure) that might affect long-term retention of these sequences. Two key factors in the acquisition of collocations, the frequency and the quality of encounter, are discussed in detail since these have important implications for teaching collocations and designing classroom materials.

2.1. Issues of Single Words in the Vocabulary Acquisition Literature

In the last three decades, there has been an increasing interest in researching first language (L1) and second language (L2) vocabulary. Although second language acquisition (SLA) research is still debating the best teaching/learning methods to acquire L2 vocabulary, researchers now agree that vocabulary should be a major component of any language learning program. Wilkins (1972) highlights the importance of vocabulary in his oft-cited statement “without grammar very little can be conveyed, without vocabulary nothing can be conveyed” (p. 111). Since collocations, the focus of the current study, are often thought of as an aspect of word knowledge (Nation & Webb, 2011), it is important to consider how word knowledge has been defined in the vocabulary research literature and the way words are acquired/learned as this has important implications for L2 pedagogy.

2.1.1. Word knowledge. What is involved in knowing a word? Although this might sound like a simple question, knowing a word is difficult to describe because of its complexity. According to the Oxford Online dictionary (n.d.), a *word* is “A single distinct meaningful element of speech or writing." For a lay person, the space that separates a word from other words in a sentence, and the meaning usually attached to it are enough to define it. However, in the vocabulary research literature, the list of the aspects of word knowledge (WK) is impressive and far from comprehensive (Schmitt, 2010, p. 48). This list can include letters, syllables, part of speech, pronunciation, meaning, form, etc.

Some researchers have thought of WK as having different components. Milton and Fitzpatrick (2014) have identified three approaches to WK: the component approach, the developmental approach, and the metaphorical approach. What they called the component approach is based on the earlier distinction made by Saussure (1916) between the two faces of a linguistic *sign*: *signifiant* (the image/idea/thing that signifies) and *signifié* (the concept or thing signified). According to this approach, knowing a word involves knowing different aspects of this word. Nation (2001) offers the most influential and comprehensive taxonomy of WK. Nation categorizes WK into three different aspects: Knowledge of the form of a word (spoken, written, and inflected forms), knowledge of meaning (form and meaning, connotation, association), and use (grammatical functions, collocations, and constraints on use) (p. 27). Each of these categories is further sub-divided into the receptive and productive aspects of knowledge.

Another approach to WK conceptualizes it as a continuum of many stages where learners acquire different aspects of WK. Paribakht and Wesche (1993) proposed a Vocabulary Knowledge Scale that starts with the word being totally unfamiliar to learners and ends with the ability to accurately use the word (p. 180). Compared to the developmental view of WK, this proposition seems rather vague in that it does not specifically identify when and how learners acquire the different aspects of WK.

More recently, some researchers conceptualized WK using the metaphor of word web. This came to be known as the Connectionist Model (McCLelland & Rumelhart, 1986), which explains language using an analogy with a computer. According to this model, language is stored in long-term memory through an infinitely complex set of connections between nodes or cells in the brain. Macaro (2005) uses the example of the word *ash* to explain how words interact with each other when a French L1 speaker is learning this word:

> The word hits a post [i.e., a node] with which it *associates* but also rebounds and makes a number of connections with other posts: *hâche* (L1 phonological connection), hash (other L2 phonological connection), *le frêne* (L1 semantic connection), tree (L2 semantic

> connection), *arbre* (L1 semantic connection), *the* tree (syntactic L2 connection) … the ash is big (syntactic connection), *le frêne dans le jardin de ma grand-mère* (emotional connection). (p. 33, italics in original)

Based on the idea of links between words, Meara and Wolter (2004) developed their *V_Link* test, which they claimed can be used "to work out how vocabulary size and vocabulary organisation are related over time" (p. 95). An online version of this test, called *V_Quint*, presents learners with five high frequency words and asks them to find a common link between them. However, as Meara admits, there is a lot of research needed before this tool can be used to estimate the number of links in the lexicon. One problem with this tool relates to the link itself. What is a link and what can be included in a link?

What the approaches described above suggest is that the concept of word knowledge is multifaceted and that "no clear or unequivocal consensus exists as to the nature of lexical knowledge" (Laufer & Paribakht, 1998, p. 396). It seems that thinking of the phenomenon of word knowledge in terms of components, dimensions, or associations may on the one hand be problematic in that WK is being divided into too many aspects/components that it becomes difficult to understand and delimit the whole. On the other hand, since WK is complex and multifaceted, thinking of it in terms of components makes the concept easier for researchers to operationalize. Nation's (2001) taxonomy for example proved to be particularly effective for second language teaching since it can guide teachers to select the aspects of words being studied. Yet, the challenge facing vocabulary research remains in using the available evidence about the nature of these components/aspects to define WK in a way that is comprehensive and precise.

2.1.2. Receptive and productive word knowledge. The distinction between receptive and productive word knowledge is based on Palmer's (1921) idea of the ability to understand a word in a given context, and the ability to use it in speaking and writing. Nation (2001) defines these aspects of word knowledge as:

> Essentially, receptive vocabulary use involves perceiving the form of a word while listening or reading and retrieving its meaning. Productive vocabulary use involves wanting to express a meaning through speaking or writing and retrieving and producing the appropriate spoken or written word form. (p.38)

This receptive-productive dichotomy is directly relevant to language teaching/learning contexts. In my experience as a second language teacher, some of my learners are usually unable to produce a word in speaking or writing although they can recognise the word and understand its meaning. There is a consensus in the vocabulary research literature that receptive word knowledge usually precedes productive knowledge (Laufer & Paribakht, 1998, p. 369), and that the receptive knowledge is larger than the productive knowledge (e.g., Fan, 2000; Laufer, 2005; Melka, 1997). However, as Schmitt (2010) notes, this difference may be the result of the lack of a clear definition of the receptive and productive knowledge or due to the measurement used (p. 80). Read (2000) poses a central question that can help researchers understand the relationship between the two types of knowledge, “Is there a certain minimum amount of word knowledge that is required before productive use is possible?” (p. 154). To date this threshold is still unknown.

A different perspective was offered by Meara (1997) positing that, rather than there being a threshold for words to move from a receptive to a productive state, it is the way these words are organized in the mental lexicon that determines the connections between them. Meara (2009) rejects the existence of a continuum along which words move from a receptive to a productive state arguing that:

> The distinction between active and passive vocabulary is a clear-cut dichotomous one, rather than a cline or a continuum. Passive vocabulary is vocabulary which is linked to the rest of the network only by afferent links, and this makes it qualitatively different from the rest of the vocabulary network. This in turn suggests that making newly learned vocabulary items active is not just a question of nudging them along a continuum. Rather it involves a change of status which has something to do with building new associational links that connect from the rest of the vocabulary to the new word. (p. 61)

What this proposition implies is that there is no such thing as passive vocabulary changing along the continuum to become active. If this is the case, it raises a very important question related to SL teachers’ practice of pushing their learners hard to move from the receptive to the productive end of the continuum. Another challenge related to the receptive-productive dichotomy is that of accurately measuring these dimensions of word knowledge, which will be discussed next.

2.1.3. Measuring word knowledge. If we admit that word knowledge is by nature multifaceted and involves different aspects, what this implies is that measuring this knowledge is not straightforward in that, to date, there is no comprehensive model of measuring this knowledge. In the L1 and L2 vocabulary research literature, there is an abundance of different vocabulary test types. One technique has been to use simple checklists of words, where learners are asked to indicate whether they are familiar with the items being tested. Another measurement procedure is a kind of recognition tests that involves matching words to their definitions. Recall tests require learners to complete or provide a word that has been left out in a written context. Vocabulary knowledge can also be assessed using translation tests that ask learners to translate words from their L1 to L2 or vice versa.

In an attempt to categorise the ways in which WK has been measured, Read (2000) proposed three dimensions of vocabulary assessment. In the first dimension, the measurement can be *discrete*. In other words, the vocabulary test "takes vocabulary knowledge as a distinct construct" (p. 8). Thus, the focus of this test would be lexical items themselves, independently of other language components. An *embedded* test, on the other hand, would focus on measuring vocabulary as part of assessing larger constructs (p. 9). In the second dimension, vocabulary measurement can be either *selective*, where the researcher or the test writer would select words to be tested, or *comprehensive*, where the focus is on the complete written or spoken vocabulary production. Finally, measuring word knowledge, according to Read, can either be *context-dependent* or *context-independent*. The former would require learners to rely on the context to respond to the question while the latter would not necessitate familiarity with the context and learners would think of words as if they were isolated items to give their response (pp. 10-11).

2.1.3.1. Measuring depth vs. breadth. Traditionally, in L2 vocabulary testing literature, one influential distinction related to assessing WK is between breadth and depth. The "breadth" of knowledge or vocabulary size is defined as the number of words that a learner knows (Anderson & Freeboy, 1981; Selinker & Gass, 2008; Nation, 2001; Vermeer, 2001), while the "depth" of knowledge refers to how well a learner knows a word (Nation 2001; Read, 1993), and this usually ranges from "no knowledge at all to complete mastery" (Schmitt, 2010, p. 16).

The most widely-used instrument to measure vocabulary size has been the Vocabulary Level Test, originally developed by Nation (2001) and revised and validated later by Nation and Beglar (2007). The test involves matching words to their definitions and covers the 10,000 most frequent words in English. An attempt to measure vocabulary depth can be found in Webb's (2005) test battery of vocabulary depth. Webb used a writing and reading task to test the kind of knowledge students can gain. He used 10 tests that reflected the different aspects of word knowledge such as knowledge of orthography, knowledge of meaning and form, knowledge of syntax, etc. What distinguishes this test battery is the rich and comprehensive description of vocabulary knowledge both receptively and productively. Webb concluded that the productive task of writing a sentence may be more beneficial in a classroom context than reading three sentences receptively (p. 50).

In the field of SLA, measuring vocabulary size can yield important information and many studies reported that it can be a strong predictor of language proficiency (Iwashita, Brown, McNamara, & O'Hagan, 2008; Schmitt, Jiang, & Grabe, 2011; Staehr, 2009). Meara (1996) notes that:

> All other things being equal, learners with big vocabularies are more proficient in a wide range of language skills than learners with smaller vocabularies, and there is some evidence to support the view that vocabulary skills make a significant contribution to almost all aspects of L2 proficiency. (p. 37)

In L2 classroom contexts, it is not uncommon for teachers to use vocabulary size measures as a diagnostic instrument to determine the focus of their lexical instruction. One significant factor that might help L2 teachers with identifying the most suitable collocation instructional method for their learners is having a broader picture of their learners' vocabulary size.

Having detailed information about vocabulary size can be helpful for both teachers and learners, showing them aspects of vocabulary knowledge that need more attention. It is generally believed that learners with a larger mental lexicon would be more successful in language use (Nation, 2011). Since formulaicity is one important aspect of language in general, one might argue that having a relatively large vocabulary size can facilitate formulaic sequences learning. In fact, few studies have discussed the relationship between learners' vocabulary size and their knowledge of collocations. Bahns and Eldaw (1993) claimed that there is no significant correlation between the vocabulary size and knowledge of collocations. However, in a recent study, Gyllstad's (2007) findings suggested that scores on the collocations test significantly correlated with those of the receptive vocabulary size test. These findings, however, should be taken with caution since the sample was small (19 ESL Swedish learners). Schmitt et al. (2004) also reported a statistically significant correlation between vocabulary size and collocations knowledge with an increase of 11.9% in the learners' vocabulary at the 5,000 level. Given these mixed results, and as part of my study, it would be interesting to investigate the relationship between learners' mental lexicon and their collocations knowledge, if any.

More recently, researchers have started questioning the breadth-depth distinction arguing that, instead, these two aspects of word knowledge are related in many ways (Qian, 1999; Read, 2004, Schoonen & Verhallen, 1998; Vermeer, 2001). This proposition seems more promising for vocabulary research, and it can form the basis for future investigations to better conceptualise word knowledge. It is reasonable to assume that as the number of words learners know/understand increases, this will in turn make them better prepared to learn more about words they encounter or use. Vermeer (2001) argues that breadth and depth are not indeed distinct concepts. He found a very strong correlation (up to r = .98) between measures of depth and breadth of L1 and L2 learners of Dutch. He concludes that this strong correlation:

> Justif[ies] the position that there is no conceptual distinction between the two. The high correlations are a logical consequence of the fact that the lexical elements in the mental lexicon consist of interrelated nodes in a network, which specify the meaning of an element. The denser the network around a word, the richer the set of connections around that word, the greater the number of words known, and the deeper the knowledge of that word. (p. 231)

This is consistent with the Connectionist model discussed above, and from this perspective, the argument that the knowledge of related words can facilitate understanding and use of individual words seems more plausible. However, it should be noted that Vermeer's (2001) subjects were young children aged five, and language acquisition research suggests that cognitive development is an important factor in determining the depth or breadth of the vocabulary of young and old language learners (see Read, 2004 for a discussion).

This brief survey of issues involved in measuring the breadth and depth of word knowledge suggests that it seems more fruitful for vocabulary researchers to continue investigating alternative ways of measuring aspects of word knowledge that go beyond how many individual words a learner knows. Read's (2004) call for researchers to "dispense with the term depth and to recognise that any substitute one might propose ... is equally problematic" is well justified because "we are setting out to describe something that is inherently ill-defined, multi-dimensional, variable and thus resistant to neat classification" (p. 224). However, for SL teachers at least, until a more comprehensive measure of word knowledge is available, adopting the metaphor of breadth and depth can still benefit assessment of their learners' lexical knowledge. This metaphor could at least offer guidance for selecting test items that could reflect different aspects of lexical knowledge.

2.1.4. Re-thinking dimensions of word knowledge. Different conceptualizations of word knowledge have certainly contributed to our understanding of what is involved in this multi-dimensional construct. However, thinking of this knowledge as having separate components may blind us to the idea that these dimensions might be combined to offer a more accurate picture of what word knowledge is. Many studies (e.g., Laufer & Nation, 1999; Meara & Buxton, 1987; Schmitt et al., 2001) have suggested that performance in one dimension of word knowledge is closely linked to other dimensions, and that word knowledge can predict language proficiency in general. It is therefore time to re-think the jargon the field has been using for a long time now, and consider carefully defining what is being studied since this has important implications for the choice of appropriate measurement tools.

Another concern related to assessing word knowledge is the consistent focus on assessing the declarative knowledge (explicit knowledge) of individual words, which may also be misleading and can draw our attention away from thinking of words in their context of use as explained by Meara (1999), who argues that "one of the main shortcomings of ... [some vocabulary research] is that it has focused attention on the acquisition of vocabulary divorced from use or from real context" (p. 565). With the evidence pointing towards the fact that words are inter-related in the mental lexicon (e.g., Macaro, 2005; Meara and Wolter, 2004), and that there is a strong tendency of words to occur in multiword units (Schmitt, 2010), our approach to assessing word knowledge should also consider different aspects of various combinations of words. Achieving this goal is not straightforward either, and many challenges need to be dealt with, and we find ourselves again trapped in the specifics of defining another construct, which is formulaicity of language. The next section will try to uncover the mysteries of formulaic language as an aspect of word knowledge.

2.1. Defining Formulaicity

Although there is little dispute that formulaicity is an important aspect of language (e.g., Erman and Warren, 2000; Howarth, 1998; Kuiper, 2004; Oppenheim, 2000), one of the major problems in vocabulary research is that there is no agreement among researchers as to what this phenomenon is (Schmitt & Carter, 2004). In her survey of collocation research literature, Wray

(2002) found well over 40 terms (e.g., collocations, amalgams, fixed expressions, chunks, formulaic language, formulaic speech, formulaic sequences, formulas/formulae) used by researchers to describe the phenomenon of two or more words co-occurring together. What is striking about formulaic language, notice Wray and Perkins (2000), is "the variability found in the forms, functions, and distributions of sequences across types of language" (p. 2). The only common denominator, according to Nesselhauf (2005), is that the term collocation "is used to refer to some kind of syntagmatic relation of words" (p. 11). Two dominant research approaches, the *frequency-based approach* and the *phraseological approach*, offer conflicting views about what a collocation is. In what follows, the definition of collocation in both approaches will be thoroughly explored, and the variation of the definitions even within the same approach will be highlighted.

2.1.1. The Frequency-based approach. The frequency-based approach or what Herbst (1996) called the "Statistically-based Approach" (p. 380), was heavily influenced by the pioneering work of the British linguist John Rupert Firth in the 1950s. Firth (1957) thought of collocations as a sequence of co-occuring words, and his oft-cited quote "You shall know a word by the company it keeps," (p. 179) is central to this view.

According to this view, collocations are defined as "the occurrence of two or more words within a short space of each other in a text" (Sinclair, 1991, p. 170). Halliday (1966) distinguished between a "node," (the word being studied) and its "collocate," (the item that co-occurs with it), and the "span," or the distance of the node from its collocate (p. 156). For example, in the following sentence taken from The Corpus of Contemporary American English (COCA), *It is the nurse's role to establish a welcoming rapport to put the patient at her ease*, and if the word being studied is *establish*, the span of the collocate (rapport) from the node (establish) is three words to the right. The collocation in this case is *establish rapport.* Jones and Sinclair (1974), expanded on Halliday's notion of span, stating that the cut-off point of co-occurrence is within four words to the left or right of the node word (p. 21).

Another criterion used to define collocation in the frequency-based approach is that of frequency. Researchers usually use concordances to sort all word combinations based on a pre-determined frequency criterion. To decide on the significance of the co-occuring words, and that these words co-occur "with a probability greater than chance" (Halliday, 1966, p. 156), different statistical procedures can be used. It is worth noticing that not all researchers adopting the frequency-based approach agree that only frequent co-occurrences of words can be called collocations. For Sinclair (1974), collocations are co-occurrences of words "such that they co-occur more often than their respective frequencies and the length of text in which they appear would predict" (p. 21). For others, however, (e.g., Moon, 1998) less frequent co-occurrences of words can also be called collocations.

Although recent development in Corpus Linguistics and the use of specialized software have made identifying frequent word combinations easier, using the raw frequency criterion to define collocation is problematic in many ways. First, highly frequent words in a corpus are usually grammatical words such as determiners and possessives. Hunston (2002) interrogated the Bank of English corpus to find words that collocate with *gaze*. As a noun, this word occurs 2,869 times in this corpus, and the most frequent collocates are *the* (1,511), *his* (822), and *her* (628) (p. 69). Hunston concludes that "it is impossible to attach a precise degree of importance to any of the figures" (p.70). In this case, the most frequent occurrence of *gaze* is with *the*, and this is not because *the gaze* is a significant collocation but because function words, like *the*, are the most frequent words in the English language. Second, using the frequency criterion only can also fail to identify real collocations because these combinations are not frequent. Schmitt (2010) illustrates how corpus frequency can be misleading using the example of *cloven hoof*, which is a strong collocation but occurs only four times in the New Longman Corpus (p. 124) that consists of more than 30 million words.

2.1.2. The Phraseological approach. What characterizes the phraseological view of word sequences in general is the wide range of terms used to describe the phenomenon of co-occurrence of words. Cowie (1994) defines phraseology as "the study of the structure, meaning, and use of word combinations" (p. 3168), and since there are many types of word combinations, the proliferation of terms "generally increases the impression of fuzziness in the field [of phraseology]" (Granger & Paquot, 2008, p. 28). This can also explain the tendency of researchers in this field to favour one type of word combinations over another, and adopt a different terminology that is suitable to their research focus.

What Nesselhauf (2004) called the phraseological approach derives from the work of Russian scholars in phraseology and defines collocations linguistically. In other words, collocations are viewed as a relatively fixed type of word combination, and they can be delineated from free word combinations using linguistic criteria. Recent research in this tradition can be found, among others, in the work of Cowie (1981, 1988, 1991, 1994), Howarth (1998), Mel'čuk (1998), Gitsaki (1999), and Nesselhauf (2005). The main preoccupation of these researchers was to develop a way of categorizing different multiword units through investigating possible criteria that could differentiate them from free word combinations.

The common ground for researchers adopting the phraseological view is that they see phraseology as a continuum, "with the most opaque and fixed ones [word combinations] at one end and the most transparent and variable ones at the other" (Ganger & Paquot, 2008, p. 28). Howarth (1998) illustrates the phraseological continuum using some possible combinations of the verb *blow*. *Blow a trumpet* would be an example of "free combination," *blow a fuse* is a "restricted collocation," *blow your own trumpet* a "figurative idiom," and *blow the gaff* is a "pure idiom" (p. 164).

One of the most influential and precise definition of collocations was put forward by Cowie (1981, 1994). Cowie distinguishes between "composites," which are word combinations having syntactic functions, and "formulae," combinations which have pragmatic functions. *How are you?* is an example of formulae used in speech (Cowie, 1994, p. 3169) and these are usually independent utterances. Cowie uses the criteria of transparency and commutability to further subdivide the "composite" category into three types of word combinations: "restricted collocations," "figurative idioms," and "pure idioms." Nesselhauf (2005) summarizes the definition of both criteria:

> Transparency refers to whether the elements of the combination and the combination itself have a literal or a non-literal meaning, and commutability refers to whether and to what degree the substitution of the elements of the combination is restricted. (p. 14)

In this sense, collocations (e.g., heavy rain) are more restricted than free word combinations, where all the parts are used in a literal sense (e.g., drink water). On the other hand, they are also less restricted than idioms, which are usually characterized by the opacity of their meaning (the meaning of the whole combination cannot be predicted by the meaning of its parts) and fixedness of their form (e.g., blow the gaff) since it cannot undergo grammatical transformation (e.g., *the gaff was blown).

One major variation in the phraseological view of collocation relates to the use of the transparency and commutability criteria to distinguish collocations from other word types. For Hausmann (1989), transparency is the main criterion to delimit collocations from idioms, with idioms being the most opaque (p. 1010). Aisenstadt (1979) uses commutability as the basis for distinction between restricted collocations and idioms (p. 71). However, Mel'čuk (1998) presents a different method for distinguishing collocations from free-word combinations and idioms. He suggests a different terminology that includes “full idiom,” “semi-idiom”, “quasi-idiom,” “collocation,” “standard collocation,” “non-standard collocation,” and “cliché” (pp. 37-40). He maintains that “a lexical phraseme [a phrase featuring some unpredictable properties] is a collocation iff [if and only if] it is compositional” (p. 38). In other words, the meaning of the collocation can be divided into two parts: the meaning of the “base” and the meaning of the “collocate.” (p.39). To illustrate this, he uses the example of the collocation *sit for an exam,* where the verb *sit* expresses *undergo* and exam means *test*. For Mel'čuk, do a favour is a collocation and not a free combination because of the restricted commutability of the verb *do* (not **give a favour* or **make a favour*). On the other hand, this collocation cannot be an idiom since the noun *a favour* is transparent (p. 31).

In addition to the criteria used to define collocations, the relationship between the constituents of a collocation are also viewed differently by researchers in the phraseological approach. While Cowie’s (1992) definition of collocation (a type of word combination) implies that none of the constituent is restricted, Mel'čuk (1998) argues that “the meaning of the base is always the semantic pivot of the collocation” (p. 39). For example in the collocation *make a decision*, the verb *make* is selected as a function of the noun *decision*. He illustrates this restriction using the French collocation *prendre une décision* (make a decision) explaining that if a French L1-speaker wanted to use the noun *choix* (choice) instead of *décision*, s/he would say *faire un choix* (make a choice) rather than **prendre un choix*.

Nesselhauf (2003) took Mel'čuk’s work a step further and refined the criteria for distinguishing collocations from other types of word combinations. Her definition applies to verb-noun combinations and can serve as the basis for defining other types of grammatical combinations such as adjective-noun. According to Nesselhauf (2003), for a combination to be considered as collocation, the sense of the verb should be restricted and not that of the noun (p. 226). In other words, the verb can only combine with certain nouns. For example, in English, *take a picture* or *take a photograph* are collocations but not **take a film* or *take a movie,* though *film* and *movie* would also be possible from a semantic point of view. It is the arbitrarily restricted sense of the verb *take* that makes the combination *take a picture* a collocation rather than a free combination. Nesselhauf illustrates the restricted sense of a noun using the idiom *sweeten the pill*. The noun *pill* in the sense of ‘unpleasant news’ cannot freely combine with other verbs, and it is the restricted sense of the noun here that makes the combination an idiom rather than a collocation (Neseelhauf, 2003, p. 226).

What is interesting about this definition is that it is theoretically consistent in using the criterion of restrictedness to delimit collocations. However, as Nesselhauf herself admits, this definition still has some limitations. First, Nesselhauf (2003) argues that the verb “want can be combined with a great number of nouns (want toys, a child, a drink, a car, truth, etc.)” (p. 225) and that *want* can freely combine with any noun. However, as Frath and Gledhill (2005) state, “the restriction posited by Cowie and Nesselhauf turn out to be false when we submit them to corpus analysis” (p. 4). Frath and Gledhill checked the *Bank of English* corpus (Sinclair, 1987) and found out that the verb *want* can indeed combine with nominal complements to form consistent frequent collocational clusters such as *I want you* (expressing a bald demand), or *I want this baby very much* (expressing a wish to have children) (p. 4).

The second problem with the phraseological categorization of word combinations is that it heavily relies on the acceptability judgements (Groom, 2007, p. 41). In other words, it is not enough for a combination to exist simply because it is used by an L1-speaker of a language, but rather because the combination “is usually considered an acceptable combination in English by adult native users of a standard variety of British or American English” (Nesselhauf, 2005, p. 34). Mel'čuk (1995) hinted at this inherently problematic acceptability criterion stressing that even L1-speakers themselves would disagree when asked to judge the acceptability of a given combination (p. 171).

The conclusion to be drawn from the accumulated research in both the frequency-based and the phraseological approaches is that the attempt to delineate collocations from free combinations using either syntactic or semantic features is possible but, as Wood (2015) warns “absolute certainty is elusive” (p. 32). While it is true that using large corpora to identify and analyse collocations according to different statistical measures can be systematically implemented, relying on the frequency criterion only can also leave out collocations that are not so frequent. On the other hand, in the phraseological tradition, using the transparency and commutability criteria to identify “real” collocations is still difficult to operationalize. Many researchers often interpret the restriction on commutability differently, and most of the time, “it is also often not made clear what exactly is meant" (Nesselhauf, 2005, p.27). Also, Nesselhauf's definition of collocation based on the notion of "restricted sense", though much more detailed and systematic, still needs to be refined to account for changes in language and use a more reliable criterion than acceptability to delineate different categories of word combination.

2.1.3. Aspects of collocation Knowledge. In addition to fuzziness surrounding their definition, in the vocabulary research literature, there is an abundance of different typologies that tried to classify word combinations. A very useful categorization of what is involved in the knowledge of collocations has been offered by Nation (2011). This classification is based on Nation's (2001) taxonomy of what the knowledge of a single word includes (form, meaning, and use). Nation's (2011) multiword units knowledge taxonomy is very helpful for research on collocations since it allows researchers to "be clear about what kind of knowledge is being tested […] and to be aware of the range of possibilities for testing in both knowledge and item type" (p. 189). Using this classification of the knowledge of collocations will certainly be a useful analytical tool in determining the validity and reliability of different test types used to measure this knowledge. When designing research instruments, researchers can refer to this taxonomy to decide on the type of knowledge of collocations that is being tested, and, consequently, choose the appropriate test format that better serves the particular research purpose(s).

Other methods of categorising collocations are based on the way they are processed and stored in memory. This account posits that collocations are stored as complete units or what N.C. Ellis (2001) called "chunks." Evidence for this view of learning/acquiring collocations comes from the research of van Lancker, Canter, and Terbeek (1981) and Peters (1983). Eye-tracking research showed that the processing of collocations was faster than novel phrases, and that participants needed shorter reaction times in tasks of grammatical judgment and lexical decision (Durrant & Doherty, 2010; Ellis, Simpson-Vlach, & Maynard; 2008; Schmitt, 2008). Kuiper (2004) explains that "smooth talkers" under time constraints make use of pre-fabricated chunks and this helps them with fluency. The way collocations are treated here echoes the view of Pawley and Syder (1983) that single words or sequences of words are memorized as single units, and as such are processed faster than creative language, which offers the language learner processing advantage.

2.1.4. Definition of collocations in the current study. Given the various classifications and typologies of collocations, and how this construct has been defined by different scholars, it becomes challenging to come up with a precise definition that most researchers would agree on. Sinclair's (1991) definition that collocations are "the occurrence of two or more words within a short space of each other in a text" (p. 170) gives collocations a broader sense and would not be interesting for second language teachers whose aim is to help their learners master the habitual combinations of words that are salient for L1-speakers of the language. Another oft-cited definition of collocations was put forward by Wray (2002):

> A sequence, continuous or discontinuous, of words or other elements, which is, or appears to be, prefabricated: that is, stored and retrieved whole from memory at the time of use, rather than being subject to generation or analysis by the language grammar. (p. 9)

Wray explains that her definition of collocations "aims to be as inclusive as possible, covering any kind of linguistic unit that has been considered formulaic in any research field" (p. 9). While this definition is helpful in clearing the ground, it still remains too broad to decide which strings are formulaic. On the other hand, Schmitt (2004) defines collocations in terms of the way they are stored in the brain. He believes that collocations are stored as whole units, and this is, according to Schmitt the defining feature of collocations. Wood (2010) reiterates this characterisation of collocations as being "multiword units which are stored in long-term memory as if they were single lexical units" (p. 38).

For the purpose of the current study, collocations are defined in a way that reconciles both the phraseological and the frequency-based approaches. Collocations are then defined as combinations of words that frequently co-occur in natural language as indicated by their MI score, and that are compositional. It is the frequency of occurrence and the compositionality that can distinguish them from free word combinations and idioms. As such, they lie in the middle ground between the two extremes of the phraseological continuum, free combinations and idioms. The collocations selection criteria first consider their internal structure. Two types of collocations are included in my study: verb + noun (e.g., *avoid conflict*) and adjective + noun (e.g., *significant contribution*) combinations. A second criterion is the degree of semantic compositionality. Only compositional collocations are treated in the study. For example, the sequence *conduct research* is compositional in that its meaning can be predicted from the meaning of *conduct* (do something) and *research* (a detailed study of something) (Macmillan

Dictionary, 2009). In addition, the frequency of co-occurrence is also used to check that the collocations are relatively frequent, and a minimum of 30 appearances in the COCA was established. Finally, the mutual information (MI), i.e., the strength of association between the two constituents (Manning & Schütze, 1999, p. 178) was also used to ensure that the constituents of the collocations are significantly associated, and all collocations chosen for the study had a minimum MI score of 5. This means that the constituents of the collocations included in the study occur frequently in the COCA and they are also strongly associated.

2.2. The Acquisition/Learning of Formulaic Sequences

2.2.1. Models of acquisition/learning of collocations. Although researchers disagree about a precise and clear definition of collocations, there is a general consensus that formulaicity is an important aspect of language. Recent research reports that a high percentage of discourse is formulaic in nature. Estimates vary considerably. Howarth (1998) pointed out that collocations and idioms constituted from 31 to 40% of the 238,000 words of academic writing. Erman and Warren (2000) report an even higher rate. They found that well over 50% of the spoken and written English discourse they studied was formulaic. Although the results vary, what is becoming evident is that a great deal of discourse is formulaic (Nattinger & DeCarrico, 1992). Given this pervasiveness and the increasing research interest in identifying and describing collocations, one would expect that theories of language acquisition might have put forward models that account for the way we acquire these sequences. However, to date, the mechanisms of how collocations are stored and processed in the mental lexicon have just started to be explored. In addition to the small-scale research projects, that are illuminating and inspiring in terms of the methodology used (e.g., eye-tracking research), what is needed are large-scale longitudinal acquisition studies, particularly in the field of SLA, that can generate large corpus data. When we collect such data, tracing the development of collocations in the lexicon and the way they are stored and retrieved would be possible.

Two prominent models in the field of formulaic language studies offer some insights into how the language learner goes about the process of acquiring and processing these strings of words. Nick Ellis (2001) and Wray (2002) present two opposing views about the acquisition of collocations. The next section considers these two views of collocations.

2.2.1.1. Ellis's Model. Ellis (2001) proposes a model of collocation learning that is structured around the idea of "chunking." According to Ellis, the process of "chunking" (first introduced by Miller, 1956) drives the learning of formulaic sequences. This model hypothesizes that the frequent co-occurrence of two or more words together enables the language learner to record them as a "chunk" in the short-term memory. These words would be treated as a single unit, suggests Ellis. This would in turn, free up the short-term memory allowing for more processing abilities. Although other views about formulaic language learning suggest that there is more to language acquisition than "chunking," (e.g., Wray, 2002), the idea of sequence-based learning seems an attractive suggestion, and there is no doubt that it can partly explain language acquisition in general.

Ellis (1996) argued that when learners are exposed to formulaic phrases and they retain the knowledge of lexical sequences in their long-term memory, this, in turn, facilitates the task of acquiring the language grammar. Ellis suggested that acquiring a language is basically "sequence learning." He contends that the principle of "chunking" is central to language acquisition. This psychological mechanism drives collocation learning. When the learner is exposed to collocations in input, the words that frequently co-occur are stored in the long-term memory as a single unit or a chunk. Ellis explains chunking using a principle he calls "law of contiguity," according to which "objects once experienced together tend to become associated in the imagination, so that when any one of them is thought of, the others are likely to be thought of also" (James, 1890, quoted in Ellis, 2001, p. 42). Bybee (2005) pertinently summarizes this process as "words used together fuse together" (p. 112). When the learner encounters these words in input again, they will be treated as chunks. As the learner commits a larger number of sequences into memory, these in turn serve as database for the extraction of the regularities of the linguistic system. Ellis (2002) adds that for the sequences to become automatized, there should be enough input, arguing that "nativelike competence, fluency and idiomaticity require an awful lot of figuring out which words go together" (p. 157).

Ellis (2002) proposes an L1 acquisition model that develops "from formulas, through low-scope patterns, to constructions" (p. 170). He explains that the multiwords found in the language of children between the age of 2 and 3 years "is produced from a developing set of slot-and-frame patterns." Children can insert different words in these slots, and, as children experiment with the language, these patterns change over time in terms of number and structure. Ellis gives the example of two hypothetical patterns (I *can't* + X, and *I don't* + X) to illustrate that it is not the implicit grammatical rules that makes the patterns related together since children at this age don't "know" about auxiliaries and verbs yet. Ellis concludes that children "pick up frequent patterns" from the surrounding input, and as the "database of related utterances grows", they develop more abstract knowledge about the language system. Ellis cautions that this learning model applies to L1 acquisition, and acknowledging the differences between L1 and L2 acquisition (e.g., conceptual development, type of input, and transfer from L1), he points out that this model could be used to guide researchers identify the mechanisms involved in L2 learning in general.

2.2.1.2. Wray's Model. Another influential view about collocations in first and second language acquisition was offered by Wray (2002). Unlike earlier theories of L1 acquisition positing that, when exposed to input, the child tends to break down linguistic units into their smallest constituents, Wray (2002) argues for a holistic storage and processing of these units stating that breaking these units down is not the norm, and this only occurs when there is a need to do so. This needs-only principle drives the use and processing of formulaic language. Wray explains how children approach the available input, through analysis, as a result of the need they use collocations for.

Wray (2002) summarizes the different functions that collocations can have in three: "The reduction of the speaker's processing effort, the manipulation of the hearer, […] and the marking of discourse structure" (p. 101). These communicative functions can be achieved through either producing novel text or choosing from the memorized prefabricated chunks. Wray concludes that in this way "Formulaic sequences are a dynamic not static solution," and since the needs are changing, "the store" of collocations is itself continuously changing. In this way, when children do analyse the available input, this is rather the result of the processes involved in selecting the appropriate function. Then, the needs-only principle is essential to understanding of the acquisition of collocations, as Wray pertinently expresses it: "Children will simply analyse whichever strings need analysing, to the extent that they need to, and no further" (p. 131). Wray was also cautious to point out that, taken alone, the needs-only analysis does not account for the acquisition of collocations, and that the "analytic knowledge" or "grammar insights" that develop over time is certainly central to the model she proposes.

This model is based on Wray and Perkins (2000), and it revolves around the proposition that, as they get older, children approach language acquisition with changing proportions of holistic and analytic processing. This model identifies four phases of development, from babyhood to adulthood, and during these stages, children use the holistic and/or analytic processing differently. During phase 1 (from birth to 20 months), Wray explains that the child is rather holistic in his approach to communication. At the end of this phase, the child is able to produce “utterances that have been heard from carers,” and Wray considers these as “single unanalysed units” (p. 133). In phase 2 (20 to 30 months), with the increasing vocabulary repertoire, grammatical knowledge or what Locke (1993) calls “grammatical analysis module” (GAM) becomes functional. It is thanks to the GAM, according to Wray, that the child is able to identify the “constituent structure” of the words or morphemes that have been acquired through social interaction. In phase 3 (8 to 18 years), with the GAM at work, the output of L1-speakers is characterized by the abundance of collocations. As for Phase 4 (late teenage), Wray argues that this is the stage when “the balance of holistic and analytic processing is settled” (p. 135).

It is important to notice that the L1 collocation learning model proposed by Wray does not apply to adult L2 learners, and that there are fundamental differences between how both approach collocation learning. Wray gives the example of the sequence *major catastrophe* to explain the differences. When encountering this string in input, the L1-speaker would notice and remember it as an unanalysed sequence and it would be stored as an idiom meaning “big disaster.” In contrast, when an adult L2 learner encounters this sequence, he “would break it down into a word meaning “big” and a word meaning “disaster” and store the words separately, without any information about the fact that they went together” (p. 209). Therefore, if the adult learner needs to talk about the idea of major *catastrophe* in the future, Wray maintains that “they would have no memory of *major catastrophe* as the pairing originally encountered, and any pairing of words with the right meaning would seem equally possible: major, big, large, important, considerable, and so on, with catastrophe, disaster, calamity, mishap, tragedy, and the like.”

2.2.2. Evidence from adult second-language learners. Wray’s model of collocations acquisition implies that, unlike children acquiring their L1, second language adult learners do not typically retain information about which words go together but instead remember single words. Recent research, however, suggests that L2 adult learners do maintain some traces of what words went together. Durrant and Schmitt (2010) tried to test the L2 adult learners’ non-formulaic approach to collocations learning. Participants were 48 postgraduate L2-speakers of English studying at the University of Nottingham coming from different L1 backgrounds. The researchers used three training conditions: single exposure (7-8 minutes), verbatim repetition (11-12 minutes), and varied repetition (14-15 minutes), with equal numbers of participants for each condition. There were two counterbalanced lists of 20 collocations. All participants took the same test that was a naming task. Participants saw a fixation point ("+") on a computer screen for 1.5 seconds. For the target collocation *warm flat*, for example, first the adjective *warm* appeared on the screen for 1.5 seconds. Then, the first two letters with dashes corresponding to the number of missing letters of the collocating noun appeared on the screen for 5 seconds ("FL_ _"; for *flat*). Participants were asked to say the word. The same 20 target collocations were presented randomly to all participants after four practice word pairs from a filler sentence list. Results showed that the nouns that appeared with their collocating adjectives were recalled more frequently than the nouns that appeared without their paired adjectives. Even a single exposure to the target collocations was enough for learners to recall the target noun (3 out of 10). L2 adult learners in this experiment were exposed to collocations under different conditions, and they were able to remember some of them. This means that there was a trace left of which words went together. Durrant and Schmitt concluded that "any shortcomings in non-natives' grasp of collocational links between words may be a product of an insufficient exposure to the target language, rather than of a distinctively "word based" approach to learning." (p. 179).

The findings of this study contradict Wray's (2002) claim that adult learners do not retain information about which words go together but instead remember single words. The real contribution of this study was in terms of the methodology it used, which is a leap forward that tried to control for the input learners receive and test their knowledge of the target collocations. However, the easy test format (naming task) and the number of the target sequences (20 collocations) make us interpret the findings of this study with caution. Also, as is the case with laboratory research in general, contextual validity is another limitation of the study. Using an interview structured around the target collocations might improve the research instrument used in this study.

In sum, Ellis' (2001) and Wray's (2002) conflicting views about the way collocations are acquired/learned offer some profound theoretical and practical insights into collocations learning. However, accurate evaluation of these models necessitates, in addition to describing learners' knowledge, a detailed consideration of the input they receive. Given the current state of our knowledge about collocations and the insufficient empirical evidence that we have, it is rather difficult to judge the models. What makes this task difficult is that the input learners receive is difficult to approximate, as Hoey (2005) pointed out that "the personal 'corpus' that provides a language user with their lexical priming is by definition irretrievable, unstudiable and unique" (p. 14). The only choice left is to use experimental laboratory-based research and try to control confounding variables.

2.2.3. Individual variables and collocation learning/acquisition. One essential question that has often attracted SLA researchers has been the variability in learners' success related to learning any aspect of an L2. Research has often confirmed that there are differences among L2 learners in terms of their achievement when learning an L2 and this came to be known as individual difference (ID) research. The variability in the learners' achievement is attributed to differences in their cognitive abilities (Dörnyei, 2006), type of personality and motivation (Masgoret & Gardner, 2003), and other aspects related to the complexity of the language being learned (Hawkins, 2004). The principal tenet of these lines of inquiry is that IDs are key factors that can make learners successful in learning an L2 (Dörnyei, 2005, p. 16). The list of learner variables that were thought to affect learning can even be more exhaustive and includes language aptitude, learning strategies, and learning styles, etc. However, what is problematic with this paradigm is that it views IDs as stable traits that are learner-internal, and as such excludes other external variables such as the time and context of learning (Dörnyei & Ryan, 2015, p. 6). Instead, a more recent perspective on IDs suggests that they are "socially interdependent, malleable states developing over time" (Falout, Murphey, Fukuda, & Trovela, 2013; p. 1). In this respect, the impact IDs have on language learning "waxes and wanes" (Ellis & Larsen-Freeman, 2006, p. 561).

One of the most widely researched learner variables in ID research is motivation. The Canadian social psychologist Robert Gardner's work was very influential in L2 motivation research. Gardner's (1993) *socio-educational model of second language acquisition* places motivation at the centre of the SLA process. In this model, motivation is linked to other learner variables such as integrativeness, attitudes towards the learning situation, attitudes towards learning the L2, motivational intensity (effort), and desire to learn the L2 (p. 8). What is intuitive in Gardner's model is that it does not confine IDs to factors such as age, gender, or learning history, but includes variables related to the learning/acquisition context. As such, IDs are not only learner-specific but also changing according to the context.

What should be noted though is that despite the extensive work of social psychology and SLA motivational research, there are other factors that should be taken into consideration when trying to account for learners' success or failure in learning an L2. Within the context of globalization, and in an EFL context, the idea of trying to integrate into a given language community (Gardner, 1993) may no longer be applicable to many language learning contexts. In the UAE, for example, where English is taught as a foreign language, learners would have other aspirations than being part of a local linguistic community. Yashima (2000) argues that it is not only IDs that might affect the learning outcome but rather what he called "international posture" which is a multifaceted construct that involves "interest in foreign or international affairs, willingness to go overseas to study or work, readiness to interact with intercultural partners and . . . a non-ethnocentric attitude toward different cultures" (p. 57). What this implies is that the identity of the language learner and the motivation to learn a language are not only internal characteristics of the learner but rather situated within the global culture (See Arnett, 2002 for a discussion of the psychology of globalization).

Given the important effect IDs can have on language acquisition/learning in general, how does this apply to learning formulaic language? One major finding of formulaic language research has been that the L2 learners' knowledge of collocations tends to lag behind other characteristics of their linguistic competence (e.g., De Cock; 2000; Kellerman; 1978; Laufer; 2003). Dörnyei, Durow, and Zahran (2004) found that the learner variable of *sociocultural integration* was an important factor in successfully using collocations and that "success in acquiring formulaic sequences is strongly related to the learners' active involvement in some English-speaking social communities" (p. 104). Moreover, they argue that "Success in the acquisition of formulaic sequences appears to be the function of the interplay of three main factors: language aptitude, motivation and sociocultural adaptation" (p.105). Although these findings can explain the variability in learners' success to learn formulaic language in a second language or immersion contexts, they might not account for differences in achievement in a FL context, where learners are exposed to the target language in the classroom only.

2.2.4. L2 Contextual variables and collocation learning

2.2.4.1. Input. Other variables related to the context of L2 instruction can also contribute to the variability in learners' achievement related to collocations. First, SLA research recommends a huge amount of input for a successful language learning (Krashen, 1985;

Schachter, 1984; Swain; 1985; Ohta; 2001), and this applies to learning collocations as well. A possible explanation of the difficulties L2 leaners face when learning collocations may be the insufficient input. Irujo (1986), for example, explained that idioms are not present in L2 learners' output because this type of formulaic language is rarely used in the L2 classroom speech or materials. Even when learners were exposed to collocations in a native-speaking environment, Siyanova and Schmitt (2008) found that the frequency of exposure was not enough for L2 learners to advance their use of collocations. While it is true that input is a key factor in acquiring different aspects of language competence, "there is no agreement on what kind or how much exposure a learner needs" (Carroll, 2001, p. 2). A possible compensation for this lack of input can be through supplementing classroom materials with digital tools such as concordances, at least in FL contexts.

*2.2.4.2. Textbooks***.** Most contemporary textbooks offer various non-interactive multiword-unit-focused activities. These can be the kind of matching constituents of a given collocation, gapped sentences where learners are required to provide a missing element of the sequence, matching collocations to their definitions, etc. Textbook designers presume that such exercises will prompt learners' engagement with the targeted sequences and that learners will notice what words can go together and thus commit them to their long-term memory (Boers, Dang & Strong, 2016).

In a recent study, Boers, Demecheleer, Coxhead and Webb (2014) tried to gauge the effectiveness of exercises found in many textbooks (gapped sentences and matching verbs to nouns). They also provided learners with corrective feedback after doing the exercises. The researchers concluded that the gains were marginal (5 to 10% gains in post-test scores), and more importantly that "wrong choices made while doing the matching exercise reduce the likelihood of subsequently retaining the correct verb–noun associations, despite the corrective feedback" (p. 67). This is because once erroneous associations between the constituents of a sequence are established in the memory of the learner, it will be hard to eradicate them despite the feedback offered to learners. Stengers and Boers (2015) echoed a similar concern regarding the effectiveness of corrective feedback to eradicate the erroneous links between collocations constituents and concluded that "when students [learners of L2 Spanish] under the trial-and-error procedure supplied a wrong response in the exercises [gap filling and matching], the corrective feedback seldom had a remedial effect" p (1).

Although, with the growing interest in formulaic language, many publishers and textbook writers have recently started making their textbooks more corpus-based (e.g., Cambridge's books *English Collocations in Use* and *English Phrasal Verbs in Use*, McCarthy & O'Dell, 2017), the truth is that, as Meunier (2012) noted "the visibility is often lost in the materials themselves" (p. 114). Burton (2012) seems even more pessimistic about the place of corpora in English language teaching (ELT) publishing stating that "the influence of corpora on course books may remain limited in the future, regardless of the outcome of debates in academic literature on the subject" (p. 106).

One more important concern related to textbooks that include non-interactive exercises is the way they present collocations to learners. In gap-filling and matching exercise formats, learners are usually presented with broken-up collocations and asked to reassemble them. The following examples taken from *English Collocations in Use* illustrate this format:

- Do you think you will make an ___________ on the flat you saw yesterday?

A	**B**
blond	a suggestion
heavy	hair
come up with	rain
words of	your principles
adhere to	wisdom

In the first example, the target word is *offer* which is part of the collocation *make an offer*. As for the second example, learners have to match words from column A to words in column B to end up with collocations like *blond hair*. This type of exercise is very common in many textbooks. The problem with such exercise formats is that they do not present collocations intact to learners although most recent research findings suggest that learners would benefit more from presenting collocations as holistic units (Durrant and Schmitt, 2010). This would minimise the risk of associating words to their wrong collocates. Then, the implication for ELT materials writers is to design activities that raise awareness about the holistic nature of collocations. In this regard, my research study will try to offer an alternative to these widely-used non-interactive exercises.

2.2.4.3. The frequency and the quality of encounter. It has been widely reported in the SLA literature that success in learning vocabulary depends on two factors: the frequency of encounter, i.e., how many times the target words appear in the written or spoken input, and the type of activities learners do with these words, or the quality of encounter. Many studies have reported a positive contribution of multiple encounters to learning new words (e.g., Nation & Wang, 1999; Waring & Takaki, 2003; Webb, 2007, Webb, Newton & Chang, 2012). Other studies have also stressed the importance of the type of activities learners engage in when learning new words (e.g., Hulstijn & Laufer, 2001; Laufer & Rozovski-Roitblat, 2015; Peters, 2014; Pichette, De Serres, & Lafontaine, 2011). However, to date, there is no conclusive evidence as to which factor, the frequency or the quality of encounter, should be prioritised when learning new words. Much uncertainty still exists in collocation learning about the impact of these two factors and which one is more important. It is hoped that this research will contribute to a deeper understanding of the effects of the frequency and quality of encounter in learning collocations.

Learning new words has traditionally been explored through reading and many empirical studies reported a relatively discouraging gain in the number of words learned ranging from one to seven words (Brown, Waring, & Donkaewbua, 2008; Dupuy & Krashen, 1993; Zahar, Cobb, & Spada, 2001). Some researchers reported that learners needed from 6 to 20 encounters to retain certain aspects of word knowledge (meaning and form) in their long-term memory measured by a delayed post test (e.g., Pellicer-Sánchez & Schmitt, 2010; Waring & Takaki, 2003). Webb, Newton, and Chang (2013) concluded that their Taiwanese learners, using graded readers to learn 18 collocations, needed 15 encounters with these sequences for "sizeable learning gains [to] occur" (p. 91). However, different results were reported by Chen and Truscott (2010) who made their participants read seven passages and encountered the 10 target words seven times. After two weeks learners were able to recall the meaning of only one word (0.95) out of 10. Given these rather discouraging results, the conclusion that can be drawn from these studies is that reading *only* cannot yield successful long-term retention of new words, and that new words should also be salient in the input learners receive.

Laufer (2005) argues for a word-focused instruction where learner's attention is directed towards new words through different techniques such as using glosses, text highlighting, dictionary use, negotiation of meaning, sentence writing, etc. More recently, many studies have confirmed the benefit of explicit attention for leaning vocabulary (Amiryousefi & Kassaian, 2010; Kim, 2006; Peters, 2006; Peters, Hullstijn, Sercu, & Lutjeharms, 2009; Sonbul & Schmitt, 2010). Peters et al. used different techniques with four groups (137 college students) of L2 German learners. Two groups read a text in German and used dictionaries to look up new words while two groups read a text and engaged in word-focused exercises. The results showed that the groups that did vocabulary exercises after reading retained more words (M = 14.97 and 15.31 out of 16) than those who did not (M = 10.41 and 11.97 out of 16). The researchers concluded that the poor retention of new words from reading only can be “substantially boosted by techniques that make students *look up the meaning of* unknown words, *process* their form-meaning relationship *elaborately*, and process them *again* after reading” (emphasis in original) (p. 114).

One important study that investigated how task type can affect the long-term retention of unknown single words is Laufer and Rozovski-Roitblat (2015). The researchers compared two tasks which were reading a text with occasional “Focus on Form” (using a dictionary) and reading a text with “Focus on Forms” (focused word exercises). Participants were 20 university students, L1-speakers of Hebrew, Arabic, and Russian, studying English for Academic Purposes. Learners were exposed to 60 target words under different conditions during 13 weeks. In both conditions (reading and focus on form and reading and focus on forms) some words appeared 2-3 times, some other words 4-5 times, and others 6-7 times.

Data analysis showed that the type of task learners did had a greater effect than the number of encounters. Learners who engaged in reading and did word focused exercises far outscored (overall mean score of 5.17 out of 10) learners who read a text and used dictionaries (overall mean score of 3.73) on the passive recognition (translation) test. However, in the passive recall (multiple-choice) test, results were less significant and the task type was not found to be superior to the number of encounters (overall mean score of 1.50 and 2.50 out of 10 for the focus on form and focus on forms conditions, respectively). It should be noted that despite the innovative research design, there were some concerns related to the research methodology that could have affected the results. First, learners had different L1s and research reports that congruence between L1 and L2 can affect learning new words (Peters, 2016). Also, the target words belonged to different parts of speech (e.g., acquire, merely, profound, quantity) and they were from different frequency levels, which could have been another factor that affected the learning.

Laufer and Rozovski-Roitblat's (2015) study reviewed above can have important implications for L2 teaching methodology and materials design. A central question that needs to be addressed when planning L2 vocabulary instruction or designing materials for use in L2 classrooms is the interaction between the two factors that are reported to affect learning new words: the frequency of encounter and the quality of encounter. If learners need to encounter unknown words repeatedly in the written or spoken input, which poses a serious challenge for material designers and teachers, is there a way to compensate for the very high number of encounters with carefully-designed tasks that offer learners the opportunity to notice different aspects of unknown words and actively engage with them? The following section will be centered around this question in an attempt to highlight current deficiencies in teaching/learning new words before embarking on the task of outlining the specifics of my proposal for a more effective methodology of vocabulary instruction.

CHAPTER 3 PEDAGOGICAL APPROACHES TO TEACHING/LEARNING COLLOCATIONS AND TASK-BASED LANGUAGE TEACHING

3.1. Lexical instruction and the focus on single words.

Most approaches to second language vocabulary learning/teaching, driven by different linguistic theories, have based their lexical instruction on single words or sometimes word families. Schmitt (2010) explains this focus on single words by the fact that “they have been considered the basic lexical unit … [and] because they are easier to work with than formulaic language” (p. 8). This is not surprising since single vocabulary items can to a certain degree be easily integrated in any learning activity, and material designers and teachers can use single words’ research findings to guide their practice. Besides, L2 learners themselves see learning vocabulary as adding single words to their lexicon and fail to notice the words that usually go together or collocate. Another reason that could explain the tendency to focus on single words in the vocabulary research literature and L2 teachers’ practice is the lack of research on formulaic sequences (AlAli & Schmitt, 2012). In fact, it is not until recently that there has been a growing interest in researching collocations, but compared to individual words research, “research on multiword units is still in its infancy” (Nation & Webb, 2011, p.175).

Given the current state of knowledge, approaching the teaching/learning of collocations still constitutes a major challenge for L2 teachers and learners. If adult learners do not maintain any trace of what words went together in the input they receive (Wray, 2002), then there would be no benefit in introducing these words as chunks. On the other hand, if chunking constitutes their first mode of analysis (Ellis, 2001), they would certainly benefit from making the features of these chunks salient in the input they receive. Although these views about the way collocations are stored and processed in the mental lexicon still need empirical evidence, the truth is that this debate about the holistic processing and storage seems rather of less importance to L2 teachers. Since teachers’ major concern is to improve their learners’ overall language proficiency, and collocations research literature widely reports their importance in achieving this goal, what is needed is a practical approach that offers them guidance about how to most effectively help their learners commit these sequences to their long-term memory.

3.2. Alternatives to the focus on single words

3.2.1. The Lexical Approach. Although the interest in prefabricated language or chunks dates back to 1904 when Otto Jespersen published his book *How to Teach a Foreign Language*, it has not been until recently that there has been a growing research interest in exploring the potential contribution of lexical knowledge to English language teaching. The work of Nattinger and DeCarrico (1992) has been seminal in this respect. Their Lexical Phrases and Language Teaching book has stimulated a wide debate about the place of lexis in second language (L2) classrooms and outlined some interesting instructional methods of incorporating lexical phrases into pedagogical practice.

When Michael Lewis published *The Lexical Approach* (1993, 1997, 2000), it provoked much controversy among ELT practitioners. Lewis's (1997) argument that "language consists of chunks, which, when combined, produce coherent text" (p. 7) was a challenge to the traditional view of language teaching and learning that prioritises structures (grammar) over single words (vocabulary). While it is true that the lexical approach (LA) to language teaching has opened up new horizons for ELT pedagogy, the fuzziness surrounding different interpretations of this approach makes its implementation even more challenging for ELT practitioners. In what follows, the major tenets of the LA will be briefly outlined, and some pedagogical problems related to adapting it to current language classrooms will be considered. Finally, some successful implementations of this approach will be highlighted.

The strong version of the LA encourages teachers to raise the awareness of their learners about the different types of chunks through "pedagogical chunking," that is, "chunking" the input correctly. This central strategy according to Lewis (1997) is vital in "maximiz[ing] the likelihood of learners turning input into intake" (p. 47) through "noticing" activities that follow a repeated "Observe-Hypothesise-Experiment" cycle. Once learners are alerted to these recurring chunks in authentic input, one way to consolidate their intake is to use vocabulary notebooks to record these phrases. Since classroom time is limited, Lewis advises teachers to teach their learners strategies that can help them become autonomous in their approach to learning these chunks. While it is true that successful language learners are those who employ various strategies, pedagogical chunking as a strategy is somewhat problematic for these learners. Learners will not be able to recognize a group of words as a sequence "unless they have encountered –and noticed — it at least a couple of times" (Boers & Lindstromberg, 2009, p. 20).

One of the major tenets of the LA is to teach "real language," which is not found in most ELT textbooks. Lewis (1997) objects to the language used in major ELT coursebooks warning that "it is not what people really say" (p. 10). He further advises practitioners to use modern corpora to determine what "Fixed Expressions" are. In fact, many studies that adopted the frequency-based approach (e.g., Hyland, 1994) confirmed that the language used in the average ELT textbooks is what Willis (1990) called "TEFLese" English. On the face of it, the idea of bringing the language being used by L1-speakers to the classroom seems attractive to practitioners, and it is also consistent with other principles of the LA in general. However, a closer look at the challenges involved in the pedagogical implementation of this principle reveals that "there is still much to be done before a lexical approach is accepted by a majority of practitioners and researchers and integrated into mainstream ELT" (Harwood, 2002, p. 140).

The LA stresses the role of corpus-based materials in providing learners with authentic input that illustrates the real lexical variation of a sequence of any group of words. This involves consulting different corpora to select the variations that meet learners' needs, given the variety of genres required by different programmes (English for Academic/Specific Purposes, General English, etc.). But could language teachers and material designers handle this heavy burden? Cook (1998) draws our attention to this challenge arguing that there is a lot of reflection and pedagogical consideration involved in the selection of corpus data for classroom use. Later in 2003, Cook clearly indicated that "the description of English which emerges from corpus analysis … is dauntingly complex and particular [and] cannot be presented to students all at once. The issue still remains how to simplify and stage the language presented to learners" (p. 108). Biber, Conrad, and Reppen (1994) also echoed a similar concern stressing the importance of taking learners' needs into consideration when choosing corpus data and making pedagogical decisions about what lexis to teach. What makes the task of selecting lexical phrases even more daunting for teachers is the fact that most corpus data are not freely accessible and the technology (computers) to access them is not always available.

Another challenge related to implementing the LA in its strong version is the absence of clear guidelines about the method that can help learners store the lexical items they notice in the input they receive in their long-term memory. In chapter six of his 1997 book, Lewis presented a wide variety of exercises designed on what he called "lexical principles." These include identifying chunks, matching, sentence completion, sorting expressions, etc. Lewis also suggested some creative activities such as “collocation boxes,” “lexical drills,” and “pattern displays.” All these activities are intended to raise awareness of learners about lexical phrases and give them strategies to work with these words not only inside but also outside the classroom. Despite all these various activities, nothing was stated about how learners can move from noticing to retaining these chunks in their LTM. Lewis (1997) states that “writers and teachers should ensure the accuracy of carefully chosen expressions, grouped in ways likely to aid retention; teachers ... can arrange class activities to generate and maintain interest while meaning is explored” (p. 38). How teachers can exactly do this, and what the criteria for selecting and grouping these lists are, is where the LA becomes open to different interpretations and causes more confusion than certainty for practitioners. Although Lewis’s (1993) Observe-Hypothesise-Experiment technique for teaching lexical phrases is a significant departure from the Present-Practice-Produce behaviourist model, it still needs to be incorporated in a broader teaching methodology that offers a clear framework for classifying different lexical phrases.

3.2.2. An optimised lexical approach. Most recent research has started looking at the possible benefits of lexical phrases to ELT approaches (e.g., Boers, Eyckmans, Kappel, Stengers, & Demechleer; 2006; Granger & Meunier, 2008; Wood, 2010), and the overall conclusion is that prioritising the lexical phrase can promote learning gains. However, we still need to confirm these benefits in large-scale studies that report all the details of the pedagogical interventions and the type of word combination targeted since one of the major problems with phrases is that there are many types of them (Schmitt, 2010) ranging from “the most freely co-occurring lexical items and transparent combinations to […] the most cast-iron and opaque idiomatic expressions” (Howarth, 1998, p. 32). Recent attempts to take a LA to the classroom can be found in Boers and Lindstromberg (2009). Their work provides insightful methodological implementation, based on recent cognitive and linguistic research findings, and different ways of what they call an Optimized Lexical Approach.

The usefulness and frequency of occurrence that the LA offers as criteria for selecting which chunks to teach are problematic in many ways and they involve many methodological challenges. Using the frequency criterion, according to Boers and Lindstromberg (2009), would leave strong collocates out of the list. They argue that high-frequency chunks “stand the best chance of being learned incidentally” and that it is better for learners if we target the “not-so-frequent chunks” (p. 61). They propose “medium-frequency chunks” as “prime candidate for teaching." However, this class of chunks would still be very large, and this is the reason why we need to take into consideration another criterion which is the processing advantage of these medium-frequency sequences. The benefit of learning relatively fixed lexical phrases has been widely reported in the literature (Boers et al., 2006; Conklin & Schmitt 2008; Siyanova-Chanturia, Conklin & Schmitt, 2011; Stengers et al., 2010). The advantage of targeting this type of lexical phrases is that "committing them to memory is economical in comparison with the lexical variations of chunks which lie well away from the fixed end of the spectrum" (Boers & Lindstromberg, 2009, p. 63). When learners are introduced to fixed lexical phrases and they commit them to memory, these phrases will be treated and retrieved as single units. Consequently, the processing time of these phrases will be shorter especially in productive tasks.

In addition to targeting medium-frequency chunks, Boers and Lindstromberg (2009) propose "teachability" as a more important criterion that can guide teachers in selecting which chunks to target. In this regard, elaboration is an efficient technique that can help teachers improve chunk retention. The idea of elaboration (Hulstjin & Laufer, 2001) means engagement with target words that involves different mental operations (spelling, meaning, association, etc.). According to Boers and Lindstromberg (2009) "highly teachable words and phrases are characterized by their considerable mnemonic potential, but it requires an intervention on the part of the teacher … to unlock that potential for the students" (p. 69). The researchers borrow the concept of linguistic motivation from Cognitive Linguistics to explain how many lexical phrases are motivated. This motivation can be semantic (e.g., the iconicity in the conventionalized simile 'as cold as ice') or phonological (alliteration in 'feel ten feet tall'; assonance in 'high time'; consonance in 'casual acquaintance'). In addition to noticing chunks, it is believed that when students do something with these chunks, they will be better entrenched in their long-term memory. This reflects Craik and Lockhart's (1972) level of processing theory positing that the deeper the processing is, the better the result will be.

Although Boers and Lindstromberg's (2009) pedagogical propositions can be effective in dealing with relatively fixed lexical phrases (idioms), this category of lexical phrase represents only one type of chunk. What about other word sequences? Do teachers need different methodologies to cater for different learners' needs or do they need a more structured approach that can incorporate different categories of lexical phrases? Since our major concern as language teachers is to improve the overall language competence of our learners, one way of achieving this is through identifying and trying out pedagogical approaches that offer learners opportunities to practise and work with different types of chunk in different contexts.

The importance of lexis in improving the overall speech fluency of learners has also been recently explored by Wood (2012). He reported that speech fluency “is related to and facilitated by the use of formulaic language” (p. 171). The quantitative (Mean Length of Run and Formula Run Ratio) and qualitative (discourse analysis) measures used in this study confirmed “the interrelationships between fluency and formulaic language” (p. 175). Acknowledging the need for an approach that gives chunks the primary importance in L2 classrooms, Wood draws our attention to the fact that teachers should not abandon the teaching techniques they have in their repertoire (e.g., task-based, focus-on-form, and communicative pedagogical activities). An effective methodology that prioritises formulaic language to improve learners’ speech fluency, according to Wood (2012), would include the principles of “interaction, production, attending to input, and, of course, attending to formulaic sequences, all integrated in an integrated way” (p. 186). While it is true that these principles are based on sound pedagogical rationale, they still remain too general and open to different interpretation as is the case with most state-of-the-art applied linguistics in general.

As it stands today, the LA both in its strong and optimized versions certainly contributes to bringing the lexical phrase into pedagogical focus and offers practitioners a wide array of classroom activities aimed at improving learners’ overall proficiency. However, the debate over how practical this approach would be to L2 classrooms is still ongoing. Clear guidelines regarding the implementation of this approach are urgently needed if we want practitioners to take this approach to their classrooms. The work of Boers and Lindstromberg (2009) and Wood (2012) is a significant step in revisiting the major tenets of this approach in a way that benefits L2 pedagogy.

3.2.3. Recent Corpus and cognitive linguistics propositions. What follows from this brief survey of the most systematic pedagogical propositions to teach/learn collocations is that collocations should constitute an essential part of L2 learning/teaching materials. Yet, as Wood (2002) pointed out, instructional materials that prioritise collocation acquisition and production are still scant. Meunier (2012) draws our attention to an important factor that is neglected or not carefully planned for which is the input learners receive. In fact, in L2 classrooms, textbooks are still the major source of input. What is problematic is that some textbooks include low-frequency words or phrases that learners are unlikely to use, at least productively. To address this problem, some publishers started using data drawn from different corpora as basic materials for their textbooks (e.g., Cambridge University Press ELT series). Another way of addressing the neglect of collocations in L2 syllabuses is to explore a possible wordlist, similar to Coxhead's (2000) academic word list that will help teachers/learners deal with FS in a more efficient way. A phrase list (PHRASal Expression list) has been recently proposed by Martinez and Schmitt (2012) who expect that "the PHRASE List will provide a basis for the systematic integration of multiword lexical items into teaching materials, vocabulary tests, and learning syllabuses" (p. 299).

Another forward move in integrating collocations into L2 pedagogy and making them a central component of instruction is the Academic Formulas List (AFL) created by Simpson-Vlach and Ellis in 2010. Based on findings from previous research that identified collocations using the frequency of occurrence (Biber et al., 2004, Nation, 2001), Simpson-Vlach and Ellis (2010) identified "constructions that appear above a baseline threshold frequency and which therefore have a reasonable currency in the language as a whole" (p. 508). Then, they identified frequent sequences in academia and those used in the English for Academic Purposes field. The researchers report that they created their AFL "using an empirically derived measure of utility that is both educationally valid and operationalizable with corpus linguistic metrics" (p. 508). This list, claim Simpson-Vlach and Ellis, is not discipline-specific and represents a "common core of academic formulas." Although it is too early to evaluate the efficiency of this phrasal list, and the AFL, it is nevertheless a brave attempt to approach collocations in an informed way and to better integrate them in L2 pedagogy.

Corpus-based research also offers interesting insights about the way of teaching collocations through a cognitive analysis approach. This view holds the belief that collocations are not arbitrary, but rather "motivated if viewed in light of the semantic mappings of the key lexical items, and cognitive linguistic theories about language use and learning" (Liu, 2010). A traditional example used in collocations research literature to show that collocations are arbitrary is the collocations *strong tea* and *powerful car*. Smajda and McKeown (1991) explain this view:

> A collocation is arbitrary because it cannot be predicted by syntactic or semantic rules. For example, 'strong' and 'powerful' are both adjectives and are synonymous in

> meaning, but ‘strong’ is used to modify ‘tea’ and ‘powerful’ to modify ‘car’ and not vice versa (p. 230)

Liu (2010) searched the World Wide Web for this pair of collocations and found that *powerful* can also collocate with *tea*, and *strong* with *car*. The following sentences illustrate the example:

- Poppy pod tea has been used as an old time *powerful tea* with many medical purposes.
- The Volkswagen Polo has been reborn. No longer is it the slow, old relative of a young family of quick and *strong cars*. It may have been ignored since 1981 and left to make do with just two small engines.

According to Liu (2010), the occurrence of powerful with tea is not arbitrary, but rather semantically motivated. He explains that since the core meaning of the adjective *powerful* is “producing great effect or reaction,” the collocation *powerful tea* is not arbitrary. Although the adjective strong can express this meaning, “it is not as intense as powerful” explains Liu. He also uses the semantic mapping of the adjective strong to explain the occurrence of the token *strong car*, which refers to “cars that were solidly made, capable of supporting strain or withstanding force; that is, it refers to the superior structural strength of the cars involved” (p. 19). Similarly, using cognitive analysis, Liu shows how the collocations *strong wind* and *heavy rain*, classically thought of as arbitrary, are indeed semantically motivated. According to Liu, “rain is made up of water, and, as such, it has weight,” and this fact makes the use of heavy logical. As for strong, it is used to modify wind because it describes the force that is characteristic of wind. This is also logical, concludes Liu.

It becomes clear that corpus analysis can certainly provide useful guidelines about the way we approach the teaching/learning of collocations. The dominant approach has been using noticing and memorization techniques, and given research findings that the relationship between frequently co-occurring words is not arbitrary, adding a cognitive analysis component to the existing instructional methods would help L2 learners improve their knowledge and use of collocations. It could as well inform publishers and educators produce more adequate materials for learning/teaching collocations.

In conclusion, the increasing research interest in formulaic language has certainly brought to the forefront the importance of lexis in language acquisition. Many researchers now agree that the phenomenon of formulaicity is crucial for fluent language use, as Wray (2012) eloquently states, “Human languages without formulaic sequences would ... lack idiomaticity” (p. 234).

Although the models discussed above offer interesting theoretical insights about this phenomenon, the “how” of acquisition still needs empirical evidence. For teachers, the challenge lies in the absence of a detailed methodological approach to make their learners’ language more idiomatic. One strategy that teachers can use however, is to remember that “repeated phrase usage leads to a growing prominence of the whole relative to the parts” (Siyanova-Chanturia, 2015, p. 297). In this regard, The *PHRASal Expression list* and the *Academic Formulas List* can be of great help. Finally, adding a cognitive analysis aspect to the available teaching strategies would certainly benefit collocations instruction.

3.2.4. Recent intervention studies. What the different taxonomies of classifying collocations and more recent proposals of teaching/learning them imply is not good news for L2 teachers: given this variety of collocations classifications, teachers may need to adopt a different teaching methodology for each category. Studies that investigated collocations in L2 contexts with direct implications to L2 pedagogy tried to improve learners’ formulaic language competence through raising their awareness regarding the fact that language is formulaic (Bishop, 2004; Jones and Haywood, 2004, Petchka, 2010), encouraging them to use dictionaries (Dziemianko, 2010; Komuro, 2009; Laufer, 2011), and using cognitive engagement techniques such as contrastive analysis, translation, sorting, dictating, and writing to help learners retain collocations in their LTM (Boers & Lindstromberg, 2009; Li, 2009).

An interesting study conducted by Jones and Haywood (2004) used text highlighting, concordance lines, and regular discussion of the benefits of collocations in developing academic writing to make 21 participants from different L1 backgrounds, taking a ten-week English for Academic Purposes (EAP) course, aware of formulaicity in language. The researchers found that the experimental group who engaged in these awareness-raising tasks became more aware of formulaic language. However, the number of collocations found in students’ end-of-semester writing was similar for both the control and the experimental group. Boers et al. (2006) found more encouraging results with a group of 32 Belgian adult learners, majoring in English, who used “text chunking” to learn collocations. The “chunking group” used more collocations in their narratives than learners who used usual tasks when interacting with the text. Surprisingly, when Stengers et al. (2010) repeated the same experiment with another group of Dutch L1 adult learners, data analysis showed that the experimental group did not use more collocations in their narratives. What these mixed results suggest is that awareness raising may not be enough to achieve long-term retention of collocations.

Studies that have explored the use of the dictionary to encourage students to notice collocations and commit them to memory also failed to provide convincing evidence in favour of looking up collocations in different types of dictionaries (Dziemianko, 2011; Komuro, 2009, Laufer, 2011). For instance, Laufer (2011) asked 95 high school students, L1-speakers of Hebrew and Arabic, learning English as an L2 to use dictionary entries to find the verb collocate for the target 30 verb-noun collocations used in sentences. Data analysis showed that the increase in the knowledge of collocations from the pre-activity test to the post-activity test was only 13%, which means that "the learners did not gain much beyond what they had previously known, before they used the dictionaries" (Laufer, 2011, p. 40). As such, the findings of these studies are not encouraging for L2 teachers to adopt dictionary use to the teaching of collocations.

Among the few studies with more robust findings that may have direct implications for pedagogy and that could help teachers/learners approach collocations effectively are experiments investigating the effect of sound repetition found in some collocations (e.g., alliteration in 'play a part'). On the one hand, Lindstromberg and Boers (2008) made a group of 25 Dutch L1 learners dictate to their partners 13 alliterative collocations (e.g., good guess) and 13 collocations with no sound similarity. The findings reported that the alliteration made remembering the collocations easier for the participants. Steinel, Hultstijn, and Steinel (2007), on the other hand, reported that teaching idioms could be also more effective when teachers evoke the mental imagery associated with some idioms (e.g., to get off the hook) to help learners retain these idioms better than those that have a more abstract meaning (e.g., the deep end). Although these experiments reported the efficacy of the teaching method, and since one aspect of formulaic language is the diversity of the classifications (e.g., figuratives, literals, fixed expressions, collocations with open slots, etc.), then we would expect that teachers should have, in their teaching repertoire, different pedagogical methods for different formulas. While this expectation may be rather demanding for teachers, more importantly, we need to first verify the efficacy of these and other teaching tools in large-scale studies.

What the studies reviewed above suggest is that, taken alone, none of the methods (awareness raising, dictionary use, and cognitive engagement) is enough to help learners retain collocations in their long-term memory. Moreover, not all researchers reported the detailed description of the pedagogical methodology adopted in teaching collocations and the different types of sequences explored. Also, the limited number of participants make it difficult to generalize the findings and evaluate the contribution of these studies to L2 pedagogy. What we need to improve our learners' retention of collocations is an approach that is deeply rooted in the wider vocabulary research literature and that bases the teaching methodology of collocations on research findings that were empirically evidenced. The benefits of noticing unknown words in the input and providing learners with multiple encounters with them in different contexts are widely reported in the vocabulary research literature (cf. Nation & Wang, 1999; Waring & Takaki, 2003; Webb, 2007). As will be shown in the following section, TBLT has the potential of incorporating these principles and as such can be an effective approach to teach collocations.

3.4. Task-Based Language Teaching

Given the importance of collocations in language acquisition and production, and that learners can benefit from achieving breadth and depth of knowledge of collocations (Boers et al., 2006; Conklin & Schmitt 2008; Siyanova-Chanturia, Conklin & Schmitt, 2011; Stengers et al., 2011), it is no surprise that collocations should be prioritised in L2 classrooms to improve L2 learners proficiency. What is problematic, however, is that neither the limited classroom time nor the teaching materials allow for an explicit focus on the teaching of collocations. The incidental acquisition of L1 vocabulary necessitates the frequent exposure to these sequences in different contexts so that they become part of the L1 lexical repertoire. In the case of SLA, Nation (1990) estimated that, for a word to be retained in the long-term memory, there should be a minimum of fourteen encounters in different contexts. Since collocations are one aspect of vocabulary knowledge (Nation, 2001), they should be no different. Therefore, classroom instructions should provide learners with multiple encounters with unknown collocations to satisfy the frequency of encounter learning condition.

If we agree with Cowie's (1992) claim that "it is impossible to perform at a level acceptable to native users, in writing or in speech, without controlling an appropriate range of multiword units" (p. 10), then the primary goal of L2 instruction should be to maximize learners' opportunity to work with these multiword units. The challenge is, however, that classroom time is limited and that the frequency of encounter learning condition is difficult to fulfil. One possible solution would be to simulate the L1 natural acquisition process of collocations. However, given the incidental nature of acquiring these sequences in L1 under intensive exposure, it would be difficult in foreign language classroom contexts to cater for the two important criteria of adequate input and multiple encounters. Another alternative that could potentially benefit L2 learners overall language competence would be to adopt a teaching methodology that explicitly introduces collocations and engages learners with these sequences in a different variety of classroom activities (Boers & Lindstromberg, 2009; Cortes, 2004; Jones & Haywood, 2004). To this end, task-based language teaching (TBLT) that prioritises seems an attractive alternative for L2 teachers to make the learning of collocations more effective through the use of tasks. The following section explains the rationale for the choice of tasks to explicitly approach the teaching collocations.

3.4.1. Importance of tasks for L2 classrooms. One major teachers' concern is to elicit language samples from their learners to be able to evaluate their performance and plan for effective classroom interaction based on the evidence they can get from these language samples. Task-based language teaching has gained interest in the recent few years as being one potential means that can guide teachers in the process of evaluating their learners' state of interlanguage and plan for activities that maximize learners' engagement with the target language. Researchers and scholars now widely agree that tasks offer unique opportunities to language classrooms that can benefit learners and teachers as well. In their edited volume dedicated to TBLT, Van den Branden, Bygate, and Norris (2009) summarize the potentials of a TBLT approach:

> ... there is widespread agreement that tasks, potentially at least, offer a uniquely powerful resource both for teaching and testing of language. In particular, they provide a locus for bringing together the various dimensions of language, social context, and the mental processes of individual learners that are key to learning. There are theoretical grounds, and empirical evidence, for believing that tasks might be able to offer all the affordances needed for successful instructed language development, whoever the learners might be, and whatever the context. (p. 11)

This statement assumes that a methodology that prioritises "tasks" offers learners necessary context to practise the language in what Johnson (1988) called "real operating conditions" that distinguish tasks from any other classroom activity. Before evaluating this claim, let us first consider the definition of "tasks" and their distinctive features.

3.4.2. Definition of a task. Although researchers acknowledge the importance of tasks in both SLA research and L2 pedagogy, there is little agreement as to what a task is. Long (1985) offered a broad definition of tasks as activities that can have a linguistic or a non-linguistic outcome (e.g., making a hotel reservation and painting a fence). A more restrictive definition of tasks presuppose the use of language to carry out the task (e.g., Nunan, 1989, Richards, Platt & Weber, 1985). Since L2 teachers and researchers as well are mostly interested in tasks that elicit language samples from learners, the narrower definition of a task seems more tempting for SLA pedagogy and research. Ellis (2003) defines a task as

> a workplan 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. To this end, it requires them to give primary attention to meaning and to make use of their own linguistic resources, although the design of the task may predispose them to choose particular forms. A task is intended to result in language use that bears a resemblance, direct or indirect, to the way language is used in the real world. Like other language activities, a task can engage productive or receptive, and oral or written skills and also various cognitive processes. (p. 16)

This definition is mostly helpful in distinguishing between tasks, where the focus is on meaning rather than form, and exercises that focus on form. Successful completion of a task also requires the learners to use interaction strategies that are similar to those found in the real world. This primary focus on meaning and the use of language as a means of communication also echoes the general principles of the Communicative Language Approach (CLT), which is mainly concerned with the learning as a process and not as a product. Finally, it is against the grain to assume that all language learning tasks should mirror real-life activities since classroom tasks can be different from the real-world tasks.

3.4.3. Pedagogical tasks. Drawing on previous research (Breen, 1987; Bygate, Swain , & Skehan, 2001; Richards & Rodgers, 1986; Willis & Willis; 2001), Nunan (2004) clearly makes a distinction between what he called “target tasks” (real-world tasks) and “pedagogical tasks” (classroom tasks). Not all pedagogical tasks, argues Nunan, are related to the real world. He gives the example of two learners who, after writing their résumés, and choosing three advertisements from a newspaper for each other, will end up comparing their choices. This is obviously different from applying for a job in the real world. The role of such transformed tasks, according to Nunan, is to provide learners with an opportunity to rehearse an activity they will encounter in real life. Pedagogical tasks can also be used to "activate their [learners] emerging language skills" (p. 20) to engage in meaningful interaction. The example Nunan uses to illustrate this is a hypothetical situation where a group of four learners are on a sinking ship and need to decide which items to carry with them if they have to swim to reach an island. The teacher is not obviously preparing the learners to be on a sinking ship but rather the purpose is to help students activate the language functions and structures needed for engaging them in meaningful communication.

Pedagogical tasks vary considerably in SLA research and many different typologies of tasks have been proposed. Richards (2001) suggested a detailed typology of tasks that divides them into five main categories:

- *Jigsaw tasks*: learners put different pieces of information together to complete the task
- *Information-gap tasks*: they involve students in exchanging information to complete the activity
- *Problem-solving tasks*: learners are presented with a problem and a set of information, and they have to discuss the problem and the information they have to reach a solution.
- *Decision-making tasks*: students discuss and negotiate one among many possible outcomes of a problem
- *Opinion-exchange tasks*: these are activities with open outcomes where learners discuss and present their ideas and they do not have to reach an agreement.

Other typologies group tasks according to the strategies used in carrying them out. Nunan (1999) identified five main strategies that include cognitive (e.g., classifying), interpersonal (e.g., roleplaying), linguistic (e.g., summarizing), affective (e.g., reflecting) and creative (e.g., brainstorming).

3.4.4. Components of a task. What makes up a task has also been conceptualized differently but TBLT research has identified at least three basic elements of a task that are input, activities and goals (Nunan, 1989). A more complex and detailed framework that describes the features of tasks was put forward by Ellis (2003). This framework identifies five elements of a task. According to Ellis, any task should have a "goal" that could be achieved using different types of “input” whether spoken or written. A task usually presents the information in different “conditions.” These conditions Ellis (2003) explains are “the way in which the information is presented, e.g. split vs. shared information” (p. 21). The techniques used to perform the task are called “procedures” and these eventually lead to “predicted outcomes” that involve both a product and a process (p. 21).

The main contribution of this framework to our understanding of task features is that, unlike Nunan (1989), it posits that a task should have “predicted outcomes.” This component would be of great importance for teachers since it allows them to evaluate the successful completion of a task by their learners. More importantly, this descriptive framework has many potential benefits for both teachers and material designers. First, it can be used to identify the key factors in designing tasks and the different options available. It can also inform decision-making about which types of tasks to include in a language curriculum. In addition, the task components identified by Ellis can also guide material designers in structuring and sequencing content in a systematic way. In relation to my study, this framework will be used to design the tasks learners in the experimental group will carry out to practise the target collocations.

3.4.5. Task features and formulaic sequences learning. Ellis (2003) defines a task as a “workplan” that involves the use of teaching materials to carry out classroom activities. These activities are intended to engage learners through communicative classroom interaction to improve their overall language proficiency. When learners communicate while performing a task, they should be primarily focusing on meaning (influence of CLT) though a focus on form would not be excluded. Since all tasks involve working with a partner or other members of a group, the purpose of the interaction is directed towards solving a problem, making a decision, or sharing information. In this way, “the gap [incorporated in the task] motivates learners to use language in order to close it” (Ellis, 2003, p. 9), and as such the task offers learners opportunities to practise and learn the language while collaborating.

While it is true that tasks can help keep students engaged and motivated, it is not guaranteed that all the group members will contribute to the completion of the task unless the task design features constrain them to do so. In fact, what is typical of language classrooms is that it is the teacher or the more proficient learners who dominate the classroom interaction. In the case of less proficient learners, and if the task does not dictate their contribution, “they tend to opt out of the task altogether” (Doughty & Pica, 1986, p. 307). One way of making all learners contribute to the successful completion of the task is to use tasks with what Long (1980) called "two-way information gap." These activities involve participants sharing different pieces of information (each group member having different part of the information) that is essential for successfully carrying out the activity. In a study of the effect of task type on SLA, Doughty and Pica (1986) confirmed the benefits of required-information exchange tasks in increasing the amount of interaction.

> Unless a required information exchange task is chosen, students will interact less and will modify their interaction less as well. While a required information exchange task will compel students to talk more in either a teacher-fronted or a group situation, this increase in total production will result in an increase of modified *interaction* [emphasis in original] only when students are working in groups. (p. 321)

In addition to increased interaction, many other studies also reported that required-information gap tasks, where the information is split between the group members, result in more negotiation exchanges (Foster, 1998; Newton, 1991; Nakahama, Tyler & van Lier, 2001). In relation to vocabulary learning, Newton (2001) found that learners who used two-way information gap tasks had more gains in word knowledge. These findings are in line with the assumptions of the Interaction Hypothesis (Long, 1981; Pica, 1987) that stresses the role of comprehensible input and interaction in SLA. In his evaluation of the Interaction Hypothesis, Ellis (2003) indicated that comprehensible input, although important, is not the only criterion for successful SLA, and that it is only when learners understand the input through the negotiation of meaning that acquisition is possible. Ellis also emphasizes the role of noticing the salient features in the input learners receive and argues that through interaction, "learners are pushed to reformulate their own utterances" (Ellis, 2003, p. 80), which in turn promotes acquisition.

The claims of the Interaction Hypothesis were largely investigated and evaluated by Teresa Pica, who provided a detailed account of how the negotiation of meaning facilitates acquisition. Pica (1992 and 1994) suggested that it is the negotiation of meaning that can facilitate language acquisition in three ways. Through their interaction, learners will be able to gain input, which is according to Mackey (2013) "*the sine qua non* of language acquisition" (p. 9). It is now widely accepted that the modifications learners make to their language during interaction and the negotiation that takes place contribute to comprehension of the input. On the other hand, Pica also proposed that it is through negotiation that learners can have feedback about their interlanguage, and as such, they will attend to problems in their output by adjusting it according to the feedback they get. Pica (1994, p. 502) illustrates this through an exchange between a native and non-native speakers (NS and NNS respectively in the following extract):

NNS the windows are crozed

NS the windows have what

NNS closed

NS Crossed? I'm not sure what you're saying there.

NNS windows are closed

NS oh the windows are closed oh OK sorry.

In this conversation the NNS adjusted the use of the word "crozed" based on the feedback given by the more competent interlocutor, the NS in this exchange, and ended up pronouncing the word correctly.

In addition to phonological and morphological features of the target language, the negotiation of meaning during interaction can also help learners improve their lexical knowledge through noticing gaps in their knowledge and attending to them with the help of more proficient language user. The following episode from Mackey (1999, p. 586) illustrates this point.

NS: there's there's a apair of reading glasses above the plant

NNS: a what?

NS: glasses reading glasses to see the newspaper

NNS: glassi?

NS: you wear them to see with, if you ca't see reading glasses

NNS: ahh ahh glasses glasses to read you say reading glasses

NS: yeah

It is through negotiation that the less competent speaker ended up understanding the meaning of an unknown word in the input s/he received from the NS.

Despite the advantages of simulating negotiation of meaning, it is not always clear in the Interaction Approach research literature how much negotiation is needed for successful SLA. Research findings are rather mixed regarding the effects of interaction and negotiation of meaning on acquisition. Research in this tradition uses what has been known as "the three Cs" (*confirmation checks*, *clarification requests*, and *comprehension checks*) to investigate the effects of negotiation of meaning through interaction on acquisition. In Mackay's (1999) episode above, the NNS used the reduced question "a what?" to check if the utterance of the NS was received correctly. Then, the need for clarification is evident through the use of "glassi" with an interrogative intonation, and finally the use of the interjection "ahh" is meant to check comprehension of the word "glasses" as something used for reading.

What is problematic about this approach is that it uses a quantitative analysis to account for acquisition, neglecting the qualitative nature of discourse and interaction (van Lier, 1998). Counting the number of the three Cs in a conversation is not sufficient to assume that acquisition occurred, and there is more to acquisition than counting beans. We obviously need more sophisticated methodologies that take into consideration how interaction and negotiation of meaning can facilitate SLA. Recent research (Porte, 2012; Mackey, Abbuhl, & Gass, 2011) has made substantial efforts in this direction by focusing on the "how" of acquisition. In other words, early interaction studies (e.g., Ellis, 1999; Gass & Varonis, 1994; Mackey & Philp, 1998), with their focus on whether interaction facilitates learning, have confirmed that it does, and what is needed for a better understanding of how acquisition/learning takes place through interaction is a different approach that takes into account other variables including, learners' cognitive abilities, their social context, and their attitudes towards the language and learning in general.

3.4.6. Current trends in interaction research. One significant trend in current research on interaction relates to the role of attention to input in acquisition/learning. Krashen's Input Hypothesis, claiming that when exposed to comprehensible input, learners acquire/learn the language subconsciously, has been challenged in many ways. Schmidt (2001) argued that there is no learning without awareness and that when learners attend to input, they do so consciously:

> ... attention is a crucial concept for SLA. The allocation of attention is the pivotal point at which learner-internal factors ... and learner-external factors ... come together. What then happens within attentional space largely determines the course of language development, including the growth of knowledge ..., fluency ..., and variation. (p. 15)

Schmidt goes even further to suggest that learning something new is basically a "side effect" of conscious processing. To internalize the input, learners have first to be aware of this input. Robinson (1995, 2002) shares the same opinion, arguing that what is stored in the long-term memory is the type of input that has been attended to. Robinson (1995) assumed that "detection plus rehearsal in short-term memory" are pre-requisites for long-term retention of some aspects of the input. Although there is an agreement that attention and conscious processing are important for SLA, these constructs remain difficult to measure in empirical studies. Only recently has interaction research focused on adopting innovative methodologies (e.g., think-aloud protocols, priming, and immediate recalls) that investigate how these constructs might affect L2 acquisition/learning.

This discussion of the features of tasks, and that they mainly allow learners to interact, which according to interaction research benefits acquisition in one way or another, leads to the central question: What is in a task other than interaction and negotiation of meaning that can help learners with stretching their interlanguage? In other words, when teachers opt for TBLT, what can guarantee the effectiveness of their approach in improving their learners' overall language proficiency? Since the current study involves learning one aspect of vocabulary knowledge, i.e. collocation, the discussion will be limited to the effectiveness of tasks in learning vocabulary.

3.4.7. Tasks and the engagement factor in vocabulary learning. In a language classroom context, when learners perform a task, the overall goal is to use targeted forms or features of the language through interaction and negotiation of meaning. In addition to this linguistic aspect of tasks, there are other processes involved in this interaction. Prabhu's (1987) definition of a task presupposes that learners use "some processes of thought" to carry out the activity. According to Prabhu, tasks that would benefit learners more are those that should involve a kind of "reasoning" such as information-gap and problem solving activities. This definition taps into the most distinctive feature of tasks: that they involve different cognitive processes.

The idea of processes that facilitate SLA is rooted in Craik and Lockhart's (1972) level of processing theory. This theory basically posits that for information to be remembered, there should be a certain level of engagement with this information. In the field of SL vocabulary, and based on this theory, Laufer and Hulstijn (2001) put forward their *Involvement Load Hypothesis* (ILH). According to the ILH, retention of an unknown word in the input depends on three factors, *Need*, *Search*, and *Evaluation*. Need relates to the learner's desire to achieve. An example would be a learner feeling the need to know the meaning of a word to convey a message. Search is when learners use available resources to find the required information (e.g., dictionaries). As for evaluation, it involves learners comparing the meanings of a word, or choices possible for the use of this word, for example, to evaluate whether a word would be suitable for a given context. If engagement is a key factor in SL vocabulary learning, and that the deeper the processing is, the better the retention will be (Craik and Tulving, 1975), how can tasks engage L2 learners and offer them better processing conditions?

To understand how tasks can help learners attend to the salient features of the input (Robinson, 2002) and how they can engage L2 learners with the information presented, and as such committing it to their long-term memory, we first need to situate TBLT in the wider context of the cognitive psychology, and more precisely in skill-building theory (Anderson, 1993, 2000; Johnson, 1988, McLaughlin, 1987; McLaughlin & Heredia; 1996). To this end, an understanding of two constructs, *declarative knowledge* (DK) and *procedural knowledge* (PK), often discussed in this research is of great relevance.

In the skill acquisition theory, learning any skill undergoes three different stages. During the first stage, learners form some DK or explicit knowledge. This might be, in the context of a language classroom, phonological features of a word, for example. In the second stage, the DK is turned into PK. In the example above, the learner would pronounce the word correctly. In this case the learner would put the explicit knowledge he gained in the first stage in action to pronounce the word. This proceduralization of knowledge "can become complete after just a few trials/instances" (Dekeyser, 2007, p. 98). Given the limited capacity of the working memory (Just & Carpenter, 1992), the proceduralization of knowledge will in turn benefit the working memory by freeing up its capacity. In stage three, and with "extensive practice" the skill is performed in less time (Dekeyser, 2007, p. 99) until the proceduralized knowledge is automatized.

In the case of language learning, Anderson (1993, 2000) suggests that, in order for the proceduralized knowledge to be fully automatized, starting with the "explanation" of a target linguistic feature would be an effective technique in the initial stage as it would trigger the process of establishing the DK. Johnson (1996) also stresses the importance of practice in the process of automatization, acknowledging the need for what he called "demonstration." In other words, using examples can demonstrate the targeted language point and provide learners with DK. In a similar vein, McLaughlin and Heredia (1996) consider that "...practice, repetition, time on task—these seem to be the critical variables for successful acquisition of complex skills, including complex cognitive skills such as second language learning" (p. 216). Practice, in this way, becomes indispensable in restructuring the DK.

What is problematic with these skill-learning theories is that the notion of *practice* is vague and sometimes hard to conceive. When learning the skill of riding a bike, *practice* obviously entails actually riding the bike, in the context of learning a language *practice* may be a fuzzy notion. If it is practising linguistic structures through the use of mechanical drills of the Audiolingual Approach (Lado, 1964), then this is not always effective in helping learners proceduralize their knowledge (Ellis, 1988, Lightbown, 1985). What is needed according to Dekeyser (1998) is practice not targeting structures but "behaviour" if the purpose is to restructure DK. In language classrooms, behaviour does not entail the repetition of decontextualized drills but rather communicative contexts that can activate the process of proceduralization of DK. Dekeyser called for an approach to skill learning in which "proceduralization is achieved by engaging in the target behaviour" (p. 49).

Finally, R. Ellis (2003), drawing on Anderson (2000) and Dekeyser (1998), argued for an approach that is aimed at behaviour that he called "Task-supported language teaching" where DK is presented through controlled processing, and then learners would engage in focused tasks that offer them communicative practice of this DK, which would help them proceduralise their knowledge. This approach, according to Ellis, gives learners a chance to practise "pre-determined linguistic features" that were established in their DK through the use of tasks. Since our major concern as language teachers is to improve the overall language competence of our learners, then one way of achieving this is through identifying and trying out tasks that offer learners such opportunities. Instead of improvising activities without considering their pedagogic underpinning, teachers need to have a clear and comprehensive approach to TBLT.

3.5. Conclusion and Research Questions

This chapter has reviewed literature directly related to important concepts in the current study. First, issues involved in learning/acquiring new words, along with different conceptualizations of word knowledge were highlighted. Then, one aspect of word knowledge, i.e., collocations, the focus of this study, was described with an emphasis on the definition debate of this construct between and within two major approaches of identifying collocations which are the frequency-based and the phraseological approaches. It was argued that reconciling these two views of the phenomenon of formulaicity would certainly make their delineation more precise through using frequency of occurrence and compositionality to distinguish them from free word combinations and idioms. Two prominent models in the field of collocation acquisition (Ellis, 2001 & Wray, 2002) were also contrasted. Ellis's chunking principle and Wray's non-formulaic approach of L2 learners to collocation offer sound theoretical grounds to understand the acquisition/learning of formulaic language. Although recent research points towards the holistic approach of L2 learners to learning collocation, the evidence is not yet conclusive and more empirical studies are needed before any stance could be adopted, and it would be more beneficial for collocation research to continue exploring the assumptions of both models.

Different learner and contextual variables were also examined and the effect of the frequency of encounter and the quality of encounter on learning new words were discussed. The literature suggests that learners need a great deal of input and a large number of encounters with new words or word combinations to retain them. In this respect, and since the frequency of encounter condition seems difficult to satisfy mainly in FL contexts, what is needed is an instructional method that offers learners in-depth encounters with the target words to possibly compensate for the scarcity of input. It also reviewed the tradition in SL vocabulary teaching, and mainly in FL contexts, to focus on single words using one-size-fits-all textbooks, and evaluated some alternative pedagogical proposals including different versions of the lexical approach and more recent attempts to learning/teaching collocations. Finally, based on SLA research findings, TBLT was anticipated as a potentially effective instructional method to aid short-term and long-term retention of collocations.

Despite the widely reported benefits of formulaic sequences in developing both language fluency and accuracy (e.g., Boers et al., 2006; Cowie, 1998; Pawly & Syder, 1983; Peters, 2009; Wray, 2000), to date, research has focused more on defining and debating the acquisition of these sequences, and only a few studies have been carried out to explore how these sequences could be effectively taught/learned (Boers & Lindstromberg 2005; Laufer, 2011; Schmitt, Dörnyei, Adolphs, & Durow, 2004). However, these studies did not provide detailed description of their pedagogical interventions that could benefit L2 teachers and learners. In an attempt to fill this gap, the current study sets out to explore an instructional method that can have the potential of offering learners the quality of encounter they need with new collocations in order to retain them in their long-term memory.

Adopting a pedagogy that favours the use of tasks would certainly benefit the teaching/learning of L2 vocabulary, including collocations, in many ways. One of the challenges associated with learning L2 vocabulary is "the relatively sparse nature of most second language input" (Durrant & Schmitt, 2010, pp. 169-170) which makes it difficult for learners to have multiple encounters with a word combination in a short time. This would affect the short-term retention of the word/sequence since learners, using traditional textbooks as a major source for L2 input, have no opportunity to meet the word/sequence again to consolidate the first encounter. Using sequenced tasks then could be an attractive alternatives for teachers. Based on the findings of cognitive research literature, it becomes clear that tasks can offer the following advantages for vocabulary learning:

- noticing the salient features in the input (Ellis, 2003)
- engaging learners through cognitive processes (Prabhu, 1987)
- providing multiple encounters with unknown words/sequences (Nation, 2001)
- proceduralization of knowledge (Dekeyser, 2007) through practice and repetition (McLaughlin & Heredia, 1996)

The challenge teachers and material designers face is then designing tasks that will "work best for acquisition" (Ellis, 2003, p. 35) and offer learners, and mainly those in a foreign-language context opportunities to improve different aspects of vocabulary knowledge.

Having reviewed recent research related to collocations and established the need for a more effective classroom instructions, the primary aim of this study is to understand the effects of the learning context on collocation retention. More specifically, the study tries to explore the importance of the quality of encounter (activities learners do) and the quantity of encounter (the number of encounter) in collocation learning. The specific questions which drive the research are:

1- What are the effects of interaction on the short-term and long-term retention of verb-noun and adjective-noun collocations?
2- How does the learning activity (interactive vs. non-interactive) affect the receptive and productive knowledge of collocations?
3- What is the relationship between learners' vocabulary size and their ability to retain collocations?
4- What individual variables are involved in learning collocations?

CHAPTER 4 METHODOLOGY

This chapter explains and discusses the methodological approach that was chosen to investigate the following research questions:

1- What are the effects of interaction on the short-term and long-term retention of verb-noun and adjective-noun collocations?
2- How does the learning activity (interactive vs. non-interactive) affect the receptive and productive knowledge of collocations?
3- What is the relationship between learners' vocabulary size and their ability to retain collocations?
4- What individual variables are involved in learning collocations?

An experimental research methodology was adopted in order to answer these research questions. An overview of the methodological approach underpinning this research project is outlined including a detailed description of the materials used with the experimental and control groups. The methods used in data collection, i.e., the pre- and post-tests, the motivational survey are also examined in detail. Since the effectiveness of the research methodology largely depends on the validity and reliability of the research instruments employed, the rationale for the use of each instrument is also provided. The chapter concludes with an overview of data analysis procedures.

4.1. Overview of the Research Methodology

Hatch and Lazaraton (1991) define research as "the organized systematic search for answers to the questions we ask" (p. 1). To answer these questions, researchers collect data which can be of two types: quantitative (usually numerical) or qualitative (non-numerical spoken or written data described in words). Since these two types of data are different in nature, they call for different procedures in collecting and analyzing data. This difference in the methods adopted by practitioners distinguishes two research approaches at the methodological level: qualitative and quantitative research approaches (Paltridge & Phakiti, 2015, p. 16).

In the case of collocations research, and as explained in the literature review section of this thesis, researchers have predominantly used a quantitative methodology to investigate the way collocations are learned/acquired. For example, Schmitt, Dörnyei, Adolph, and Durow (2004) used a pre- and post-test design supplemented with a survey to explain how the knowledge of collocation develops over time. Webb and Kagimoto (2009) used four tests that were statistically analysed to understand the effects of reading and writing tasks on learning collocations and their meaning. Although the findings of these studies were useful in inspiring collocations researchers, and had important pedagogical implications, the confounding effect of some extraneous variables had not always been accounted for.

In Schmitt et al. (2004), participants' knowledge of the target formulaic sequences was not tested prior to the treatment, and as such their prior knowledge of some of the words included in these sequences might have affected their retention. Moreover, as Schmitt et al. (2004) admitted, neither the amount nor the type of exposure was controlled (p. 62). Consequently, it was not evident whether participants improved their knowledge because of the instructional intervention or because of the amount of exposure they had inside or outside the classroom.

As for Webb and Kagimoto (2009), although the study was designed to measure gains in receptive and productive knowledge of collocations, there was no pre-test that measured participant's productive knowledge of the target collocations. In addition, nothing was known about the long-term gains in collocation knowledge since there were no delayed post-tests. Thus, it becomes hard to gauge the effectiveness of the training if we admit that the main purpose of any pedagogical intervention is to help learners maintain words/sequences in their long-term memory.

In the experimental research design adopted in the current study, every effort was made to account for the confounding effect of extraneous variables. First, participants' knowledge of the target collocations was measured prior to the treatment and only unknown collocations were selected for inclusion. Also, the same immediate receptive and productive post-tests were used as delayed receptive and productive tests, which permitted the researcher to measure short-term and long-term collocation gains. Finally, both the input and the amount of exposure were controlled, which would make the comparison of the experimental and control groups' collocation gains more reliable.

To summarize, the experimental research methodology adopted in this study was considered more effective in answering my research questions. The systematic and precise measurement of variables involved, and the advanced powerful statistical analyses are more likely to lead to valid and reliable data. Also, the effects of any confounding variables were taken into consideration when designing and carrying out the experiments. In the subsequent sections, evidence of the appropriateness of the research methodology employed will be demonstrated.

4.2. Methodology

The research design of my study involved two major experiments: Experiment 1 (EX1) and experiment 2 (EX2). EX1 looked into learning the verb-noun collocations type while EX2 targeted adjective-noun sequences. In addition to idioms, collocation research has also identified the verb-noun and adjective-noun collocations as being the most challenging word combinations for second language (L2) learners (AlAli & Schmitt, 2012; Chan & Liou, 2005; J. Li & Schmitt, 2010; Nesselhauf, 2003; Qi & Ding, 2011). Also, analysis of my students' writing suggested that they had serious difficulties with these two types of collocations. Since I was teaching students the *Academic Reading and Writing 1* course, and idioms are less used in formal academic writing, the focus of my study was the verb-noun and adjective-noun collocations. Given the fact that my students were struggling with collocations in general, the overall purpose of this research project was to find a more effective teaching method to help my students improve their collocation knowledge.

EX1 involved 20 verb-noun collocations and consisted of two sub-experiments. In experiment 1a (EX1a) both the control and experimental groups were exposed to 20 verb-noun target collocations four times. To clarify the effects of the instructional treatment, a second experiment (EX1b) was conducted. In EX1b, participants encountered the same collocations four times for the experimental group and eight times for the control group. As for EX2, the only difference was in the type of collocations. Thus, it targeted 20 adjective-noun collocations, and similarly, in experiment 2a (EX2a), both the control and experimental groups encountered the adjective-noun collocations 4 times, whereas experiment 2b (EX2b) offered the experimental and control groups four and eight encounters, respectively. Table 4.1 summarizes this information, and in the following sections, a detailed description of both experiments will be presented.

Table 4.1

Details of the Two Experiments

	Experiment 1		Experiment 2	
	Experiment 1a	Experiment 1b	Experiment 2a	Experiment 2b
Type of collocation	verb-noun		adjective-noun	
Collocations Number	20		20	
Number of encounters for control group	4 times	8 times	4 times	8 times
Number of encounters for experimental group	4 times	4 times	4 times	4 times

The treatment consisted of exposing participants in both experiments (verb-noun and adjective-noun experiments) to the target collocations using two different teaching methods. The experimental groups encountered the target collocations through four tasks (interactive) and the control groups used four exercises (non-interactive) to learn these sequences. Both the amount and the type of exposure were controlled, and the experiment was carried out over a two-hour period during students' regular English classes.

In the beginning of every new semester, I always use a vocabulary size test to estimate my students' lexical knowledge and plan for the lexical component of the course accordingly. During the first week of classes, all participants took the Vocabulary Size Test (Nation & Beglar, 2007) to measure their vocabulary size. Then they were introduced to the concept of collocations through awareness raising activities that accompanied reading passages. Prior to the experiments, all students signed a written consent form to participate in the experiments and they were given the choice to withdraw from the study any time. They were also told that all the tests carried out in these experiments would not be part of their final grade for the course. Participants first took the pre-test to check that they had no prior knowledge of the target collocations. Then, both groups had a different treatment explained below.

The experimental groups used four tasks designed by the researcher for the purpose of this study to learn the unknown collocations. These tasks required that students work in pairs to practise the form, the meaning and use of the target sequences. For the control groups, the same materials used with the experimental groups were turned into four exercises that mirrored those found in the English textbooks that students were using. The only difference was that students had to work individually to do the four exercises. The experimental and control groups represented different classes (there was a total of 13 semester-one classes) and since this was their first semester in the engineering programme, they did not know each other.

Immediately after the treatment, and to prevent any learning effect of the receptive post-test, both groups took the immediate productive post-test first. Then, they did the motivational survey. Finally, they took the immediate receptive post-test. After the mid-semester break and the UAE National Day holiday, which took students away from college for approximately one month (29 days), students took the same immediate productive and receptive post-tests as delayed post-tests. In the subsequent sections, the two experiments will be explained separately. Figure 4.1 summarizes the order of the testing battery for both studies:

Vocabulary Size Test
↓
Pre-Test
↓
Immediate Productive Post-Test
↓
Survey
↓
Immediate Receptive Post-Test
↓
Delayed Receptive Post-Test
↓
Delayed Productive Post-Test

Figure 4.1. Order of the testing battery

4.3. Experiment 1: The Verb-Noun Collocations

4.3.1. Participants and setting. Participants in Experiment 1 were 109 male Emirati college students aged 18-21 years. They were randomly assigned to experimental group 1a (EG1a, n=29), control group 1a (CG1a, n=27), experimental group 1b (EG1b, n= 27), or control group 1b (CG1b, n=26). All participants were L1-speakers of Arabic, learning English for academic purposes in their first semester of the four-year engineering bachelor programme at the Higher Colleges of Technology (HCT), Fujairah Men's College. This higher education institution used English as the medium of instruction in all majors. The college requirement for joining this program was IELTS band 5.0. Regarding language proficiency, all participants had an IELTS band score ranging from 5 to 6, which roughly corresponded to the B1-B2 levels (independent user) of the Common European Framework of Reference (Hawkey & Barker, 2004; Lim, Geranpayeh, Khalifa & Buckendahl, 2013). The Vocabulary Size Test (Nation & Beglar, 2007) was also used to determine participants' vocabulary size and the results shown in Table 4.2 indicated that they were all still at the 3000 word level, i.e., these participants knew the 2000 most frequent words in English and they were learning the third thousand words.

Table 4.2

Descriptive Statistics of the Vocabulary Size Test for All Groups

Group	N	Mean	SD	Minimum	Maximum
Control Group 1a	27	23.74	5.634	15	36
Experimental Group 1a	29	23.34	5.023	12	32
Control Group 1b	27	23.96	5.80	15	36
Experimental Group 1b	26	23.14	5.23	12	33

Before joining the college, participants spent a minimum of 12 years learning English as a foreign language (EFL) in public schools. In the primary cycle, English is taught as a subject for 4 hours a week, while in the preparatory and secondary cycles the number of hours increased to six per week. The books used in public schools were mainly published by the United Kingdom based publishing companies *Garnet* and *Longman*. In the UAE public schools, English teachers were mostly Arab nationals from the Middle East (Syria, Palestine, Jordan) and North Africa (Egypt, Tunisia, Morocco).

Participants in this study were all semester one students, and they had to take a total of 36 general education credits as part of their graduation requirements. The general education courses aimed at preparing students to succeed in their college studies through intensive English courses in academic spoken and written communication. Prior to conducting the study, I got the approval from both the University Research Ethics Committee (UREC) at the University of the West of England and my institution to carry out the current research project. In line with research ethics, all participants signed a written consent form (see Appendix A) to voluntarily participate in the study. I was the English teacher of all these students and I taught them *Academic Reading and Writing 1* for four hours a week. I am a Tunisian English teacher holding an MA in Teaching English to Speakers of Other Languages (TESOL) from the American University of Sharjah in the UAE. I have been teaching English for 22 years (three years in Tunisian high schools, 15 years in the UAE high schools, and 7 years in a higher education institution in the UAE).

4.3.2. Instructional treatment

4.3.2.1. Choosing the verb-noun collocations. The subjects in my study were semester-one students who were taking *Academic Reading and Writing 1* as an introductory course to improve their academic reading and writing skills. One of the course objectives was that students should master the first five sublists of the Academic Word List (AWL, Coxhead, 2000). As such, choosing collocations based on the AWL is two fold: on the one hand, the course objective related to mastering words from the AWL was attended to during the time of the study. On the other hand, students also practised learning these chunks to increase their lexical repertoire. The target collocations chosen included a noun from the AWL as collocate and a verb as node word. All the collocations chosen could be included under the restricted sense collocation category (Nesselhauf, 2003). In a restricted sense collocation, the sense in which the noun is used is unrestricted but the sense of the verb is restricted, so the verb in the sense in which it is used can only be combined with certain nouns. Nesselhauf (2003) used the example of the verb ‘take’ to explain this type of collocations: ‘take’ can combine with photograph but not with film, though this is semantically and syntactically possible (take a picture/photograph; but not *take a film/movie).

There were three main criteria that informed the choice of collocations for this study. The first criterion was that, in addition to having a noun from the AWL as collocate, the sequences should be relatively frequent in the academic context, since they were introduced to students through written texts. The second criterion was related to the strength of association between the two words that formed the sequence, which Church and Hanks (1990) termed Mutual

Information (MI). MI can be simply defined as "[the] measure of how much one word tells us about the other" (Manning & Schütze, 1999, p. 178). The MI score is a measure of the strength of association between the constituents of a given sequence of words. In collocations research literature, it was commonly suggested that for the MI of a given sequence to be statistically significant, it should be equal to or greater than 3 (e.g., Hunston, 2002; Evert & Krenn, 2001). For example, although the sequence *establish rapport* occurs only 40 times in the Corpus of Contemporary American English (COCA), it has an MI score of 9.93, which suggests that the two words are strongly associated. The choice of the MI score as a criterion for inclusion of the collocations yielded sequences that were strongly associated and that are relatively frequent in academic discourse.

The third criterion relates to the concept of congruence. Congruent collocations are defined as "collocations with a word-for-word translation equivalent in the L1" (Wolter & Gyllstad, 2013, p. 455). For instance, the collocation *show respect* is congruent and has a direct Arabic equivalent (يظهر الاحترام) but *pay respect* is incongruent since its literal translation into Arabic would be (يدفع الاحترام) which is meaningless and incorrect in Arabic. The findings of studies that investigated the effects of congruency on the acquisition/learning of collocations suggest that L2 learners in general perform better in tasks involving congruent collocations (e.g., Nesselhauf, 2005; Sadeghi, 2009; Wolter & Gyllstad, 2011).

For example, Yamashita and Jiang (2010) reported a significant difference in response times and error rates in an acceptability judgment task. Participants (Japanese L1 learners) in their study processed congruent collocations faster than incongruent ones with lower error rates. The researchers concluded that incongruent English collocations are more challenging than congruent collocations for Japanese learners. In a similar vein, Wolter and Gyllstad (2011) found that their L1 Swedish learners learning ESL, processed congruent collocations faster than incongruent collocations in a primed lexical decision task.

What these studies suggest is that congruence is an important variable that might affect the reliability and validity of research results in general. Moreover, in my study, all collocations had their noun collocates from the AWL (Coxhead, 2000) since students were required to learn words from this list. Also, incongruent collocations are not frequent in academic discourse and students will benefit more from learning congruent collocations. Therefore, in the current study, all selected collocations were congruent.

Before using corpora to extract potential collocations that could be included in my study, I surveyed the textbooks that were used in previous years for the *Academic Reading and Writing 1* course to identify collocations containing any noun that appeared in the first five sublists of the AWL. These included the following: *Key Concepts 1: Reading and Writing Across Disciplines*, *Academic Connections 4*, and *Skills in English: Reading and Writing 2*.

The result of my search was 79 candidate collocations with nouns as node words. I then eliminated 13 sequences that did not have a verb as the collocate and a noun as the node word. The following step was to eliminate combinations of words that had a MI less than 5 and a minimum frequency of 30 in the COCA. This reduced the initial list to a total of 38 candidate collocations. The final step was to consult teachers who were teaching *Academic Reading and Writing 1* for their opinion about the usefulness of the selected sequences for this course. The seven instructors (4 L1-speakers and 3 L2-speakers of English) were surveyed and asked to choose the 20 sequences they think would be most useful for our students. I also had a discussion with other teachers from other campuses about which sequences to include, and finally 20 verb-noun collocations (see Appendix B for complete information about their frequency and MI scores) were selected for the study.

*4.3.2.2. The case of the experimental group***.** The experimental group (EG) treatment consisted of three sequenced tasks that offered learners of this group four encounters with each target verb-noun collocation. In Task 1(Translation Activity) the collocations were introduced using sentences that were extracted from the COCA and adopted to students' level (see Appendix C). All the running words were checked using the online VocabProfile (available at Tom Cobb's website www.lextutor.ca/vp/) to eliminate any words that might be unknown for participants. Most running words were from the 1000 and 2000 most frequent English words except for the target collocation. The following example illustrates the context for the presentation of the sequence 'avoid conflict':

Many studies have found that successful learners are those who most often try to **avoid conflict** at all costs with teachers, other students, and college employees.

To help learners notice the salient features of the input (Schmidt, 1995), i.e., drawing their attention to the unknown sequence to be learned, the two constituents of the target collocation were put in bold. Howarth (1998) argues that it is “[the] lack of awareness of the phenomenon” of formulaicity that is causing challenges to L2 learners (p. 186). Consequently, if we could make the form of the sequence salient in the input (using bold face), learners might be able to clearly delineate this sequence and recognize its boundaries. This could be achieved by different techniques such as underlining, highlighting, and using bold face (see Tullis, 1988 for a detailed review of these techniques). Many studies reported the benefit of this typographical salience in ameliorating retention of collocations (e.g., Butler, 1980; Chun & Plass, 1996; De Ridder, 2000). In a more recent study, Bishop (2004) reported that making unknown collocations typographically salient improved the overall comprehension of these sequences. In my research project, it was estimated that using the bold face to enhance the written input would help learners focus on this particular part of the sentence and help them notice the collocation as a chunk.

The four tasks are described below using Ellis’s (2003) framework (this framework was explained in the literature review section):

Task 1: Translation Activity

- *Goal*: to recognise the meaning and form of collocations through translation
- Input: 20 written sentences
- *Conditions*: shared information
- *Procedures*: pair work
- *Predicted outcomes*: Product: list of translated collocations;
  Process: contrasting, using online dictionaries, negotiation

Task 2: How motivated are you

- *Goal*: to practise using collocations in questions through carrying out a survey
- Input: a 20-item written survey
- *Conditions*: shared information
- *Procedures*: pair work
- *Predicted outcomes*: Product: completed survey;
  Process: reasoning and matching

Task 2, *How Motivated Are You*, (see Appendix D) was an activation task and it was used to “activate [learners] emerging language skills” (Nunan, 2004, p. 20) to engage in meaningful interaction. Participants worked in pairs to “measure” their partners’ motivation through surveying each other. The following is an example of the survey questions:

	Questions	Yes	No
1.	Do you **provide assistance** to your classmates when they need it? يوفر المساعدة		

After surveying each other, students used a scoring sheet provided by the teacher to determine their partners’ motivation. The target collocations were presented in bold and their Arabic translations were also provided.

Task 3: the first year in college

- *Goal*: to practise the spelling and recognize the meaning of collocations
- Input: written sentences
- *Conditions*: two-way information gap
- *Procedures*: pair work
- *Predicted outcomes*: Product: completed table;

  Process: fact finding and sorting information

Task 3 was a two-way information gap (Davies, 1982; Long, 1980). This activity involved participants sharing different pieces of information (each group member having different part of the information) that is essential for successfully carrying out the activity. The following example shows how learner A needs to interact with learner B to complete the missing collocation *avoid conflict*:

Learner A	**Learner B**
Whenever possible, you should always try to avoid conflicts with all the teaching and administrative staff during your first	In semester one ________________ ________________ with all the teaching and administrative staff

Each learner had five missing collocations, indicated by the two lines/gaps in each sentence that he needed to complete through asking his partner about them using the clues given in each sentence (semester one or two). The ultimate goal of the information exchange was to complete a table about what students were expected to do in semester one and two.

Task 4: the college student council

- *Goal*: to practise the spelling and recognize the meaning of collocations
- Input: written sentences
- *Conditions*: shared information
- *Procedures*: pair work
- *Predicted outcomes*: Product: completed table;
  Process: comparing, matching, and reasoning

Task 4 was a problem-solving task, where learners had to read job descriptions related to three college student council positions. Then, they had to match three candidates to the described positions. To solve the problem, students had to use the ten target collocations integrated in the job descriptions as clues to guide them. The collocations put in bold to facilitate the task for students. The following example shows the job description of the position of president.

The President

- During social events organized by the college, the president of the student council should work to **raise awareness** among the students regarding the issue of bullying.
- In the first week of classes, the president is expected to **encourage participation** of students in all the scheduled events and activities by visiting different classes.
- During the graduation ceremony, it is the responsibility of the president to give a speech about challenges that students face to **stimulate debate**.
- The president should **maintain contact** with other council members to inform them about all scheduled social events.

After completing the four tasks, students were told to record the collocations in their vocabulary notebooks (collocation, meaning in English, Arabic translation, and example sentence) as homework. Table 4.3 summarizes the stages of the instructional treatment for the experimental group with the duration of each one:

Table 4.3

Stages of the Experimental Group Treatment

Stage	Task	Number of Collocations	Number of encounters	Time in Minutes
Task 1	Translating the 20 Collocations	20	1	25
Task 2	How Motivated Are You	20	1	25
Task 3	Information Gap	10	2	25
Task 4	Problem Solving	10	2	25

4.3.2.4. The case of the control group. The treatment for the control group (CG) differed from the EG treatment in that all tasks were turned into individual activities mirroring those found in English textbooks (see Appendix E). The same context used with the EG was kept for the CG treatment and students did the exercises individually. There was no interaction between students and they only interacted with the teacher while doing the exercises or during the correction stage. Students did four exercises explained below.

Exercise 1: Translation

The first exercise for the control group was a translation activity where students were given the Arabic translation of the collocations and asked to find the English equivalents in the context sentences as in the following example:

يتجنب الخلاف	Many studies have found that successful learners are those who most often try to avoid conflict at all costs with teachers, other students, and administrators.

Exercise 2: How motivated are you

The second exercise for the control group was to do a survey (the same survey and scoring sheet used with the EG students). The difference was that the CG learners did the survey individually, scoring themselves using the same scoring sheet to determine the level of their motivation.

Exercise 3: Fill in the blanks

The third activity was a gap-fill exercise using the same context sentences as the information gap task in the EG treatment. A list of the 20 target verbs was given and students were asked to fill in the gaps (one lines indicating the need for one word) with the correct verb from the list. Below is an example sentence where students should select the verb *establish* from the list of verbs provided to complete the collocation *establish rapport*:

> During the first semester, interacting with your classmates and friends, getting to know them better, and showing them respect will help you ___________ rapport with them.

After completing the exercise, students had to individually complete a table that classified the things they were expected to do in semester one and two.

Exercise 4: Match the two constituents of the collocations

Activity three consisted of a matching exercise. Students were given a list of nouns and they had to match each noun with its verb collocate in the gapped sentence (the same sentences used with the EG were turned into a matching exercise) as in the example below.

> The president should maintain _________________ with other council members to inform them about all scheduled social events.

Then, learners had to complete a table with the combinations Noun + Verb. After completing the four exercises students were also instructed to use their notebooks to record the collocations they learned as homework. Table 4.4 summarizes the control group treatment stages.

Table 4.4

Stages of the Control Group Treatment

Stage	Activity	Number of Collocations	Number of encounters	Time in Minutes
Presentation	Translating the 20 Collocations	20	1	25
Exercise 1	How Motivated Are You	20	1	25

Exercise 2	Gapped Sentences	10	2	25
Exercise 3	Matching	10	2	25

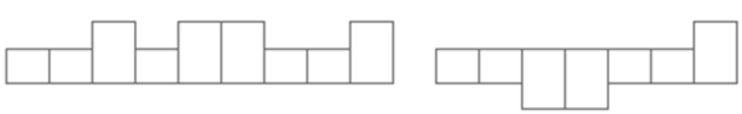
As explained above and since experiment 1 consisted of two sub-experiments, the number of encounters in EX1b was increased for the GC1b to eight times and kept the same for the EG1b, i.e., four times. This would allow the researcher to understand the effects of the teaching method used with each group of learners. Consequently, there was an increase in the number of exercises learners in the CG1b had to do. The following exercises (see Appendix E) were added to the lesson handout for the control group.

Collocation search. This was the classical word search activity but instead of single words, learners had to search for the two constituents of each collocation that were hidden in the puzzle. The collocations were placed horizontally, vertically, or diagonally. When learners located a collocation, they had to draw a circle around it as in the example below for the collocation *explore alternatives*.

q	s	y	d	h	c	b	s	t	o	i	f	o	j	k	y	i	y	v	i	i	k	r	e	i
f	s	s	m	w	e	l	x	e	p	o	v	n	a	w	p	o	k	v	h	f	b	s	s	t
m	l	h	k	i	j	l	i	r	f	n	o	r	z	k	o	n	w	b	m	u	e	e	s	y
e	x	p	l	o	r	e	j	a	l	t	e	r	n	a	t	i	v	e	s	t	p	i	v	w

Collocation box. This was a matching exercise that required learners to match the two constituents of ten collocations randomly placed in a box.

Collocation shape. Learners had to print the target collocations in empty boxes. The shape of the collocation must match the shape of the boxes as in the example below for the collocation *establish rapport*.

3. 

4.4. Experiment 2: The Adjective-Noun Collocations

4.4.1. Participants and setting. Participants in Experiment 2 were 108 male Emirati college students aged 18-20 years. They were randomly assigned to experimental group

2a (EG2a, n=28), control group 2a (CG2a, n=27), experimental group 2b (EG2b, n= 26), and control group 2b (CG2b, n=27). They were similar to participants in experiment 1 in terms of proficiency level (IELTS 5 to 6) and vocabulary size (learning the third thousand words). Table 4.5 presents details about the vocabulary size for each group.

Table 4.5

Descriptive Statistics of the Vocabulary Size Test for All Groups

Group	N	Mean	St. Deviation	Minimum	Maximum
Control Group 2a	28	23.63	4.64	17	35
Experimental Group 2a	27	23.49	4.97	12	32
Control Group 2b	26	23.70	5.73	15	36
Experimental Group 2b	27	23.30	5.01	14	34

The same procedure was used to select the 20 target adjective-noun collocations (see Appendix F for information about their frequency and MI scores) and the same criteria were adopted for inclusion of these collocations in the study (see Experiment 1 above).

4.4.2. Defining the instructional treatment. The instructional treatment for the adjective-noun collocations mirrored that of experiment 1. In experiment 2a (EX2a) the control group 2a (CG2a) and the experimental group 2a (EG2a) encountered the target collocations four times. In experiment 2b (EX2b) the number of encounters was increased for the CG2b to eight times and kept the same for EG2b (four times).

4.4.2.1. The case of the experimental group. In experiment 2a, the experimental group treatment consisted of four sequenced tasks (see Appendix G) with four encounters with each target adjective-noun collocation. The initial stage in Task 1 involved translating the target collocations to Arabic. The same typographical salience technique (bold face) was used to draw learners' attention to these sequences to aid noticing. After this stage learners engaged in doing three more tasks described using Ellis's (2003) framework below.

Task 1: Translation Activity

- *Goal*: to recognise the meaning and form of collocations through translation
- Input: 20 written sentences

- *Conditions*: shared information
- *Procedures*: pair work
- *Predicted outcomes*: Product: list of translated collocations;

  Process: contrasting, using online dictionaries, negotiation

Task 2: How motivated are you

- *Goal*: to practise using collocations in questions through carrying out a survey
- Input: a 20-item written survey
- *Conditions*: split information
- *Procedures*: pair work
- *Predicted outcomes*: Product: completed survey;

  Process: reasoning and matching

The only difference between this task and the one used in experiment 1 is the type of collocations used. This task targeted adjective-noun sequences.

Task 3: Two courses

- *Goal*: to practise the spelling and recognize the meaning of collocations
- Input: written sentences
- *Conditions*: two-way information gap
- *Procedures*: pair work
- *Predicted outcomes*: Product: completed summaries;

  Process: listing and comparing

In this task participants had to share information about two semester-one courses to complete two summaries about these courses.

Task 4: Student clubs

- *Goal*: to practise the spelling and recognize the meaning of collocations
- Input: written sentences
- *Conditions*: shared information
- *Procedures*: pair work
- *Predicted outcomes*: Product: completed table;

  Process: comparing, contrasting, and matching

4.4.2.2. The case of the control group. As for the control group in this experiment, the same contextualized sentences used in the four tasks above were turned into four individual exercises (Translation activity, an individual survey, fill in the blanks and matching exercises listed in Appendix H). As in experiment 1b, and to clarify the effects and gains from each teaching method, the number of encounters of the 20 target adjective-noun collocations was increased to eight times for the control group and kept the same for the experimental group (four times) in experiment 2b. Four more activities were added to the control group class handout to cater for the eight-time frequency of encounter criterion. These activities were a collocation search, a collocation box and a collocation shape exercise (see Appendix H).

4.5. Research Instruments

4.5.1. The Pre-tests. Two pre-tests, pre-test A and pre-test B (see Appendix I), were used in the study and they were intended to measure the participants' receptive knowledge of meaning and form of the target collocations. Pre-test A was intended to measure participants' receptive knowledge of meaning and form of the target verb-noun collocations, while the pre-test B was used for adjective-noun collocations. Both tests had a multiple-choice (MC) format. Although discrete-point MC vocabulary tests have been criticized in the vocabulary research literature as being invalid measure of the overall language proficiency (e.g., Wesche & Paribakht, 1996), they can still be used to gauge learners' vocabulary knowledge since "the more we contextualize the assessment of vocabulary, the less clear it may be to what extent it is vocabulary knowledge that is influencing the test taker's performance" (Read, 2004, 116). However, when opting for MC discrete-point vocabulary tests, Nation and Webb (2011) caution that "there is more to vocabulary knowledge than being able to choose the appropriate meaning in a multiple-choice test" (p. 285). In fact, MC vocabulary tests do not mirror real language use since when language learners meet a new word in a real-life situation, there are no options available to choose the correct meaning from. Therefore, according to Waring and Takaki (2003), a vocabulary translation test might be a better alternative to measure the presence or absence of this knowledge because it has a similar level of difficulty as real life language use.

To increase the validity of the multiple-choice collocation knowledge pre-tests used in the current study, the Arabic literal translation of the target collocations was required to confirm that learners knew the meaning of the sequence.

Another issue in multiple-choice vocabulary tests is random guessing which might affect the reliability of the test and make it difficult to interpret the test scores. Read's (1998) findings suggested that guessing was an important factor that affected learners' achievement. In the current study, to discourage guessing, a fourth option, *I don't know*, was added to the distracters in order not to force learners to select a word when they did not know the answer and hence minimise the chances of guessing. The following examples illustrates two test items, the target verb-noun collocations *conduct research* (pre-test A) and the adjective-noun collocation *profound impact* (pre-test B).

Question: Read the word in column A and choose the word that you think usually goes with it from column B, and provide the Arabic Translation. If you think that you don't know the words that can go with each other choose *I DON'T KNOW***.**

A	B	Arabic Translation
1- **conduct**	a- result b- charge c- research d- I DON'T KNOW	____________________ ____________________
2- **profound**	a- impact b- telephone c- insect d- I DON'T KNOW	____________________ ____________________

Pre-tests A and B consisted of 35 items and a sentence translation distracter activity that was not part of the study. To control for word difficulty, all the distracters were from the most frequent 2000 words that participants at this level were supposed to know. The BNC and the COCA were used to check that the correct answer was the natural choice and that none of the distracters appeared with the collocate. The tests were also checked by three English teachers (two native and one non-native English speakers) who identified some distracters that might be problematic for test takers. These were removed from the test and replaced with other words with the help of these teachers.

4.5.2. The Post-tests. Designing both valid and reliable measurement tools to measure receptive or productive aspects of collocation firstly necessitates that we appropriately define the construct we want to measure. To do so, and since knowledge of collocation represents only one aspect of vocabulary knowledge (Nation, 2001), we firstly need to define vocabulary knowledge itself. In the vocabulary research literature, different approaches were used to explain what is involved in knowing a word. In the *component approach* (Cronbach, 1942; Nation, 2001; Richards, 1976) the concept of word knowledge refers to knowing the form of the word, its meaning, and its use. The *developmental approach* (Dale, 1965; Paribakht and Wesche, 1993) posits a multi-stage development where some aspects of word knowledge precede others. For example, knowledge of a word collocate is largely dependent on its form. Finally the *metaphorical approach* uses metaphors such as the lexical space (Daller et al., 2007) and the web of words (Aitchison, 1987) to describe some characteristics of word knowledge. (These approaches were explained and reviewed in the literature review sections).

In my study, the concept of vocabulary knowledge was defined as the knowledge of the form, the meaning, and the use of a given word (the component approach). Since how words are acquired and the ability to use them appropriately in different contexts is still far from being fully accounted for by different applied linguistics theories, “we can attain a fuller understanding of the entity [vocabulary knowledge] itself” by deconstructing this phenomenon into component parts (Fitzpatrick & Milton, 2014, p.175). Thinking of vocabulary knowledge as multi-faceted can make examination of these parts more focused and detailed. More importantly, this could also contribute to a better understanding of how the vocabulary learning/teaching method might affect learners’ achievement in different aspects of word knowledge. Finally, it is also important to mention that Nation’s (2001) component framework is of potential benefit to L2 teachers since they can effectively apply it to teaching L2 vocabulary in a more systematic and straightforward way.

This way of conceptualizing vocabulary knowledge extends to the knowledge of collocations. Nation and Webb (2011) adapted the single words component framework to describe the knowledge of collocations or what they called *multiword units*. As such, “the knowledge of multiword units can be approached in the same way as knowledge of single words” (p. 189). One significant advantage of approaching the definition of collocations in terms of *form*, *meaning*, and *use* is for researchers to “be clear about what kind of knowledge is being tested and what knowledge is not being tested” (Nation & Webb, 2011, p. 189). Another advantage is that this framework can be used to analyze any test items and choose the more suitable items for the knowledge being tested.

Another very important issue that needs to be addressed when designing vocabulary measurement instruments is the receptive/productive distinction. Many researchers reported the lack of a clear and commonly accepted definition of what constitutes receptive and productive knowledge of words (for a detailed discussion, see Melka, 1997; Read, 2000; Schmitt, 2000). This absence of exact definition extends to collocations as well (see the literature review section), and it is therefore central for the reliability and the validity of the research instruments to choose the correct test type that measures the specific knowledge being studied. Being clear about the knowledge to be tested is essential for an adequate selection of the appropriate test format suitable for the research goals.

In the current research project, the *receptive* knowledge of collocations was defined as the knowledge of the form and meaning of the target collocation simply manifested in the ability to recognize the form of the collocation and translate it from English (L2) to Arabic (L1). This knowledge was tested through giving participants the written form of a collocation and asking them to translate it from L2 to their L1. As for the *productive* knowledge of collocations, it was defined as the ability to express an idea or a concept through the use of an English sequence of words. This involved the ability to translate a given collocation from Arabic (L1) to English (L2). Consequently, testing this knowledge was achieved through requiring participants to translate the collocation from Arabic to English and write it in a gapped sentence.

3.5.2.1. The Immediate and delayed productive post-tests. The Cued recall test, where the initial letters of the sequence being tested is provided, was used, along with the English definition in Schmitt et al. (2004) to test the productive knowledge of collocations illustrated in the test item below:

Speaker A: I've always been watching the news reports, and they say that **there is a go_____ cha______ that** the international debts of poorer countries might be canceled.	(this will probably happen)

Although this item tested productive knowledge, it would still be challenging for less advanced learners and the test score might be affected by unknown words in the gapped sentence or the given definition since if the test takers did not get the correct answer, we would not know if it were because they did not know the collocation or because the did not know some words in the contextual sentence and/or the definition. As such, adding the L1 equivalent would make the test even more reliable as it would eliminate any effect of difficult words for the test takers.

The immediate and delayed productive post-tests (see Appendix J) employed in my study followed the cued recall format (Schmitt et al., 2004) but the L1 equivalent was given instead of the English meaning for the reasons discussed above. All the words used in the contextual sentences were checked using the online VocabProfile to control for word difficulty. Most running words were from the 1000 and 2000 most frequent English words. The final version of the tests contained 20 items following the same format as in the example item below.

Nowadays, with the popularity of smart phones, students find it easier to **mai**_____________ **co**___________ with their old friends through the use of social media applications like Facebook and Twitter.	**يبقى على اتصال**

3.5.2.2. The Immediate and Delayed Receptive Post-Tests. The multiple-choice test format has been used in some studies to test both the receptive and the productive knowledge of collocations (Schmitt et al., 2004; Spöttl and McCarthy, 2004). However, this test format has not always been used appropriately as in Spöttl and McCarthy (2004) who wanted to test the receptive knowledge of collocations through giving test takers gapped sentences and asking them to choose the correct collocations from five options, as illustrated in the example below taken from their test:

> **A**: It would be perfect. His Miami tee shirt on. Oh he'd love it.
> **B**: Yes he would.
> **A**: Florida would be just right for him. He wouldn't look ________________. He's got an American body. He's got the shape for it, completely.

a. in shape **b.** in form **c.** out of place **d.** out of touch **e.** I don't know

In this case, test takers moved from recognizing the meaning (in the contextual sentence) to the choice of the correct form, which was rather testing productive knowledge.

Schmitt et al. (2004) also used a multiple-choice test format to measure respondents' receptive knowledge of the target collocations in their study. The following item illustrates this test format:

Speaker A: I've been watching the news report and they say that (**11**) **________________** the international debts of poorer countries might be cancelled.	**11**. **a-** there's a good chance that **b**. it seems to be happening that **c**. the evidence is increasing that **d**. people are thinking that **e**. I DON'T KNOW

A careful analysis of this test item reveals that it is in fact testing productive knowledge and not receptive knowledge as the researchers intended. Test takers were asked to choose the right form and since the movement was from the meaning cued by the contextual sentence to the choice of the correct form, this was rather a productive knowledge test.

To test receptive knowledge of single vocabulary items or collocations, a translation test would be more valid and effective for many reasons**.** Although some teachers and researchers object to the use of translation in teaching or testing word knowledge, as Nation (2001) pointed out "translation is one of a variety of means of conveying meaning that in general is no better or worse than the use of pictures, real objects, definitions, L2 synonyms and so on" (p. 567). The multiple-choice or matching test formats usually use L2 definitions to test the knowledge of the target word/sequence. However, these definitions usually require more advanced lexical and grammatical skills to be understood by the test taker. As such**,** the choice of the correct/wrong answer might be affected by unknown words or structures in the definitions/options given. For these reasons, a translation test was used in my study to test the receptive knowledge of collocations.

The purpose of the immediate and delayed receptive post-tests (see Appendix K) was to test whether test takers would be able to recognize the form and meaning of the target collocations. The tests asked participants to translate the 20 target collocations into Arabic to show their receptive knowledge of meaning and form of the target collocations. If they did not know the meaning, they would circle *I DON'T KNOW* as illustrated by the following test item.

Collocation	Arabic Translation
	______________________
analyze data	I DON'T KNOW

4.5.3. The Vocabulary size test. The vocabulary size test (VST) developed by Nation and Beglar (2007) was used to measure participants' receptive vocabulary size in English. According to Meara (1996a) the VST is the 'nearest thing we have to a standard test in vocabulary' (p. 38). The VST is a measure of the receptive recognition of meaning and form of a given word and uses a multiple-choice format with four options to measure "decontextualized knowledge of the word" (Nation, 2012, p. 1). The stem consists of a non-defining example sentence where the target word is bolded. The following test item illustrates the format:

SEE: They **saw** it.

a. cut

b. waited for

c. looked at

d. started

An initial validation study of the VST was carried out by Beglar (2010), who reported considerably high reliability estimates ranging from .96 to .98. The high reliability of the test makes its use convenient as a measure of the overall learners' vocabulary size. For ease of scoring and administration, the online version of the VST was used in this study, available on Tom Cobb's *Lextutor* website (http://www.lextutor.ca/tests/levels/recognition/).

4.5.4. The Motivational survey. The third stage of data collection included an attitudinal/motivational survey developed by Dörnyei (2009). The purpose of the survey was to uncover some of the learner variables that might affect the learning of collocations. It has been widely reported in SLA research that motivation has a critical role to play in learning a new language and according to Ushioda (2012) motivation can be thought of “as an important internal cause of variability in language learning success” (p. 396). The original survey consisted of 16 multi-item scales (e.g., *criterion measures*, *ideal L2 self*, *parental encouragement*, *travel orientation*, *English anxiety*, etc.) and it contained 67 items and used a six-point Likert scales ranging from *strongly disagree* to *strongly agree*. Most of the multi-item scales had a reliability coefficient greater than the .07 threshold. The overall survey reliability coefficient was (r = .88), which is a high figure given the comprehensiveness of the survey.

Since the original survey was part of the pre- and post tests package, and given the short time of the experiments, it was deemed too long for participants in my study and it was piloted twice with three groups of learners (12 and 17 students in the first piloting, and 29 students during the second piloting) to decide on the variables included in the original survey that were related to the study context. The second time the survey was piloted, it consisted of six multi-item scales and contained 24 items only (see Appendix L). To encourage participants to focus on the content of the survey and to eliminate any effects of unknown English words, the survey items were also translated to the participants’ Arabic L1. Reliability analysis showed that the survey had an acceptable overall Cronbach alpha (r = .763). The different piloting sessions showed that the six multi-scale items illustrated in Table 4.6, with their reliability figures, were more relevant to the UAE context.

Table 4.6

The Six Multi-Scale Items

The multi-scale items	number of items	Cronbach Alpha
criterion measure	4	.849
parental encouragement	4	.761
instrumentality: Promotion	4	.709
instrumentality: Prevention	4	.759
attitudes towards L2	4	.723
English Anxiety	4	.724

4.6. The Pilot Study.

The pilot study was carried out six months before the main study. The purpose of the pilot study was threefold. First, the research instruments were tested to check the validity and reliability of different measurement instruments to be used in the main study. Second, the suitability of the main study materials to participants' level was checked. Finally, there was a need to assess the anticipated data analysis techniques to identify any potential problems.

The study was piloted with 56 students who were all semester one students. They had similar characteristics to those of the subjects in the main study. They were all Emiratis, aged 18-22 years, and they all had their IELTS requirement with scores ranging from band 5.0 to 6.0, and they were taking their first English course, *Academic Reading and Writing 1*. The same materials used with both the control and experimental groups in the main study were also used in the pilot study, and participants also took the same tests. The order of the tests was as follows:

1- The Vocabulary Size Test
2- The pre-test
3- The immediate receptive post-test
4- The survey
5- The immediate productive post-test

The piloting offered valuable insights for improving the research design and quality. First, the two-hour time frame was not enough and the experimental group students needed more time to finish all the tasks they were supposed to do. As such, I revised the tasks and made them shorter by leaving out some sentences. Another point that needed attention was the order of the measurement instruments. The scores of participants on the productive post-test were considerably high, and it was evident that there was a learning effect of the receptive post-test. Consequently, in the main study, the receptive post-test was administered after the productive test. Also, participants took the survey after the productive test to distract them from focusing on remembering the form of the target collocations.

Preliminary analysis of data collected during the pilot study revealed that the chosen statistical procedures would be adequate for the overall research protocol. This stage of the pilot study was very beneficial for the researcher. Although stepping into the world of statistical analysis was "time-consuming, frustrating, and fraught with unanticipated problems" (Mason &

Zuercher, 1995, p. 11), it nevertheless opened the eyes of the researcher on issues that could affect the overall success of the research project.

In the following chapter, quantitative data collected during the study, i.e., the VST, the immediate and delayed receptive and productive post-tests, and the survey scores will be presented and analyzed using descriptive statistics (e.g., mean, mode, range, variance, and standard deviation), and parametric and non-parametric tests.

CHAPTER 5 RESULTS

In this chapter, data collected during both experiments 1 (verb-noun collocations) and 2 (adjective-noun collocations) are analysed and presented, in light of the research questions raised in Chapter 3. First, results from quantitative data gathered through the pre-tests, the vocabulary size test (VST), the immediate and delayed receptive and productive post-tests, and the motivational survey are examined. The findings of experiment 1 and experiment 2 are examined separately in this chapter.

5.1. Experiment 1: The Verb-Noun Collocations

The first stage of data analysis involved checking that the experimental group 1a (EG1a) and the control group 1a (CG1a) are comparable in terms of proficiency level. Both the IELTS results and the VST scores were compared. Then scores obtained in different measurements were statistically analysed using parametric tests (independent t-test) when the assumptions of normality and equality of variance were met. In the case these assumptions were violated, then non-parametric tests (the Wilcoxon rank-sum test and Mann-Whitney test) were used. The data obtained from the survey were also checked for reliability and statistically analysed. Finally, the interviews were transcribed, coded and analysed.

5.1.1. Experiment 1a: The four-time encounter condition. In this experiment, the EG1a (N = 29) encountered the 20 target collocations four times through the three sequenced tasks: an activation task, an information-gap task, and a problem-solving task. As for the CG1a (N = 27), they were similarly exposed to these collocations four times but using three individual exercises (the three tasks used with EG1a were turned into exercises that required CG1a students to work individually).

5.1.1.1. Pre-treatment data analysis.

5.1.1.1.1. The IELTS test. First, the IELTS scores for both EG1a and CG1a groups were retrieved from students' online profiles and were submitted to statistical analysis. Table 5.1 shows the descriptive statistics for both groups.

Table 5.1.

Descriptive Statistics of the IELTS Test for Participant Groups

Group	N	Mean	St. Deviation	Minimum	Maximum
Control Group 1a	27	5.26	.321	5	6
Experimental Group 1a	29	5.28	.286	5	6

A Kolmogorov-Smirnov test was used to check for the normal distribution of the data (see Appendix M). For the CG1a, IELTS scores did not deviate from normality ($D(27) = .346$, $p < .001$); and for the EG1a, scores were also normally distributed ($D(29) = .315$, $p < .001$). A Levene's Test was also used to check for the homogeneity of variance. As can be seen in Table 5.2, the variances of scores were roughly equal for both groups.

Table 5.2.

Test of Homogeneity of Variances of the IELTS Test Scores for Participant Groups

	Levene Statistic	df1	df2	Sig.
IELTS	.523	1	54	.473

Based on the normality and the homogeneity of variance tests results, and since the assumptions of normal distribution and equal variances were not violated, the *t*-test was estimated as being more suitable to check if the groups were comparable in terms of proficiency level. The CG1a ($N = 27$) was associated with an IELTS score of $M = 5.26$ ($SD = .321$), and the EG1a ($N = 29$) had a score of $M = 5.28$ ($SD = .286$). An independent sample *t*-test was performed to test the difference in mean scores. The results suggested that the difference between the two groups was not statistically significant ($t(54) = .473$, $p = .839$).

4.1.1.1.2. The vocabulary size test. The descriptive statistics of the results of the vocabulary size test (Nation & Beglar, 2007) for both groups are shown in Table 5.3.

Table 5.3.

Descriptive Statistics of the Vocabulary Size Test for Participant Groups

Group	N	Mean	SD	Minimum	Maximum
Control Group 1a	27	23.74	5.634	15	36
Experimental Group 1a	29	23.34	5.023	12	32

The VST scores were also checked for normality using the Kolmogorov-Smirnov test (see Appendix M) and the results revealed that both groups' scores were roughly normally distributed. For the CG1a, VST scores ($D(27) = .115$, $p = .200$), and for the EG1a scores, ($D(29) = .150$, $p = .095$), which suggested that data was not different from a normal distribution. Levene's F test was also used to check the homogeneity of variance, and the results suggested that the CG1a and EG1a scores for the VST had an approximately equal variance, $F(1, 54) =.062$, $p = .804$ (see Appendix M) . Similarly, a t-test was used to compare the vocabulary size of both groups and the difference was not statistically significant ($t(54) = .804$, $p = .782$).

*4.1.1.1.3. The Pre-test A***.** The Pre-test A was used to check that participants did not know the target collocations. It had a multiple-choice format and consisted of 35 items and a sentence translation distracter activity. Test-takers were presented with a verb collocate and asked to choose the correct noun that would usually be used with it from the choices provided. The response alternatives (Osterlind, 1998) contained both the correct response—the key—and the distractors. To prevent test-takers from resorting to guessing if they did not know the answer, a fourth options—*I DON'T KNOW*—was included. The choice of the correct answer would also be confirmed by translating the sequence into Arabic. The following is an example item from the test:

A	**B**	**Arabic Translation**
3- **conduct**	e- result f- research g- charge h- I DON'T KNOW	____________________ ____________________

The pre-test results were submitted to quantitative multiple-choice statistical item analysis. Two numerical indicators were used to understand the test scores: *item difficulty* and *item discrimination* indices. To conduct an item analysis, test scores were first arranged from highest to lowest, and then scores were divided into upper and lower groups and responses tallied to different options (Bachman, 2004). Each group consisted of one third of the total number of test-takers (10 for the verb-noun collocations pre-test). Once responses were tallied for both groups for all items in the test, the statistical analysis was carried out by calculating the following:

- *Item Difficulty Index*: This represents the "proportion of people who chose the correct answer, or key" (Bachman, 2004, p. 125). This is usually calculated using the equation: $p_i = \frac{RU - RL}{2n}$, where R_u is the total number of test-takers in the upper group who got the correct answer, R_L is the number of those who got it correct in the lower group, and *n* is the total number of persons in the upper or lower group.
- *Item Discrimination Index*: It is the extent to which an item differentiates between high and low scorers. The equation used to calculate this index is: $D_i = P_U - P_L$, where P_U is the number of test-takers in the upper group who got the item correct, and P_L is this number in the lower group.

The following example in Table 5.4 illustrates these indices for item 1 above, *conduct research*, on the verb-noun collocations pre-test:

Table 5.4

Example Test Item Analysis

Item	-	Upper (n =10)	P_u	Lower (n =10)	P_l	P_i	D
1	A	3	0.3	4	0.4	0.35	-0.05
	*B	2	0.2	0	0	0	0.1
	C	1	0.1	2	0.2	0.2	-0.05
	D	4	0.4	4	0.4	0.4	0

* *correct answer*

The correct answer for this item was option *B*, and if students chose it they would score 1 mark (conduct research), and this also proved that students were familiar with this collocation. As such, it will be excluded from the study since the purpose of the pre-test was to identify collocations that are unknown to my students prior to treatment and further testing. Also, options *A* and *C* were wrong responses, and if *D* was chosen this meant that student did not know the answer and they did not want to guess.

In the case of multiple-choice test items that are scored dichotomously (right or wrong), Bachman (2004) argued that for distractors to be effective, they should all attract some responses (p. 130). The rule he proposed to gauge the effectiveness of a distractor is a minimum *p*-value of

0.10. As for the difficulty index *Di*, Bachman argued that it should be negative for an effective distractor, since it would indicate that more students in the lower group chose this distractor.

Statistics for item 1 showed that none of the upper or lower group students knew the correct answer (conduct research) since they scored zero on option *B* with a $P_i = 0.1$. The distractors *A*, and *C* were working well for this question (a P_i of 0.35 and 0.2 respectively). In the upper group, five students did not know the collocation and they did not try to guess the answer, compared to three students in the lower group. All test items were analysed accordingly and only collocations with a maximum of $P_i = 0.2$ (two students in the lower group and two students in the upper group knew the target collocation) were retained for the main study.

Analysis of this test showed that 11 students knew the collocation *achieve success*, 9 knew the sequence *earn income*, and 7 students knew *seek revenge*. These students were able to match the noun to its correct collocate and they also provided a more or less correct literal translation to their Arabic L1. Since among the 35 items in the pre-test, there were 30 potential collocations for inclusion in the study, these sequences were not chosen in the final list of the 20 target collocations.

Since the pre-test format was chosen to minimise the chances of guessing (participants were instructed to select the *I DON'T KNOW* option when they did not know the answer), the 20 target collocations were unknown for them according to the pre-test item analysis. Also, the results of the independent sample *t*-test suggested that before the treatment, both the CG1a and EG1a had a roughly equal proficiency level as suggested by their IELTS scores and vocabulary size. As such, with the random assignment of participants to groups and controlling the input and the amount of exposure to the target collocations during the treatment, any difference in the post-treatment outcome variables might be attributed to the different instructional method (interactive vs. non-interactive) used with each group.

1.1.1.2. Post-treatment data analysis. The post-treatment instruments included immediate and delayed productive and receptive post-tests administered immediately after the treatment. The same tests were administered after one month as delayed productive and receptive post-tests.

1.1.1.2.1 The immediate receptive and productive post-tests. The immediate receptive and productive post-tests for the Control Group 1a (CG1a) and Experimental Group 1a (EG1a) were analysed using different statistical procedures. First, the test scores were checked for normality. As can be seen in Table 5.5, for the CG1a, the Kolmogorov-Smirnov Test showed that the receptive post-test scores were normally distributed ($D(27) = .146$, $p = .144$) while the productive post-test scores distribution considerably deviated from normality ($D(29) = .176$, $p = .031$). As for the EG1a, the receptive post-test scores were also not normally distributed ($D(29) = .210$, $p = .002$) while the productive test scores were not different from a normal distribution ($D(29) = .139$, $p = .161$).

Table 5.5

Normality Test for the Receptive and Productive Post-Test for Participant Groups

Groups	Post-Test	Kolmogorov-Smirnov		
		Statistic	df	Sig.
Control 1a	Receptive	.146	27	.144
	Productive	.176	27	.031
Experimental 1a	Receptive	.210	29	.002
	Productive	.139	29	.161

Descriptive statistics were also computed for both groups for the immediate receptive and productive post-tests. These statistics are shown in Table 5.6 below.

Table 5.6

Descriptive Statistics for the Immediate Receptive Post-Test for Participant Groups

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 1a	Receptive	27	9.63	2.63	4	15
Experimental 1a	Receptive	29	13.66	3.28	6	18

As shown in Table 5.6, the EG1a students obviously outperformed the CG1a in the receptive post-test. The difference in performance on this test can be further understood when graphed visually. Figure 5.1 shows the boxplots for the receptive post-test scores for both groups.

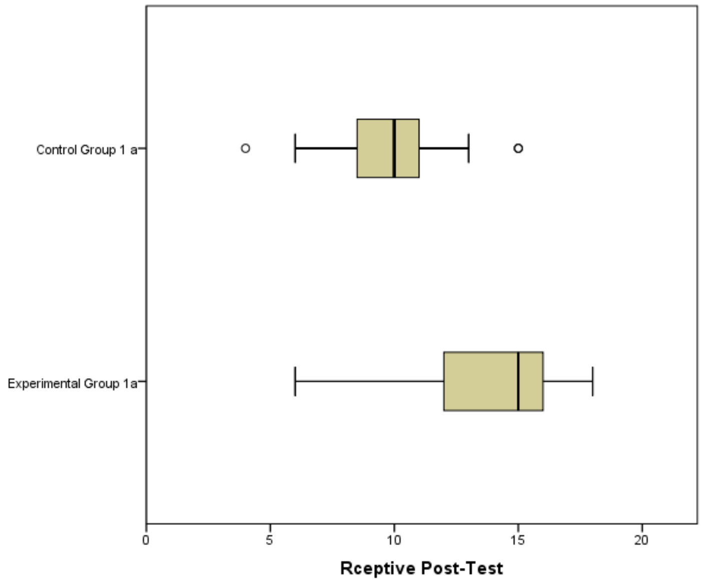


Figure 5.1. Immediate receptive post-test scores for participant groups.

Figure 5.1 suggests that the EG1a students who learned the 20 verb-noun collocations using four interactive activities, scored considerably higher than the CG1a who used three non-interactive exercises to learn these collocations. On average, the spread of marks in the EG1a was much larger, and more than 75% of students of this group scored higher than the median (*Mdn* = 10) of the CG1a.

As regards the immediate productive post-test data, the descriptive statistics presented in Table 5.7 below and the visual representation of the data in Figure 5.2, suggest that there was a similar trend. Looking at the details, it is clear that the EG1a students' scores on the productive post-test were considerably higher than the CG1a students. Again, more than 75% of the EG1a students scored higher than the CG1a students' median (*Mdn* = 5). On average the EG1a learners retained more than nine collocations compared to only six in the CG1a (the maximum mark for the test was 20, and each mark obtained was equated with one collocation retained on the test).

Table 5.7

Descriptive Statistics for the Immediate Productive Post-Test for Participant Groups

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 1a	Productive	27	5.63	1.62	3	9
Experimental 1a	Productive	29	9.72	2.08	5	14

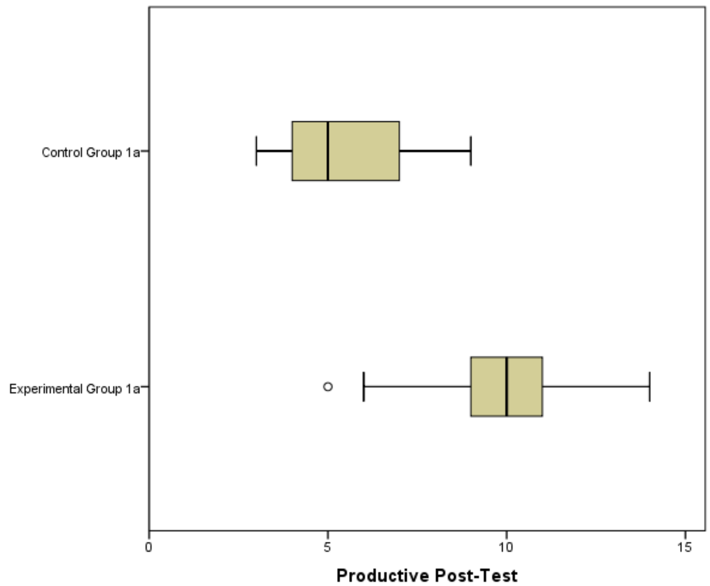


Figure 5.2. Immediate productive post-test scores for both groups

1.1.1.2.2 The delayed receptive and productive post-tests. The delayed receptive post-test for the CG1a and EG1a were similarly analysed using the same statistical procedures. The Kolmogorov-Smirnov normality test (see Appendix M) showed that scores of the CG1a were normally distributed on the delayed receptive post-test (D(27) = .150, p = .122). As for the EG1a, there was a deviation from normality in the receptive post-test data (D(29) = .173, p = .027). Descriptive statistics for both groups were also computed and they are presented in Table 5.8 below.

Table 5.8

Descriptive Statistics for the Delayed Receptive Post-Test for Participant Groups

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 1a	Receptive	27	4.37	1.54	2	7
Experimental 1a	Receptive	29	8.38	2.02	4	14

The EG1a scores were higher than the CG1a on both the delayed receptive and productive post-tests. The EG1a mean score was 8.38 on the receptive test compared to 4.37 for the CG1a, which means that the EG1a students had receptively learned twice as many collocations as the CG1a students. A further look at the boxplots (Figure 5.3) reveals that for the

EG1a students, 75% of their scores on the receptive post-test were higher than 7, which was the maximum score the CG1a could attain.

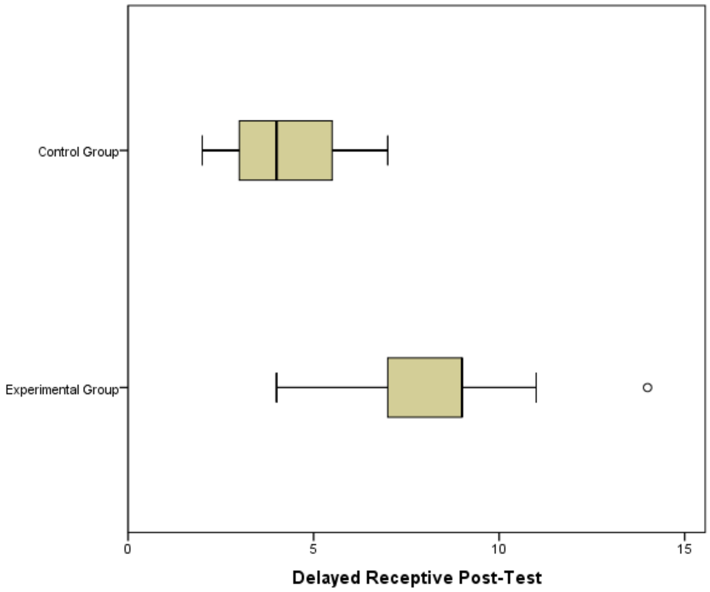


Figure 5.3. Delayed receptive post-test scores for participant groups.

With reference to the delayed productive post-test, the Kolmogorov-Smirnov normality test (see Appendix M) revealed that scores of the CG1a were not normally distributed ($D(27) = .208$, $p = .004$), while for the EG1a, data were normally distributed ($D(29) = .150$, $p = .094$). Table 5.9 shows descriptive statistics for both groups.

Table 5.9

Descriptive Statistics for the Delayed Productive Post-Test for Participant Groups

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 1a	Productive	27	2.89	1.34	1	6
Experimental 1a	Productive	29	6.48	1.72	3	11

For the productive post-test, the pattern was even more pronounced; i.e., students in the EG1a were able to remember six collocations to a productive state compared to almost 3 collocations for the CG1a. A further look at the boxplots in Figure 5.4 reveals that for the EG1a students, the lowest score was 3 out of 20, which was the middle value (*Mdn* = 3) for the CG1a scores.

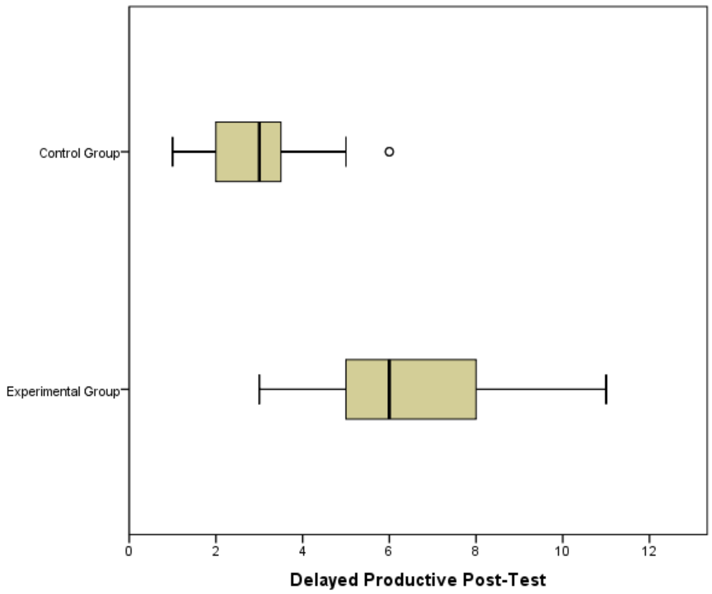


Figure 5.4. Delayed productive post-test scores for both groups

since the post-treatment collected data were different from a normal distribution, and to confirm the superiority of one method over the other (interactive vs. non-interactive), a Mann-Whitney U test was carried out (see Appendix M) to test the significance of the difference in mean scores.

The test indicated that the receptive short-term retention of verb-noun collocations in the Control Group (*Mdn* = 10.00) differed significantly from the Experimental Group (*Mdn* = 15.00) after the treatment, U = 135. 50, $z = -4.21$, $p < .001$. Likewise, the productive short-term retention of the target collocations in the Experimental Group (*Mdn* = 10.00), significantly exceeded that of the Control Group (*Mdn* = 5.00), U = 54.00, $z = -5.56$, p < 001.

Regarding, the long-term retention of the target collocations measured by the delayed receptive and productive post-tests, there was a similar trend and the retention was significantly higher for the Experimental Group as indicated in Tables 5.8 and 5.9. For the delayed receptive test, the Experimental Group students (*Mdn* = 9) significantly retained more collocations than the Control Group (*Mdn* = 4), U = 43.50, $z = -5.74$, p < 001. Similarly, the delayed productive post-tests scores were significantly different for the Experimental Group (*Mdn* = 6) and the Control Group (*Mdn* = 3), U = 41.00, $z = -5.79$, p < 001.

Finally, it is also very important to notice the effect size associated with each condition. The effect size *r* can be calculated using the following equation, $r = \frac{z}{\sqrt{N}}$ (Rosenthal, 1991, p. 19), where *z* is the *z*-score and *N* is the number of total observations. The effect size expresses how much of the variance observed in the outcome variable can be accounted for by the independent variable (the teaching method in this case). According to Field (2013) the effect size *r* "would quantify the experimental effect" (p. 131) and serves as a standardised measure of the observed effect. The effect size *r* was calculated for the four tests:

$$r_{\text{immediate receptive}} = \frac{-4.21}{\sqrt{7.48}} = -0.56$$

$$r_{\text{immediate productive}} = \frac{-5.56}{\sqrt{7.48}} = -0.74$$

$$r_{\text{delayed receptive}} = \frac{-5.74}{\sqrt{7.48}} = -0.76$$

$$r_{\text{delayed productive}} = \frac{-5.79}{\sqrt{7.48}} = -0.77$$

For all the immediate and delayed receptive and productive post-test data, the effect size was well above the .5 threshold for a large effect. Then, it can be cautiously concluded that the independent variable, which was the task-based teaching methodology involving interaction in this experiment, could largely explain the variances observed in all test scores. Although the effect size was huge in this experiment, to understand the effectiveness of interactive activities for both the short-term and long-term retention of congruent verb-noun collocations, a second experiment was carried out—where the Experimental Group had the same number of encounters (four times) with the target collocations through the same tasks but the amount of exposure to these collocations was increased to eight times for the Control Group using non-interactive individual exercises. If activities involving interaction are more effective for learning collocations, then the difference between both groups will be still significant despite the fact that the Control Group will have more encounters with the target sequences. Data collected during Experiment 1b are analysed in the following section.

5.1.2. Experiment 1b: The eight-time encounter condition

5.1.2.1. Pre-treatment data analysis. In this experiment, EG1b (N = 27) encountered the 20 target collocations four times through the same four sequenced tasks used in Experiment 1a: A translation task, an activation task, an information-gap task, and a problem-solving task, whereas CG1b participants (N = 26) were exposed to these collocations eight times using eight individual exercises.

*5.1.2.1.1. The IELTS and VST Tests***.** Once the IELTS scores for both groups were retrieved from students' online profiles, and the VST was administered and marked, scores were submitted to statistical analysis (see Appendix N). Table 5.10 shows the descriptive statistics for both groups.

Table 5.10

Descriptive Statistics of the IELTS and VST Test for Participant Groups in Experiment 1b

Group	Test	N	Mean	St. Deviation	Minimum	Maximum
Control	IELTS	26	5.25	.381	5	6
	VST	26	23.96	5.80	15	36
Experimental	IELTS	27	5.19	.315	5	6
	VST	27	23.15	5.23	12	33

A Kolmogorov-Smirnov test was used to check for the normal distribution of the data (see Appendix N). As can be seen in Table 5.11 below, the IELTS scores were not normally distributed for CG1b and EG1b ($p < .001$ for both groups). As for the VST, data were normally distributed with $p = .200$ for both groups.

Table 5.11

Test of Normality of the IELTS and VST scores for Participant Groups

Group	Test	Kolmogorov-Smirnov		
		Statistic	df	Sig.
Control 1b	IELTS	.398	26	.000
	VST	.083	26	.200
Experimental 1b	IELTS	.426	27	.000
	VST	.114	27	.200

A Levene's Test was also used to check for the homogeneity of variance, and the test results showed that variances of both CG1b and EG1b scores were roughly equal as illustrated in Table 5.12.

Table 5.12

Test of Homogeneity of Variances of the IELTS and VST Tests for Participant Groups

	Levene Statistic	df1	df2	Sig.
IELTS	1.87	1	51	.177
VST	.173	1	51	.679

To compare the difference in mean scores for both groups on these tests, the Mann-Whitney U test was used with the IELTS test since the data were not normally distributed, and results suggested that there was no significant difference between CG1b and EG1b (U = 326.5, z = −.530, p = .596). Regarding the VST, a t-test revealed that there was no statistically significant difference in vocabulary size between both groups ($t(51) = −.536$, p = .594).

The Mann-Whitney U and the t-test results indicate that the CG1b and EG1b were not different in terms of proficiency level and vocabulary size, prior to the treatment. Therefore, with the number of encounters with the target 20 verb-noun collocations increased in this experiment to eight times for the control group and kept unchanged for the experimental group, any difference in post-treatment tests' scores would reflect the effectiveness of the teaching method used with the group that achieved higher retention rates of the collocations being studied. In other words, if interactive activities were more effective for learning verb-noun collocations, the EG1b students who encountered these sequences four times only would still outperform their CG1b peers.

On the other hand, if CG1b, who used non-interactive exercises and encountered the target collocations eight times would outperform their experimental group peers, this could be an indication that moving from four to eight encounters could positively impact the collocation retention rates of this group. Analysis of the post-treatment data in the following sections will confirm whether this statement could be true.

5.1.2.1.2. The pre-test. The same pre-test A, analysed above, was used again in Experiment 1b and the same method of data analysis was adopted. Item Difficulty and Item Discrimination Indices were used to check how well the test was working. All test items were analysed accordingly and only collocations with a maximum of Pi = 0.2 were retained for the main study.

Analysis of Pre-test A in Experiment 1b showed that 14 students knew the collocation *do* homework**,** 6 knew the sequence *enjoy life* and only one knew *earn income*. These were all distracter collocations added to the list being tested to prevent students from focusing on the target collocations. In addition, only one student was able to match the constituents of the sequence *analyse data,* included in the study, but he could not provide the L1 Arabic equivalent. This was considered as random guessing since the student could not translate the collocation. *Item Difficulty* and *Item Discrimination Indices* confirmed that the 20 verb-noun collocations included in Experiment 1b were unknown to the students prior to the treatment. The post-treatment data collected in Experiment 1b are analysed and presented in the following section.

5.1.2.2. Post-treatment data analysis

5.1.2.2.1. The immediate receptive and productive post-tests. The same statistical procedures used to analyse Experiment 1a data were also adopted in Experiment 1b. First, the receptive post-test scores for CG1b and EG1b were checked for normality, and the Kolmogorov-Smirnov test (see Appendix N) revealed that test scores for CG1b were normally distributed ($D(26) = .122$, $p = .200$), whereas the EG1b test scores were different from a normal distribution ($D(27) = .265$, $p < .001$). The descriptive statistics for the immediate receptive post-test in Table 5.13 suggest that the experimental group participants achieved better results than their control group counterparts.

Table 5.13

Descriptive Statistics for the Immediate Receptive Post-Test for Participant Groups in Experiment 1b. (Experiment 1a results in brackets)

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 1b	Receptive	26	11.15 (9.63)	3.06 (2.63)	5 (4)	18 (15)

Experimental 1b	Receptive	27	13.81 (13.66)	2.64 (3.28)	6 (6)	17 (18)

A closer look at the graphical representation of the data in Figure 5.5 below shows that, overall, the EG1b had higher scores than the CG1b in the immediate receptive post-test. It is clear that the middle 50% of scores (the Inter-Quartile Range represented by the tinted box) is higher than the median for CG1b which was 11. The difference in mean scores for these tests was statistically significant (U = 110. 00, $z = -4.31$, $p < .001$).

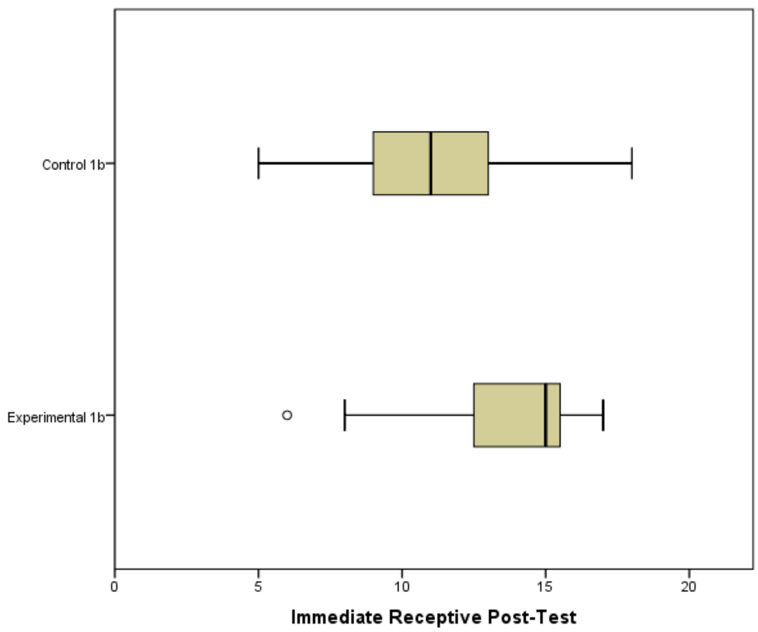


Figure 5.5. Immediate receptive post-test scores for participant groups

With respect to the immediate productive post-test scores, a Kolmogorov-Smirnov test showed that scores were normally distributed for CG1a ($D(26) = .124$, $p = .200$) and not normally distributed for EG1b ($D(27) = .219$, $p = .002$). Descriptive statistics for this tests are displayed in Table 5.14 below.

Table 5.14

Descriptive statistics for the immediate productive post-test for participant groups in Experiment 1b. (Experiment 1a results in brackets)

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 1b	Productive	26	7.46 (5.63)	2.50 (2.50)	4 (3)	13 (9)

Experimental 1b	Productive	27	10.04 (9.72)	2.27 (2.08)	5 (5)	13 (14)

The distribution of the immediate productive post-test scores was not very dissimilar from the receptive post-test as shown in Figure 5.6 below. What is remarkable for the EG1b is that more than 75% of the test scores (the middle 50% of the data and the upper quartile) were considerably higher than the median (*Mdn* = 8) of the CG1b scores. This means that more than 75% of EG1b participant learned 11 collocations (*Mdn* = 11) out of a maximum score of 20. A Mann-Whitney U test showed that the difference in performance on the immediate productive post-test was also statistically significant after the treatment ($U = 153.500.\ 00$, $z = -3.543$, $p < .001$).

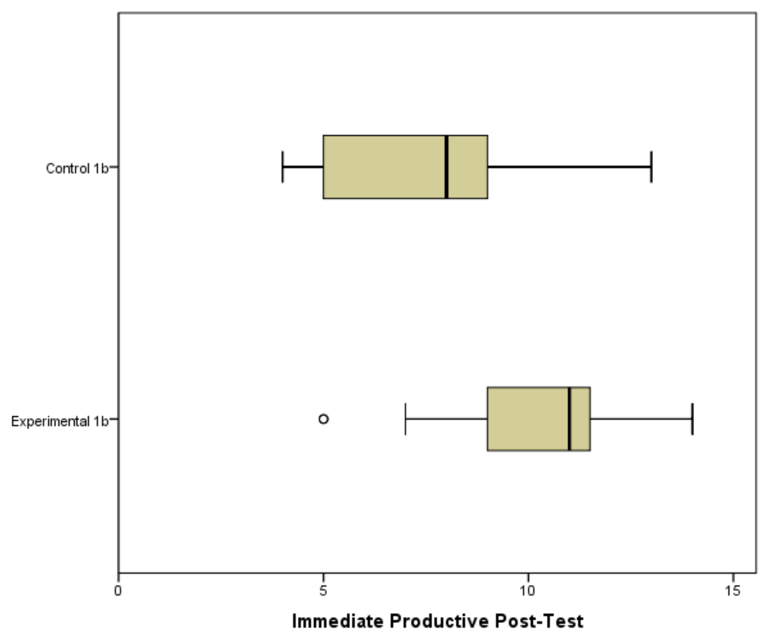


Figure 5.6. Immediate productive post-test scores for participant groups.

5.1.2.2.2. The delayed receptive and productive post-tests. For the delayed receptive post-test, a normality check revealed that scores were not normally distributed for both CG1b and EG1b (D(26) = .213, p = .004, and D(27) = .122, p < .001, respectively). Descriptive statistics were computed for both groups and they are shown in Table 5.15 below.

Table 5.15

Descriptive Statistics for the Delayed Receptive Post-test for Participant Groups in Experiment 1b. (Experiment 1a results in brackets)

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 1b	Receptive	26	5.65 (4.37)	2.43 (1.54)	1 (2)	13 (7)
Experimental 1b	Receptive	27	9.04 (8.38)	2.42 (2.02)	4 (4)	14 (14)

When data were plotted using box plots in Figure 5.7 below, the differences in achievement for both groups could easily be spotted. The EG1b middle data value (*Mdn* = 9) was considerably higher compared to that of the CG1b (*Mdn* = 5). Moreover, more than 75% of the CG1b participants scored 6 or less, which is still lower than the median of the EG1b. In other words, EG1b students succeeded in retaining almost nine collocations to a receptive knowledge state in their long-term memory, since the delayed receptive post-test was administered one month after the treatment. The Mann-Whitney U test confirmed that the difference in performance on the delayed receptive post-test was statistically significant one month after the treatment (U = 110. 00, $z = -4.31$, $p < .001$).

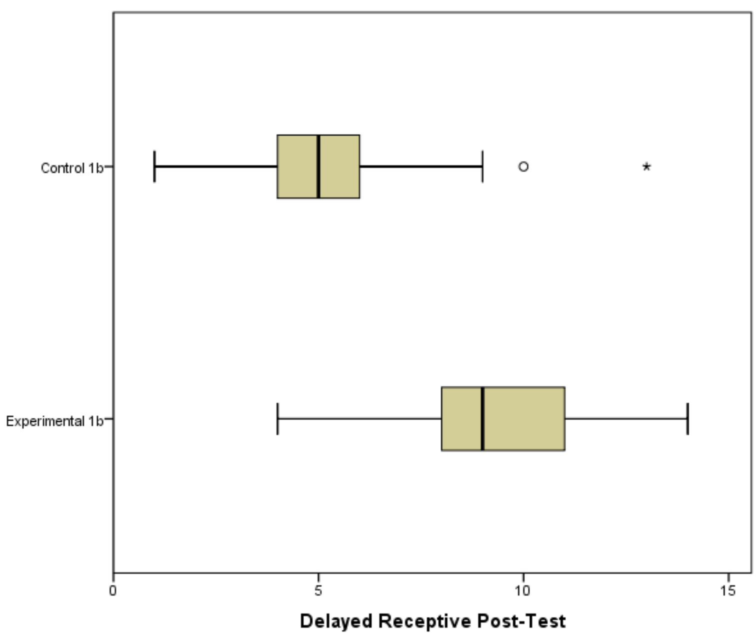


Figure 5.7. Delayed receptive post-test scores for participant groups.

As regards the delayed productive post-test, although retention rate was lower than the delayed receptive post-test for both groups, the EG1b students still considerably outperformed their CG1b peers. As shown in Table 5.16, the mean score for the former (M = 6.11) was almost double that of the latter (M = 3.54).

Table 5.16

Descriptive Statistics for the Delayed Productive Post-Test for Participant Groups in Experiment 1b (Experiment 1a results in brackets)

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 1b	Productive	26	3.54	2.51	0	10
Experimental 1b	Productive	27	6.11	2.25	3	11

Looking at the summary of the data set in Figure 5.8 below, it is evident that 75% of EG1b students' delayed productive post-test scores lie between 4 and 8 marks, whereas 75% of CG1b students scored at or below 4 marks. Knowing that one mark on this test means one collocation retained, on average, CG1b students were able to retain more than three collocations to a productive knowledge state, while the number was considerably higher for the EG1b students (six collocations). The Mann-Whitney U test, confirmed that the difference was statistically significant (U = 144. 00, z = −3.72, p < .001).

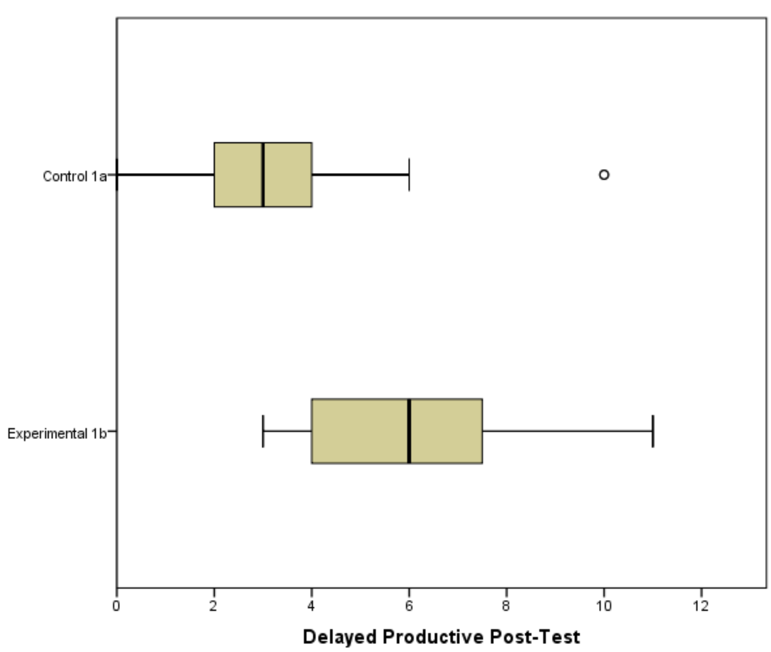


Figure 5.8. Delayed productive post-test scores for participant groups

Finally, to understand how the difference in instructional method (non-interactive vs. interactive) can explain the variance of test scores, the effect size *r* was also calculated for the immediate and delayed receptive and productive post tests (using the equation, $r = \frac{z}{\sqrt{N}}$) in Experiment 1b.

These are presented below:

$$r_{\text{immediate receptive}} = \frac{-3.19}{\sqrt{7.28}} = -0.44$$

$$r_{\text{immediate productive}} = \frac{-3.54}{\sqrt{7.28}} = -0.49$$

$$r_{\text{delayed receptive}} = \frac{-4.31}{\sqrt{7.28}} = -0.59$$

$$r_{\text{delayed productive}} = \frac{-3.72}{\sqrt{7.28}} = -0.51$$

The effect size in Experiment 1b was medium for the immediate receptive and productive post-tests (0.44 and 0.49, respectively) but it exceeded the .5 threshold for a large effect in the case of the delayed receptive post-test (r = 0.59) and the productive post-test (r = 0.51). Knowing that the experimental group used interactive activities and encountered the target collocations four times only, unlike the control group that used non-interactive activities and were exposed to the same collocation eight times, the teaching method used with the experimental group, i.e., task-based teaching involving interaction, can still account for a large part of the variation in the higher achievement of the experimental group in this experiment. Although there are many other contextual variables that might affect collocations learning (e.g., learners' proficiency level and motivation), the results of Experiment 1b confirm the findings of Experiment 1a: Interaction through task-based teaching/learning is more effective for a better short-term and long-term retention of congruent verb-noun collocations.

5.2. Experiment 2: The Adjective-Noun Collocations

The purpose of this experiment was to investigate both the short- and long-term retention of another type of collocations: Congruent adjective-noun sequences. The same statistical analysis procedures used in Experiment 1 (verb-noun collocations) were also adopted in this experiment. Experiment 2 comprised two sub-experiments and data collected during these experiments are described and analysed below.

5.2.1. Experiment 2a: The four-time encounter condition

5.2.1.1. Pre-treatment data analysis.

5.2.1.1.1. The IELTS and vocabulary size tests. To check that both Experimental Group 2 a (EG2a) and the Control Group 2 a (CG2a) had similar language proficiency and vocabulary size, participants' scores were compared. First, IELTS scores were checked for normality, and for both EG2a and CG2a, a Kolmogorov-Smirnov test (see Appendix O) showed that scores were different from a normal distribution ($D(28) = .346$, $p < .001$, and $D(27) = .372$, $p < .001$, respectively). As for the VST, scores proved to be normally distributed for both groups ($p = .200$). Table 5.17 shows descriptive statistics for these tests.

Table 5.17
Descriptive Statistics for the IELTS and VST Scores for Participant Groups

Group	Test	N	Mean	St. Deviation	Minimum	Maximum
Control	IELTS	27	5.22	.288	5	6
	VST	27	23.63	4.64	17	35
Experimental	IELTS	28	5.32	.279	5	6
	VST	28	23.43	4.97	12	32

It is clear from these figures that both groups had roughly similar language proficiency and vocabulary size. A Mann-Whitney U test (see Appendix O) showed that the difference is not statistically significant for the IELTS scores ($U = 305.500.\ 00$, $z = -1.385$, $p = .166$), and a *t*-test was also used to compare the vocabulary size of both groups and the difference was not statistically significant ($t(53) = -1.55$, $p = .877$). Having checked that EG2a and CG2a were comparable in terms of proficiency level and vocabulary size, other test analyses were carried out.

5.2.1.1.2. The pre-test B. Pre-test B (see Appendix N) was used in this experiment and it used the same format as Pre-test A that was used in Experiment 1. Item Difficulty and Item Discrimination Indices were also used to check how well the test was working. All test items were analysed accordingly and only collocations with a maximum of $P_i = 0.2$ (two students in the lower group and two students in the upper group knew the target collocation) were retained for the main study. Analysis of Pre-test B results showed that 7 students knew the collocation ‘large amount’. Consequently, it was not included in the study. In addition, only one student was able to match the constituents of the sequence ‘reliable data’ but he could not provide the L1 Arabic equivalent. This was considered as random guessing since the student could not translate the collocation into Arabic.

5.2.1.2. Post-treatment data analysis.

5.2.1.2.1. The immediate receptive and productive post-tests. As can be seen in Table 5.18, scores for the immediate receptive and productive post-tests were not all normally distributed (see Appendix O). Therefore, the Mann-Whitney U test was used to compare the difference in mean scores.

Table 5.18

Normality Test for the Receptive and Productive Post-Test for Participant Groups

Groups	Post-Test	Kolmogorov-Smirnov		
		Statistic	df	Sig.
Control 2a	Receptive	.119	27	.200
	Productive	.174	27	.035
Experimental 2a	Receptive	.242	28	.000
	Productive	.139	28	.058

Regarding the immediate receptive post-test, the descriptive statistics presented in Table 5.19 below suggest that EG2a (*M* = 14.61) outscored CG2a (*M* = 11.07).

Table 5.19

Descriptive Statistics for the Immediate Receptive Post-Test for Participant Groups in Experiment 2a

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 2a	Receptive	27	11.07	2.84	7	17
Experimental 2a	Receptive	28	14.61	3.02	6	19

Looking at the graphic representation of the data sets in Figure 5.9 below, we can clearly see the difference in achievement. All EG2a participants, except three outliers, scored 11 or more, which is the average score for CG2a participants (*Mdn* = 11). On average, EG2a learned more than 14 collocations to a receptive state, while the figure was only 11 for CG2a students.

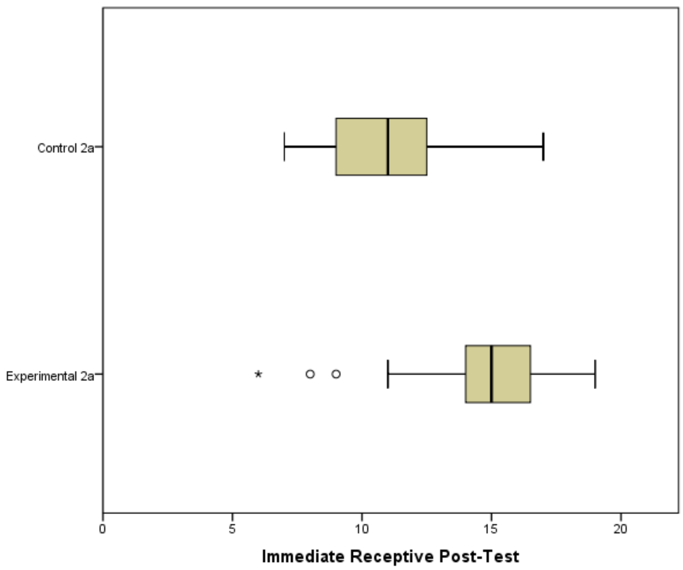


Figure 5.9. Immediate receptive post-test scores.

When checked for statistical significance using the Mann-Whitney U test (see Appendix O), the difference in mean scores for the receptive post-test was significant ($U = 142.500$, $z = -3.984$, $p < .001$).

As for the immediate productive post-test, the figures in Table 5.20 below show that EG2a students outperformed their CG2a peers.

Table 5.20

Descriptive Statistics for the Immediate Productive Post-Test Scores

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 2a	Productive	27	7.26	2.31	4	12
Experimental 2a	Productive	28	11.14	2.08	5	15

The difference can be better understood when scores are plotted using the boxplot in Figure 5.10 below. All EG2a students, except one outlier, scored higher than 75% of CG2a participants. The difference in the average score was still high (*Mdn* = 7 for CG2a and *Mdn* = 11 for EG2a) on this test. A Mann-Whitney U test confirmed that this difference is statistically significant (U = 89.500, $z = -4.889$, $p < .001$). EG2a participants learned four more collocations to a productive state than the CG2a learners.

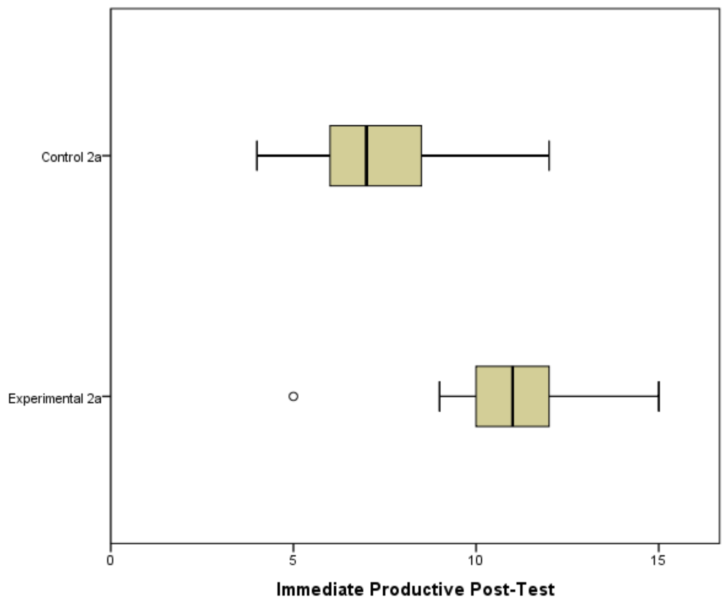


Figure 5.10. Immediate productive post-test scores.

*5.2.1.2.2. The delayed receptive and productive post-tests***.** The delayed receptive post-test scores were not normally distributed for EG2a (D(28) = .267, p < .001). The descriptive statistics in Table 5.21 showed that the EG2a scores were considerably higher for this test. Participants in this group succeeded in retaining more than nine collocations in their long term memory compared to almost six collocations for the CG2a students.

Table 5.21

Descriptive Statistics for the Delayed Receptive Post-Test Scores

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 2a	Receptive	27	5.96	3.26	1	14
Experimental 2a	Receptive	28	9.57	2.54	4	16

Figure 5.11 also illustrates the distribution of these data sets, and we can clearly see that 75% of EG2a students scored eight marks or higher, while 75% of CG2a scores were below eight. This difference is statistically significant ($U = 128.500$, $z = -4.238$, $p < .001$).

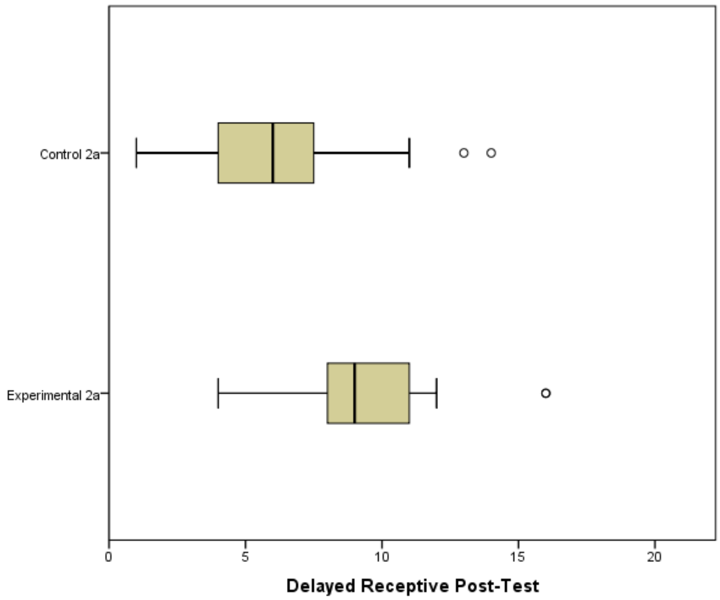


Figure 5.11. Delayed receptive post-test scores.

With regard to the delayed productive post-test, there was a similar trend as shown in Table 5.22 and Figure 5.12. Results were more encouraging for EG2a learners who were able to remember seven collocations to a productive state one month after the treatment, while CG2a students could remember only less than four collocations. A *t*-test revealed that this difference was statistically significant ($t(53) = 6.76$, $p < .001$).

Table 5.22

Descriptive Statistics for the Delayed Productive Post-Test Scores

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 2a	Productive	27	3.67	1.79	1	8
Experimental 2a	Productive	28	7.04	1.89	4	12

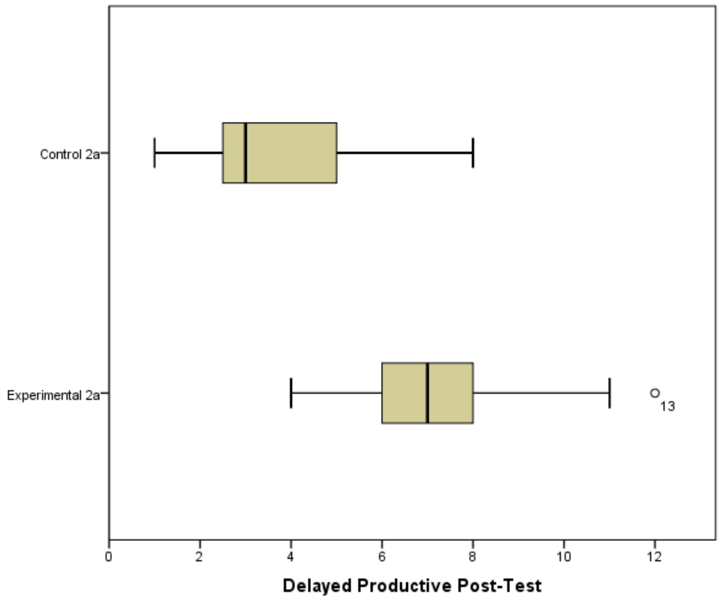


Figure 5.12. Delayed productive post-test scores.

In this experiment, EG2a students encountered the 20 target adjective-noun collocations four times using three sequenced tasks, while CG2a learners encountered them using four times but using three individual exercises. The post-tests scores were higher for the EG2a and the difference was statistically significant for all tests. In order to understand the effectiveness of the interactive activities used with the EG2a, the effect size was computed for all tests:

$$r_{\text{immediate receptive}} = \frac{-3.98}{\sqrt{7.42}} = -0.54$$

$$r_{\text{immediate productive}} = \frac{-4.88}{\sqrt{7.42}} = -0.66$$

$$r_{\text{delayed receptive}} = \frac{-4.23}{\sqrt{7.42}} = -0.57$$

$$r_{\text{delayed productive}} = \frac{-5.17}{\sqrt{7.42}} = -0.70$$

Although the effect size in this experiment is well over the .5 threshold for a large effect, it is particularly huge for the productive post-tests. The argument that could follow is that interactive activities may be more effective for learning adjective-noun collocations to a productive state of meaning and form since the productive tests measured how well learners could produce the meaning (through translation) and recall the form (through cued recall) of the target collocations.

This still needs to be confirmed after analysis of data collected in Experiment 2b in the following section.

5.2.2. Experiment 2b: The eight-time encounter condition

5.2.2.1. Pre-treatment data analysis.

5.2.2.1.1. The IELTS and vocabulary size tests. First, IELTS scores for both EG2b and CG2b, (D(25) = .295, p < .001, and D(27) = .448, p < .001, respectively). Regarding the VST scores they were normally distributed (see Appendix P) for both groups (p = .200). Table 5.23 shows descriptive statistics for these tests.

Table 5.23

Descriptive Statistics for the IELTS and VST Scores for Participant Groups

Group	Test	N	Mean	SD	Minimum	Maximum
Control	IELTS	27	5.20	.3.73	5	6
	VST	27	23.70	5.73	15	36
Experimental	IELTS	25	5.34	.313	5	6
	VST	25	23.20	5.08	14	34

A Mann-Whitney U test showed that the difference is not statistically significant for the IELTS scores (U = 245.500, z = −1.911, p = .056), and a t-test proved that the difference in vocabulary size was not statistically significant (t(50) = -3.34, p = .740). This makes the groups start the treatment with a comparable level of proficiency.

5.2.2.1.2. The pre-test B. Item Difficulty and Item Discrimination Indices were also used to analyse Pre-test B results. A total number of 5 students knew the collocation ‘sweet taste’, and seven were familiar with enjoy life. These sequences were not among the target collocations for the study. Moreover, two students matched the constituents of the sequence shared responsibility without providing the L1 Arabic equivalent. It was thought that this was random guessing and this collocation was included in the study.

5.2.2.2. Post-treatment data analysis.

5.2.2.2.1. The immediate receptive and productive post-tests. Descriptive statistics for the immediate receptive and productive post-tests for both participant groups are presented in Table 5.24.

Table 5.24

Descriptive Statistics for the Immediate Receptive Post-Test for Participant Groups in Experiment 2b (Experiment 2a results in brackets)

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 2b	Receptive	27	12.04 (11.07)	2.88 (2.84)	6 (7)	18 (17)
Experimental 2b	Receptive	25	14.48 (14.61)	2.00 (3.02)	9 (6)	18 (19)

The mean score for EG2b was higher on this test which suggests that this group learned two more collocations than their CG2b peers. A closer look at the data set distribution in Figure 5.13 shows that 75% of EG2b students' scores are higher than 13 which is the average score for CG2b. Since data was not normally distributed for EG2b ($D(25) = .184$, $p = .029$), a Mann-Whitney U test was carried out to compare the difference in mean scores and it was statistically significant ($U = 156.500$, $z = -3.357$, $p = .001$).

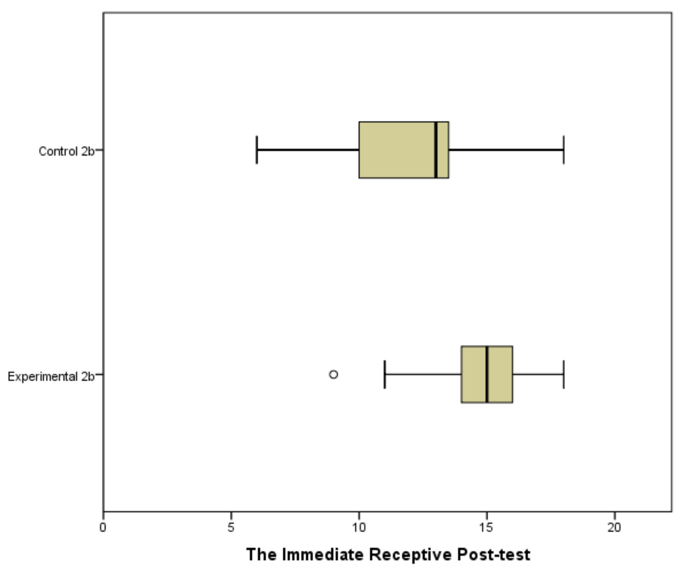


Figure 5.13. The immediate receptive post-test scores.

Results were also similar for the immediate productive post-test (see Table 5.25). The EG2b outscored CG2b students and they learned on average two more collocations to their productive state than the CG2b students.

Table 5.25

Descriptive Statistics for the Immediate Productive Post-Test (Experiment 2a results in brackets)

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 2b	Productive	27	8.04 (7.26)	2.73 (2.31)	3 (4)	13 (12)
Experimental 2b	Productive	25	10.52 (11.14)	2.12 (2.08)	5 (5)	13 (15)

The visual representation of the data in Figure 5.14 below shows that, overall, EG2b students did better on this test and 75% of their scores were equal to or higher than nine marks out of 20, which was the average score for CG2b (*Mdn* = 9).

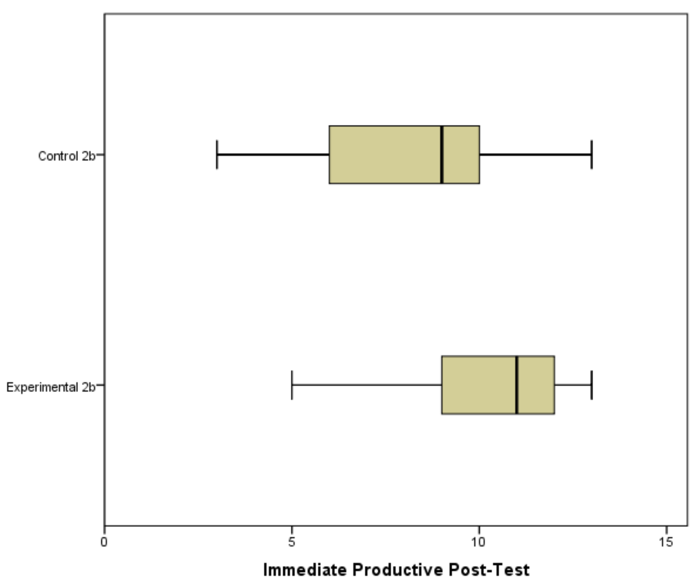


Figure 5.14. The immediate productive post-test scores

4.2.2.2.2. The delayed receptive and productive post-tests. Results of the delayed receptive post-test were similarly analysed (see Appendix P) and the descriptive statistics for this test are presented in Table 5.26 below.

Table 5.26

Descriptive Statistics for the Delayed Receptive Post-Test Experiment 2a results in brackets

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 2b	Receptive	27	7.37 (5.96)	3.11 (3.26)	2 (1)	15 (14)
Experimental 2b	Receptive	25	9.88 (9.57)	2.31 (2.54)	4 (4)	15 (16)

According to table 5.26, learners in EG2b retained, on average, two collocations more than CG2b in their long-term memory measured by the delayed receptive post-test one month after the treatment. Figure 5.15 shows that the data distribution for EG2b on this test is skewed left meaning that most of their scores are concentrated on the high end of the scale. An independent sample *t*-test (data was normally distributed) was carried out and the results suggested that there was a significant difference between the performance of the two groups on this test ($t(50) = 3.276$, $p = .002$).

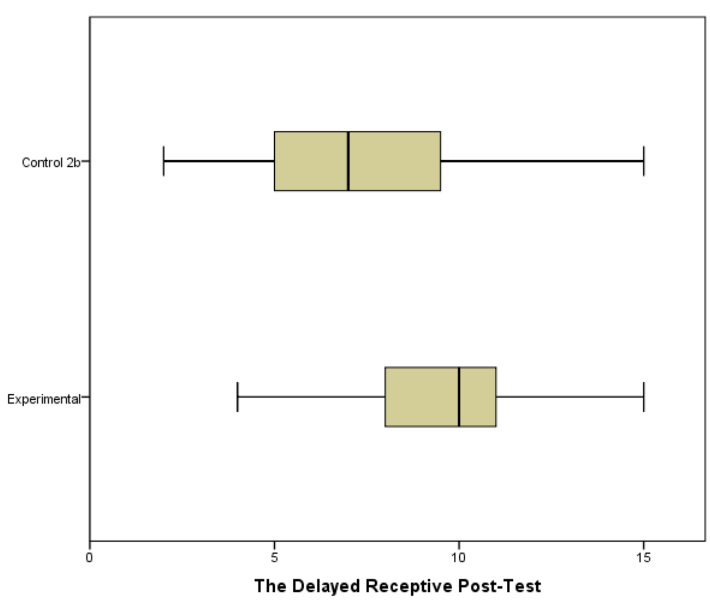


Figure 5.15. The delayed receptive-post-test.

As regards the delayed productive post-test, results showed that, overall, EG2b students retained one collocation to a productive state more than CG2b in their long-term memory (see Table 5.27).

Table 5.27

Descriptive Statistics for the Delayed Productive Post-Test (Experiment 2a results in brackets)

Groups	Post-Test	N	Mean	SD	Min.	Max.
Control 2b	Productive	27	5.07 (3.67)	2.57 (1.79)	1 (1)	10 (8)
Experimental 2b	Productive	25	6.72 (7.04)	1.96 (1.89)	3 (4)	11 (12)

The visual representation of the scores in Figure 5.16 shows that for CG2b the middle 50% of the scores lie between three and seven marks, and between 6 and 8 for EG2b, which means that test scores were better for EG2b participants. This difference was statistically significant as illustrated by the independent sample t-test results ($t(50) = 2.576$, $p = .012$).

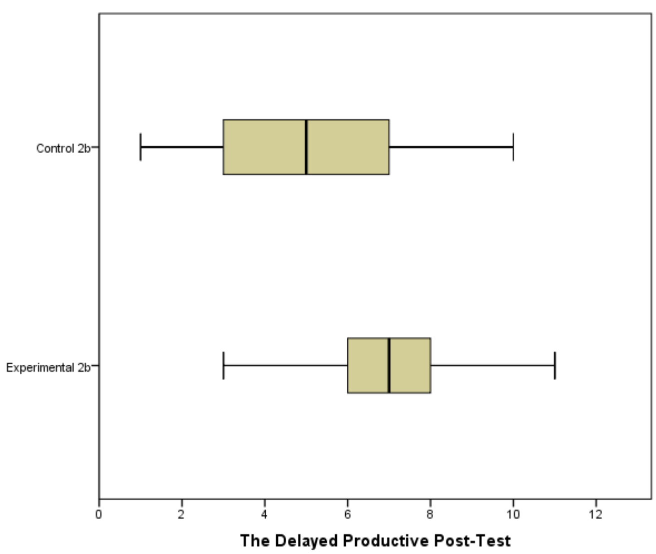


Figure 5.16. The delayed productive post-test.

In Experiment 2b, the EG2b students used three tasks to learn the 20 target collocations, and they were exposed to each collocation four times, while for the CG2b learners, they used individual exercises to learn these sequences but they encountered each collocation eight times. Data analysis suggested that EG2b students scored higher in all tests and the difference was statistically significant. The variable that was manipulated in this experiment was the teaching method. Interactive activities associated with EG2b yielded better retention of collocations both receptively and productively. The effect size, calculated below may also explain the effectiveness of this method.

$$r_{\text{immediate receptive}} = \frac{-3.35}{\sqrt{7.42}} = -0.47$$

$$r_{\text{immediate productive}} = \frac{-3.33}{\sqrt{7.21}} = -0.46$$

$$r_{\text{delayed receptive}} = \frac{-3.06}{\sqrt{7.21}} = -0.43$$

$$r_{\text{delayed productive}} = \frac{-2.36}{\sqrt{7.21}} = -0.33$$

5.3. Results of the two experiments

The overall purpose of this study was to understand the effects of the quality of encounter (the type of activities used) learners need with collocations and the amount of exposure they need with these sequences. The variables that were manipulated were the teaching method and the amount of exposure. In Experiment 1, under the experimental condition, learners used interactive activities, and they encountered the 20 target verb-noun collocations four times, while the control group used individual non-interactive exercises to learn the sequences with an equal number of encounters (four times). Experiment 2 had a similar design and the only difference was the type of collocation it targeted (adjective-noun).

In Experiment 1a, Data analysis of the immediate and delayed post-tests suggested that the experimental group learned significantly more collocations both receptively and productively. Since learners in both groups had roughly similar proficiency level as suggested by their IELTS band score (see Table 5.1) and their vocabulary size was not significantly different, and since the number of encounters with the target collocations was also equal (four times) for both groups, the difference in their achievement could be attributed to the activities they used to learn the collocations. In other words, the interactive activities used with the experimental group could have benefited them, and they retained more collocations both in their short-term and long-term memory. To clarify this effect, and in Experiment 1b, the number of encounters was increased to eight times for the control group using non-interactive exercises and kept at four times only for the experimental group associated with the interactive activities.

Namely, all immediate and delayed post-tests scores were still significantly higher for the experimental-group. The results of Experiment 1b confirmed the findings of Experiment 1a that those participants that were exposed to interactive activities learned more verb-noun collocations than those exposed to non-interactive individual exercises.

As for Experiment 2, it focussed on adjective-noun collocations and the purpose was to check if interactive activities would have similar effects on learning this type of collocations. Overall, the results were not different from Experiment 1 and the experimental groups learned significantly more collocations than the control groups on all tests. Even when the number of encounters was raised to eight times for the control group in Experiment 2b, experimental group participants significantly outscored their control group peers on all tests.

Together the results of the two experiments suggest that learners who used interactive activities retained more verb-noun and adjective-noun collocations in their short- and long-term memory than those using individual non-interactive exercises. Although the control groups in experiment 1b and 2b encountered the collocations eight times, they could not achieve better results than the experimental group learners who encountered the collocations four times only. As such, this difference in achievement could be explained by the type of activities learners used to learn the sequences.

5.4. The Relationship Between Vocabulary Size and Collocation Knowledge

One of the aims of the study was to understand the relationship between the knowledge of single words as measured by the vocabulary size test (VST) and the knowledge of collocation as indicated by different measures throughout the two experiments (i.e., the verb-noun and adjective-noun receptive and productive post-tests). According to data analysis of the VST (see section 4.1.1.1.2), participants in both experiments were all at the third thousand level, which means that they knew most of the two thousand words and were still learning the third thousand words of the Academic Word List (Coxhead, 2000). On average, they knew between 34.3% and 39.6% from the third thousand word level. In the current study, a correlation test was used to investigate the type of relationship that may exist between the VST and receptive and productive tests, and if vocabulary size can be a predictor of the ability to retain collocations. The results are presented in the following sections.

Since data of the receptive and productive post-tests were not normally distributed and to control for the effect of outliers, Spearman's correlation test was used to explore any possible relationship between the knowledge of single vocabulary items and the learning of verb-noun and adjective-noun collocations.

5.4.1. Experiment 1: The verb-noun collocations. For EG1a, Spearman's test (see Appendix Q) showed that there was a strong correlation between the VST and the receptive measures of collocations (see Table 5.28). In fact, the VST strongly correlated with the immediate receptive post-test, $r = .892$, $p < .001$. This correlation was still strong with the delayed receptive post-test, $r = .571$, $p = .001$. As for the productive measures, there was a moderate correlation between the VST and the immediate productive post-test $r = .477$, $p = 009$, and this correlation was stronger with the delayed productive post-test, $r = .504$, $p = .001$.

Table 5.28

Correlation test for the VST and Collocation Measures in Experiment 1

Group	Vocabulary Size Test	Spearman's rho	Immediate Receptive	Immediate Productive	Delayed Receptive	Delayed Productive
EG1a (interactive)	Vocabulary Size Test	Correlation Coefficient	.892**	.477**	.571**	.504**
		Sig. (2-tailed)	.000	.009	.000	.001
		N	29	29	29	29
CG1a (non-interactive)		Correlation Coefficient	.691**	.452**	.562**	.499**
		Sig. (2-tailed)	.000	.000	.000	.000
		N	27	27	27	27
EG1b (interactive)	Vocabulary Size Test	Correlation Coefficient	.675**	.596**	.628**	.486**
		Sig. (2-tailed)	.000	.000	.000	.000
		N	27	27	27	27
CG1b (non-interactive)		Correlation Coefficient	.682**	.720**	.497**	.571**
		Sig. (2-tailed)	.000	.000	.000	.000
		N	26	26	26	26

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

With reference to CG1a (see Appendix Q), the correlation was stronger with the receptive tests (r = .691, p < .001, and r = .562, p < .001 for the immediate and delayed receptive post-tests, respectively). The correlation of the VST with the productive tests was also significant. The VST was related to the immediate productive post-test, r = .452, p < .001, and the delayed productive post-test, r = .499, p < .001.

In Experiment 1b, for EG1b, although the VST correlated with both the receptive and the productive tests, the correlation was stronger with the immediate and delayed receptive post-tests (r = .675, p < .001, and r = .628, p < .001, respectively). However, with CG1b, the trend was the opposite: The correlation was stronger with the immediate and delayed productive post-tests (r = .720, p < .001, and r = .571, p < .001, respectively).

Overall, what is noticeable across all groups in both experiments 1a and 1b, is that the correlation between the VST and the receptive tests (both immediate and delayed) was stronger than the correlation between the VST and the productive tests of collocations, except for CG1b.

5.4.2. Experiment 2: The adjective-noun collocations. The VST that was used to measure learners' vocabulary size strongly correlated with all the receptive and productive measures of collocations in this experiment (see Table 5.29). However, the correlation was stronger for the immediate and delayed receptive post-tests (see Appendix Q). For instance, for EG2a, the correlation with the immediate receptive test was r = .824, p < .001, and with the delayed receptive test it was r = .762, p < .001, whereas for the immediate and delayed productive tests the correlation was r = .693, p < .001 and r = .520, p < .001, respectively.

Table 5.29

Correlation Test for the VST and Collocation Measures in Experiment 2

Group	Vocabulary Size Test	Spearman's rho	Immediate Receptive	Immediate Productive	Delayed Receptive	Delayed Productive
EG2a (interactive)	Vocabulary Size Test	Correlation Coefficient	.824**	.693**	.762**	.520**
		Sig. (2-tailed)	.000	.000	.000	.000
		N	28	28	28	28
CG2a (non-interactive)		Correlation Coefficient	.651**	.507**	.592**	.476**
		Sig. (2-tailed)	.000	.000	.000	.000

		N	27	27	27	27
EG2b (interactive)		Correlation Coefficient	.775**	.611**	.644**	.752**
		Sig. (2-tailed)	.000	.000	.000	.000
	Vocabulary Size Test	N	25	25	25	25
CG2b (non-interactive)		Correlation Coefficient	.658**	.502**	.602**	.512**
		Sig. (2-tailed)	.000	.000	.000	.000
		N	27	27	27	27

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

When examining the relationship between the VST and different collocation tests in Experiment 2, a similar trend to that found in Experiment 1 can be discerned: The correlation of the VST with the receptive tests is also stronger than that with the productive tests, across all groups in the adjective-noun experiment, except for CG2a and EG2b, where the VST correlation was higher with the delayed productive post-test.

5.5. Changes in the Receptive and Productive Knowledge of Collocations

Data analysis in sections 5.1 and 5.2 suggested that experimental group participants had a better retention of the collocations they learned than control group participants both receptively and productively. However, comparing only mean scores might obscure important details about how the receptive and productive knowledge of meaning and form of the verb-noun and adjective-noun collocations may develop over time in both experiments. To explore this development, tracing what happened to the knowledge of each collocation over the immediate and delayed post-tests could improve our understanding of the process of acquiring unknown collocations. To this end, learners’ responses in the immediate and delayed receptive tests and the immediate and delayed productive tests were tallied up according to the following procedure:

- If the sequence was known on both the immediate and delayed tests, this would be labelled *long-term knowledge*.
- If the sequence was known on the immediate test and then unknown on the delayed test, this would be labelled *short-term knowledge*.
- If the sequence was unknown on the immediate test and then known on the delayed test, this would be *unpredicted knowledge*.

- If the sequence was unknown on the immediate test and then unknown on the delayed test, the label would be *no learning*.

The following examples shown in Table 5.30 illustrate the analysis of a participant's response on both the immediate and delayed receptive post-tests and the knowledge state on each test.

Table 5.30

Example of the Changes of Collocations Knowledge Over the Two Tests

Collocation	Test 1 item score (immediate)	Test 2 item score (delayed)	Type of knowledge
provide assistance	1 (known)	1 (known)	long-term knowledge
conduct research	1 (known)	0 (unknown)	short-term knowledge
deserve credit	0 (unknown)	1 (known)	unpredicted knowledge
avoid conflict	0 (unknown)	0 (unknown)	no learning

The number of participants in Experiment 1 (verb-noun collocations) was 109 learners who were tested on their knowledge of the 20 collocations in 4 tests. In Experiment 2 (adjective-noun collocations), there were 106 learners who took the same number of tests (see Appendix E). This yielded a total of 4320 cases for the two receptive tests and 4320 for the two productive tests, which adds up to 8640 cases (216 participants who took a pair of two tests consisting of 20 items each). In what follows, detailed data analyses of participants' responses in the two experiments are presented separately.

5.5.1. Experiment 1: The verb-noun collocations

5.5.1.1. The four-time encounter condition. For the four-time encounter condition, results of the data analysis (see Appendix R) for the change of the verb-noun collocations knowledge from Test 1 (the immediate test) to Test 2 (the delayed test), over the period of one month, are shown in Table 5.31.

Table 5.31

Change in Participants' Receptive and Productive Knowledge in Experiment 1a

Type of knowledge	T1 to Test 2 (Receptive)		T1 to Test 2 (Productive)	
	Experimental Group 1a	Control Group 1a	Experimental Group 1a	Control Group 1a
Long-term knowledge	37.6%	20.7%	28.4%	13.3%
Short-term knowledge	29.1%	27.9%	20.0%	16.1%
Unpredicted knowledge	3.4%	1.1%	3.1%	2.1%
No learning	29.8%	50.2%	48.4%	68.5%

First, regarding the *long-term knowledge* of the 20 verb-noun collocations included in the study, for EG1a learners who used interactive activities, the number of cases where there was successful retention of the target collocations (collocations known on Test 1 and known on Test 2) represented nearly 38% of the total number of cases for the receptive test items, whereas for CG1a students who were taught using main-stream activities, it was almost 21% of the test items. In a similar vein, EG1a learners were able to maintain the productive knowledge of the target sequences in more than 28% of the cases, compared to only 13.3% for CG1a learners.

Second, for the *short-term knowledge* of the target collocations, i.e., when the collocations are only known on the immediate test, the difference could barely be noticed for the receptive test. EG1a and CG1a learners had receptive knowledge in 29% of the cases on the immediate receptive test and the state of this knowledge deteriorated on the delayed receptive test, after one month. For the productive tests, EG1a learners had a better short-term productive knowledge of the 20 collocations than their CG1a peers (20% and 16.1%, respectively).

Third, with respect to the *unpredicted knowledge*, i.e., when the test item becomes only known on the delayed test, only in 3.4% and 1.1% of the total number of cases did the state of receptive knowledge advance for EG1a and CG1a, respectively. As for the productive knowledge, in only 3.1% of the cases for EG1a and 2.1% for CG1a did learners gain productive mastery of the target collocations.

Finally, overall, the *no learning* represented the category with the greatest number of cases. For EG1a, the number of cases where there was no learning was around one third of the total number of cases on the receptive tests, whereas this number was higher for CG1a on the same tests. As for the productive tests, the total number of cases where there was no learning was even higher and it was almost more than two thirds for CG1a.

5.5.1.2. The eight-time encounter condition. When the number of encounters was increased to eight times for the CG and kept at four times for the EG in Experiment 1b, there were noticeable changes in the receptive and productive state of knowledge over the one month period that separated the immediate tests from the delayed tests, mainly for the control group (see Table 5.32).

Table 5.32

Change in Participants' Receptive and Productive Knowledge in Experiment 1b

Type of knowledge	T1 to Test 2 (Receptive)		T1 to Test 2 (Productive)	
	Experimental Group 1b	Control Group 1b	Experimental Group 1b	Control Group 1b
Long-term knowledge	39.8%	27.3%	27.2%	17.1%
Short-term knowledge	29.3%	29.0%	23.0%	20.6%
Unpredicted knowledge	5.3%	0.9%	2.8%	1.35%
No learning	25.6%	42.7%	47.0%	61.0%

Overall, the changes in the degree of knowledge of the target verb-noun sequences for EG1b did not differ significantly from EG1a on both the receptive and productive tests. However, for CG1b, analysis of learners' responses showed important differences. For the receptive tests, the most important difference was that the number of cases where students maintained their receptive knowledge (long-term knowledge) of the target collocations increased from 20.7% in the four-encounter condition to 27.3% in the eight-encounter condition. Moreover, the total number of cases where there was no learning decreased from 50.2% to 42.7% when the amount of exposure was increased to eight times. For the productive tests, the trend was similar. The long-term productive knowledge increased from 13.3% for CG1a to 17.1% of the total number of cases for CG1b. Most importantly, the no-learning cases decreased from 68.5% for CG1a to 61.0% for CG1b.

5.5.2. Experiment 2: The adjective-noun collocations

5.5.2.1. The four-time encounter condition. As can be seen in Table 5.33 below, for the receptive knowledge, EG2a learners were able to maintain the knowledge of the collocations they gained in more than 44% of the total 540 cases analyzed, whereas for CG2a, receptive knowledge was maintained in 28.3% of the cases. The short-term knowledge was almost similar for both groups and constituted nearly 29% of the total number of cases. What is remarkable in this experiment is that the number of cases where there was no learning decreased from almost 30% in Experiment 1 to 23.21% in experiment 2 for EG2a, and from 48.4% to nearly 43% for CG 2a.

If we look at the productive knowledge of the adjective-noun collocations, the numbers were also higher than the verb-noun collocations for both groups in the short-term and long-term knowledge categories. Indeed, EG2a participants were successful in maintaining the productive knowledge of the tested adjective-noun sequences in more than 31% of the cases, compared to nearly 18% for CG 2a learners. The short-term productive knowledge was also better for EG2a and represented almost 24% of the total number of cases.

Table 5.33

Change in Participants' Receptive and Productive Knowledge in Experiment 2a

Type of knowledge	T1 to Test 2 (Receptive)		T1 to Test 2 (Productive)	
	Experimental Group 2a	Control Group 2a	Experimental Group 2a	Control Group 2a
Long-term knowledge	44.1%	28.3%	31.6%	17.6%

Short-term knowledge	28.9%	26.8%	23.9%	19.8%
Unpredicted knowledge	3.75%	1.9%	2.7%	1.5%
No learning	23.21%	42.9%	41.8%	61.1%

*5.4.2.2. The eight-time encounter condition***.** The receptive and productive knowledge state for EG2b did not differ significantly from the four-time encounter condition (see Table 5.34 below). In almost one half of the 560 cases for the receptive test students maintained the knowledge they gained about the collocations. In the productive test, this was nearly one third of the number of cases. The number of no-learning cases was also similar to the four-time encounter condition.

However, for CG2b, the number of cases was significantly higher when the number of encounters was increased to eight times both in the receptive and productive tests. Learners of this group maintained their receptive knowledge in about one third of the cases and their productive knowledge in nearly one quarter of the 500 cases analyzed. What is noteworthy for the CG1b is that, in Experiment 1b (eight encounters), and for both the receptive and productive test results, as the amount of exposure increased, the number of no learning cases decreased, compared to Experiment 1a (four encounters).

Table 5.34

Change in Participants' Receptive and Productive Knowledge in Experiment 2b

Type of knowledge	T1 to Test 2 (Receptive)		T1 to Test 2 (Productive)	
	Experimental Group 2b	Control Group 2b	Experimental Group 2b	Control Group 2b
Long-term knowledge	46.2%	33.0%	30.8%	23.9%
Short-term	24.4%	26.3%	21.4%	17.2%

knowledge				
Unpredicted knowledge	2.4%	3.9%	2.0%	1.5%
No learning	27.0%	36.9%	45.8%	57.4%

The overall conclusion that can be drawn from comparing the knowledge state of each collocation over the immediate and delayed post-tests is that the proportion of the no learning cases was too high in both experiments, though, with reference to the adjective-noun collocations, this rate decreased significantly. As for the long-term knowledge category, analysis of learners' responses suggested that all experimental group participants had a better long-term retention of the verb-noun and adjective-noun collocations than their control group counterparts since the number of cases where the long-term knowledge was maintained was significantly higher in all experiments.

5.4.3. Receptive and productive knowledge vs. the teaching method. Although data analysis in sections 5.1 and 5.2 points to the conclusion that interactive activities are more effective for a better short-term and long-term retention of congruent verb-noun and adjective-noun collocations, comparing mean scores within and between groups might be the tree that hides the forest. To understand the effect of the teaching method on the participants' achievement, we need to closely look at the receptive and productive long-term gains of different groups.

Overall, in Experiment 1, analysis of participants' responses (see Table 5.35) clearly shows that the long-term receptive knowledge category of the 20 verb-noun collocations was higher than the no-learning category for both EG1a and EG1b. However, this was not true for the productive knowledge category which was lower than the number of the no-learning cases. As for CG1a and CG1b, the no-learning category far outnumbered the long-term receptive knowledge, and there was a similar result pattern for the productive knowledge category.

Table 5.35

The Type of Knowledge vs. the Teaching Method in Experiment 1

Method	Interactive Activities				Non-interactive Activities			
Group	EG1a		EG1b		CG1a		CG1b	
Type of Knowledge	R[a]	P[b]	R	P	R	P	R	P
Long-term Knowledge	37.6%	28.4%	39.8%	27.2%	20.7%	13.3%	27.3%	17.1%
No Learning	29.8%	48.4%	25.6%	47.0%	50.2%	68.5%	42.7%	61.0%

[a]Receptive, [b]Productive

In experiment 2, the trend was similar. The long-term durable receptive knowledge of the target adjective-noun collocations was higher than the no-learning cases for both EG2a and EG2b (see Table 5.36). As in Experiment 1, the long-term productive knowledge was also lagging behind the no-learning cases for these groups. For the control groups, the state of participants' receptive and productive knowledge was no better, and the number of no-learning cases was still higher.

Table 5.36

The type of Knowledge vs. the Teaching Method in Experiment 2

Method	Interactive Activities				Non-interactive Activities			
Group	EG2a		EG2b		CG 2a		CG2b	
Type of Knowledge	R[a]	P[b]	R	P	R	P	R	P
Long-term Knowledge	44.1%	31.6%	46.2%	30.8%	28.3%	17.6%	33.9%	23.9%
No Learning	23.2%	41.8%	27.0%	45.8%	43.0%	61.1%	36.9%	57.4%

[a]Receptive, [b]Productive

If we take into consideration that two different teaching methods were used with the experimental and control groups, and that even when the amount of exposure to the target sequences for the control groups (main-stream) was increased to eight times, the state of their receptive long-term knowledge was not better than their experimental group peers in all tests, then we might conclude that the type of activity helped experimental group participants develop and maintain their long-term receptive knowledge over a period of one month. With respect to the long-term productive knowledge, although it was higher for the experimental groups than the control groups in all experiments, it did not outnumber the no-learning cases in any test.

Thus, the overall conclusion that can be made from comparing the gains in the long-term knowledge to the cases where there was no learning is that using interactive activities with the experimental group participants helped them increase their receptive long-term knowledge of the target collocations more than their long-term productive knowledge in both experiments. As for the control group participants, it is evident that when the number of encounter was increased to eight times in Experiments 1b and 2b, there was a substantial gain in the number of collocations retained both receptively and productively, compared to the four-time encounter condition.

5.6. The Motivational Survey

One of the aims of the study was to explore any individual variables involved in learning collocations. For this purpose, a 24-item motivational survey (see Table X, Appendix B) was used. The motivational survey was administered after the immediate productive post-test. The first step was to conduct a *post hoc* item analysis to check that the survey was working according to expectations. The *post hoc* reliability analysis (see Appendix S) showed that the survey had an overall good internal consistency as indicated by Cronbach alpha (α = .802, see Table 4.10, Appendix B). The six multi-scale items also had acceptable reliability coefficients as can be seen in Table 5.37.

Table 5.37

Post Hoc Reliability Coefficient of the Six Multi-Scale Items

The multi-scale items	number of items	Cronbach Alpha
criterion measure	4	.791

parental encouragement	4	.691
instrumentality: Promotion	4	.802
instrumentality: Prevention	4	.697
attitudes towards L2	4	.806
English Anxiety	4	.736

Based on participants' responses, a motivational score was computed for every participant for all variables included in the survey (i.e., criterion measure, parental encouragement, instrumentality: Promotion, instrumentality: Prevention, attitudes towards L2, and English anxiety).

To understand the relationship, if any, between these variables and participants' performance on the immediate receptive and productive post-tests, Spearman's correlation test was used (see Appendix S). This test was chosen to minimize the effects of any outliers and the violation of normality since the immediate receptive and productive tests data were not normally distributed. The results of the correlation test for different groups in the two experiments are presented separately in what follows.

5.6.1. Experiment 1: The verb-noun collocations. Overall, EG1a learners' performance on the immediate receptive and productive post-tests was related to three of the six variables investigated in the study (see Table 4.12). Parental encouragement was significantly correlated with the receptive-post-test scores, r = .730, p < .001, and the productive post-test scores, r = .566, p = .001. Criterion measure correlated only with the receptive post-test, r = .730, p = .013. As for English anxiety, it was negatively related to how well learners did on the receptive and productive post-test (r = -.544, p = .002, and r = -.492, p = .007, respectively).

To better understand the relationship between EG1a learners' receptive and productive post-tests scores and these three variables, and since correlation does not mean causality, we can take the analysis one step further by calculating the effect size R^2, also known as the coefficient of determination. This is simply "a measure of the amount of variability in one variable that is shared by the other" (Field, 2013, p. 349). Computing the effect size yielded the results shown in Table 5.38.

Table 5.38

The Effect Size for Spearman's Correlation Test for EG1a, Experiment 1a

	Spearman's rho	Receptive Post-Test	Productive Post-Test
Criterion measure	Correlation Coefficient	.454	-
	R^2	.206	-
Parental encouragement	Correlation Coefficient	.730	.566**
	R^2	.533	.320
English anxiety	Correlation Coefficient	-.544	-.492**
	R^2	.296	.242

For Spearman's correlation test, the effect size R^2 tells us how much of the variability in the ranking of learners' scores on the receptive and productive post-test is shared by the other variables. For example, the correlation between criterion measure and the receptive post-test is .454, and consequently the value of R^2 is .206. This means that .206 of the variability in ranks in this test is shared by criterion measure ranks, that is, the intended effort made by learners in their studies. Multiplying R^2 by 100 would give us the percentage of shared variance, which is in this case 20.6%. In this example criterion measure shares 20.6% of the variability in ranks of the receptive post-test scores. The most significant correlation was between the post-test scores and parental encouragement (r = .730) and consequently the effect size R^2 was the strongest (.533), which means that 53.3% of the variability in the ranks of learners' scores is shared by parental encouragement.

For the CG1a learners, results of the immediate receptive and productive post-tests were related to only one of the six variables investigated in the study: English anxiety (see Table 4.14, Appendix A). This variable was negatively correlated with the receptive-post-test scores, r = -.513, p = .006, and the productive post-test scores, r = -.587, p = .001. This means that for CG1a learners as anxiety about their English studies increased, their marks on both collocation tests decreased. Consequently the effect size R^2, the shared variability in the ranking of both scores, will be .263 for the receptive post-test and .345 for the productive post-test.

Spearman's correlation test was also used with EG1b to understand the relationship between learners' performance on the receptive and productive post-tests and the six variables included in the survey (see Appendix H). The correlation tests suggest that there was a relationship between four of the survey variables and the results of the receptive and productive post-tests for this group. Both tests correlated with parental encouragement, instrumentality promotion and prevention, and English anxiety. For these learners, as well, the strongest correlation was between parental encouragement and the receptive and productive post-test scores. This is also supported by the effect size presented in Table 5.39.

Table 5.39

The Effect Size for Spearman's Correlation Test for EG1b, Experiment 1b

	Spearman's rho	Receptive Post-Test	Productive Post-Test
Parental encouragement	Correlation Coefficient	.739**	.651**
	R^2	.546	.423
Instrumentality (promotion)	Correlation Coefficient	.575**	.488*
	R^2	.330	.238
Instrumentality (prevention)	Correlation Coefficient	.382*	.423*
	R^2	.145	.178
English anxiety	Correlation Coefficient	-.584**	-.537**
	R^2	.341	.288

According to table 5.39, the strongest effect size R^2 was .546, which means that 54.6% of the variability in the ranks of learners' scores on the receptive post-test is shared by parental encouragement.

As for the CG1b learners, survey data analysis suggests that their performance on the receptive post-test was significantly related to parental encouragement, $r = .545$, $p = .004$. This means that having supportive parents can positively affect students' learning. Also, there was a negative correlation between the test results and English anxiety, $r = -.422$, $p = .032$ (see Table 4.17, Appendix A), which indicates that, for these learners, their higher English anxiety may prevent them form learning more collocations. Similar relationships were also noted between the productive post-test results and the learner variables parental encouragement and English anxiety with $r = .441$, $p = .024$, and $r = -.539$, $p = .004$, respectively. The effect size R^2 was also calculated using these correlation coefficients as can be seen in Table 5.40. The magnitude of the effect was moderate for the correlation between parental encouragement and tests results (R^2 = .297), and small for the relationship between English anxiety and the tests results (R^2 = .178).

Table 5.40

The Effect Size for Spearman's Correlation Test for CG1b, Experiment 1b

	Spearman's rho	Receptive Post-Test	Productive Post-Test
Parental encouragement	Correlation Coefficient	.545	.441
	R^2	.297	.194
English anxiety	Correlation Coefficient	-.422	-.539
	R^2	.178	.290

5.6.2. Experiment 2: The adjective-noun collocations. The same survey analysis (Spearman's correlation test) was also used in experiment 2 to examine the relationship between the receptive and productive post-tests scores and the six variables included in the survey. For EG2a, the results (see Appendix H) suggest that the receptive post-test was significantly negatively related to English anxiety, r = -.650, p < .001; the productive post-test scores also correlated with the same variable, English anxiety, r = -.480, p = .010.

Computing the effect size R^2 using the correlation coefficient yielded the results shown in Table 5.41. The effect was moderate for the correlation between English anxiety and the receptive post-test results (R^2 = .422), and small for the relationship between English anxiety and the productive post-test results (R^2 = .230).

Table 5.41

The Effect Size for Spearman's Correlation Test for EG2a, Experiment 2a

	Spearman's rho	Receptive Post-Test	Productive Post-Test
English anxiety	Correlation Coefficient	.650	-.480
	R^2	.422	.230

As regards CG2a, the results of the correlation test (see Table 4.21, Appendix A) show that for the receptive post-test scores, they only correlated with English anxiety, $r = -.717$, $p < .001$. As for the productive post-test scores, they were related to parental encouragement, $r = .473$, $p = .013$, instrumentality promotion, $r = .554$, $p = .003$, instrumentality prevention, $r = .483$, $p = .011$, and English anxiety, $r = -.539$, $p = .004$.

In this experiment, the most noticeable effect size was for the relationship between the receptive post-test scores and English anxiety, $R^2 = .514$, which means that 51.4% of the variability in the ranks of learners' scores is shared by English anxiety (see Table 4.22). As for the productive post-test, there was a low effect size for the four variables shown in Table 5.42.

Table 5.42

The Effect Size for Spearman's Correlation Test for CG2a, Experiment 2a

	Spearman's rho	Receptive Post-Test	Productive Post-Test
Parental encouragement	Correlation Coefficient	-	.473
	R^2	-	.223
Instrumentality (promotion)	Correlation Coefficient	-	.554
	R^2	-	.306
Instrumentality (prevention)	Correlation Coefficient	-	.483
	R^2	-	.233
English anxiety	Correlation Coefficient	-.717	-.539
	R^2	.514	.290

For EG2b learners, the results of the Spearman's correlation test (see Table 4.23, Appendix A) suggest that, with reference to the receptive post-test scores, they were significantly related to the variable attitude towards L2 community, $r = .587$, $p = 002$. Also, there was a moderate relationship between the test scores and English anxiety, $r = -.463$, $p < .001$. As for the productive post-test scores, test performance was moderately correlated with attitude towards L2 community, $r = .441$, $p = 027$, and English anxiety, $p = -.413$, $p = .040$.

Measuring the strength of the relationship between the two survey variables and the post-tests scores yielded the results shown in Table 5.43. In this experiment, the effect size R^2 was moderate for the correlation between attitude towards L2 community and the receptive post-test results ($R^2 = .344$), and small for the relationship between the receptive post-test scores and English anxiety ($R^2 = .214$). As for the correlation between the productive post-test results and attitude towards L2 community and English anxiety, the magnitude of the effect was low ($R^2 =$ .194 and .170, respectively).

Table 5.43

The Effect Size for Spearman's Correlation Test for EG2b, Experiment 2b

	Spearman's rho	Receptive Post-Test	Productive Post-Test
Attitude towards L2 community	Correlation Coefficient	.587	.441
	R^2	.344	.194
English anxiety	Correlation Coefficient	-.463	-.413
	R^2	.214	.170

The results of the correlation test for CG2b (see Table 4.25, Appendix A) show that for the receptive post-test scores, they negatively correlated with English anxiety, $r = -.500$, $p = 008$. With reference to the productive post-test scores, they were related to instrumentality promotion, $r = .575$, $p = .002$, and English anxiety, $r = -.557$, $p = .003$.

Finally, as can be seen in Table 5.44, the effect size R^2 was small for the correlation between English anxiety and the receptive post-test results ($R^2 = .250$). As for the correlation between the productive post-test results and instrumentality promotion and English anxiety, the magnitude of the effect was moderate ($R^2 = .330$ and .310, respectively).

Table 5.44

The Effect Size for Spearman's Correlation Test for CG2b, Experiment 2b

	Spearman's rho	Receptive Post-Test	Productive Post-Test
Instrumentality (promotion)	Correlation Coefficient	-	.575
	R^2	-	.330
English anxiety	Correlation Coefficient	-.500	-.557

R^2	.250	.310

5.6.3. Results of the motivational survey over the two experiments. Over the two experiments, participants' retention of collocations was measured 16 times. In Experiment 1a (verb-noun collocations), two tests of receptive knowledge and two tests of productive knowledge were used, and there was a similar number of tests in Experiment 1b. In Experiments 2a and 2b (adjective-noun collocations), participants took a total of four receptive tests and four productive tests. When looking at the results of all experiments together, a consistent pattern emerged: The only individual variable that correlated with *all* the 16 tests of collocations was English anxiety. The effect size of the relationship between English anxiety and the 16 measures of collocations in the two experiments ranged from $R^2 = .170$ to $R^2 = .514$, which means that this variable shares between 17% and 51.4% of the variability in ranks of the 16 receptive and productive tests. In other words, English anxiety can directly affect both the short-term and long-term retention of collocations as measured by the immediate and delayed post-tests in both experiments.

The second most important variable that had a statistically significant correlation with the different measures of collocations was parental encouragement. This variable correlated with seven out of the 16 tests used to measure participants' retention of collocation. The lowest effect size was $R^2 = .223$ and the largest was $R^2 = .546$. As such, parental encouragement can share more than 50% of the variability of learners' scores in collocation tests. As such, the impact this variable had on learners' short-term and long-term retention of collocation is less evident than English anxiety.

Finally, the other multi-scale items (criterion measure, instrumentality: prevention, instrumentality: promotion, and attitudes towards L2 community) did not seem to have an important effect on collocation learning. Criterion measure and instrumentality: prevention correlated only once with the 16 tests, attitudes towards L2 community was related to the tests scores twice, and instrumentality: promotion correlated four times with the 16 tests. The effect size associated with these variables ranged from $R^2 = .194$ to $R^2 = .344$, which means that the effect these variables had on the retention of collocation in this study was negligible.

5.7. Conclusion

In this chapter, data collected before and after the treatment were analysed. First, the pre-treatment data (IELTS scores and Vocabulary Size Test) were statistically analysed using descriptive statistics, normality test and the *t*-test. The results of the independent sample *t*-test suggested that before the treatment, control groups and experimental groups in all experiments had a roughly equal proficiency level as suggested by their IELTS scores and vocabulary size. With participants being randomly assigned to control or experimental conditions, and the fact that the target collocations were new to them in all experiments as indicated by the pre-tests, any difference in the post-treatment outcome variables might be attributed to the different type of exposure to the target collocations (whole units vs. broken down) and the instructional method (interactive vs. non-interactive) used with each group.

Second, quantitative data obtained after the treatment (immediate and delayed receptive and productive post-tests) were also examined through computing descriptive statistics and statistical significance tests. In both experiment 1 (verb-noun collocations) and experiment 2 (adjective-noun collocations), an interesting pattern emerged. The short-term and long-term retention of the target collocations for the four experimental groups significantly exceeded that of the control groups on all the receptive and productive immediate and delayed post-tests. Even when the number of encounters was increased to eight times for the control groups, and kept at four times for experimental groups, all test results were still significantly higher for the experimental groups.

If we consider data analyses of participants' responses to all test items in the two experiments (a total of 8640 cases), the number of cases where the receptive and productive long-term knowledge of the target collocations was maintained over a one-month period was significantly higher for experimental groups in all experiments. It could be argued that these positive results for all experimental groups were due to the pedagogical approach they used to learn these collocations. It is possible that the interactive activities helped them retain the target collocations through offering them better exposure. In other words, regardless of the number of encounter, when the collocations were introduced and practised through interactive tasks, as chunks, this seemed to yield better results for experimental groups in Experiments 1 and 2.

Regarding the relationship between vocabulary size and the retention of collocation, Spearman's correlation test revealed that the correlation of the VST with the receptive tests was stronger (up to $r = .924$, $p < .001$) than that with the productive tests, suggesting that the vocabulary size test can be a strong predictor of learning verb-noun and adjective-noun collocations to their receptive state, but not equally reliable in relation to their productive state.

Finally, regarding other factors involved in learning collocations, survey data analysis showed that, when looking at the results of all experiments together, two individual variables (English anxiety and parental encouragement) strongly correlated with the different measures of collocations. This means that English anxiety and parental encouragement can directly affect both the short-term and long-term retention of collocations as measured by the immediate and delayed post-tests in both experiments.

CHAPTER 6 DISCUSSION OF THE FINDINGS

6.1. Introduction

In this chapter, key research findings presented in chapter 5 are discussed, with reference to each of the research questions raised in chapter 1, and in relation to previous research studies. Section (6.2.1) discusses the effects of the two types of encounter (interactive vs. non-interactive) and the amount of exposure (4 vs. 8 times) on the short-term and long-term retention of verb-noun and adjective-noun collocations in the two experiments carried out in this study. In Section (6.2.2) the discussion also draws on the changes in the receptive and productive collocation knowledge, over a period of one month, to explain the effects of the task type and the amount of exposure on collocation learning. The third section considers the relationship between vocabulary size and collocation learning. Finally, section (6.2.4) will shed some light on the individual variables that are involved in learning collocations.

The main research question is:

What are the effects of interactive activities on the short-term and long-term retention of congruent verb-noun and adjective-noun collocations?

The sub-questions are:

1- How does the learning activity (interactive vs. non-interactive) affect the receptive and productive knowledge?

2- What is the relationship between learners' vocabulary size and their ability to retain collocations?
3- What individual variables are involved in learning collocations?

6.2. Discussion of Research Questions

6.2.1. Discussion of research question 1. This study investigated how the retention of verb-noun and adjective-noun collocations was affected by the learning context. The experimental design involved two major experiments. Experiment 1 (EX1) investigated the effects of the learning context on the retention of 20 verb-noun collocations while experiment 2 (EX2) explored its effects on 20 adjective-noun sequences. Each experiment involved two sub-experiments where participants were exposed to the target collocations through different combinations of classroom activities and amount of exposure. In sub-experiments 1a and 2a (EX1a and EX2a, respectively) the experimental groups used four interactive activities that exposed them to the verb-noun and adjective-noun collocations four times, while the control groups used four non-interactive exercises with an equal number of encounters with the target collocations. The results of all collocation measures suggested that when all participants encountered the collocations four times in the written input, the two experimental groups significantly outperformed the two control groups in EX1a and EX2a and retained more collocations both on the immediate and delayed receptive and productive post-tests. On average, experimental group participants retained three collocations more than the control-group participants (see Sections 5.1.1 and 5.2.1)

In sub-experiments 1b and 2b (EX1b and EX2b, respectively), the experimental groups used four interactive activities with four encounters to learn the target verb-noun and adjective-noun collocations, whereas the control groups used eight non-interactive exercises that exposed them eight times to the target collocations. Data analysis showed that there was a similar pattern as in EX1a and EX2a, and the experimental groups were able to retain more collocations to their receptive and productive states on the immediate and delayed post-tests than the control groups despite the fact that they only encountered these sequences four times in the written input. If participants who used interactive activities and had less exposure to the target collocations in both experiments consistently outperformed those who either had an equal or superior number of encounters in the written input, it might be the case that the instructional context benefited the experimental groups and helped them remember these sequences on all tests. So what are the potential explanations for the experimental groups' outperformance of the control groups? To answer this question, we need to consider the aspects of both instructional methods used with both groups in order to identify the factors that contributed to the better retention rates of all experimental groups.

Theoretically, as discussed in the literature review section of this study, the effectiveness of the instructional context can be explained with reference to some key findings of cognitive research: noticing the salient features of the input (Ellis, 2003), practice and repetition (McLaughlin & Heredia, 1996), and engaging learners through cognitive processes (Laufer & Hulstijn, 2001) (see Section 3.4.7). In SLA vocabulary research, many studies had investigated these factors separately and found that the use of input enhancement techniques resulted in substantial collocation gains (e.g., Peters, 2012), repetition had positive effects on the number of collocations learned (Webb, Newton, & Chang, 2013), and the type of task could be important in improving word knowledge (e.g., Laufer and Rozovski-Roitblat, 2015). However, to the best of my knowledge, no research has investigated the effects of these three factors combined together in collocation learning, and the current study might be a step in this direction. The contribution of each of these factors to the superior results of the experimental groups in this study are discussed below.

6.2.1.1. The importance of noticing. A possible explanation of the superior receptive and productive learning gains of the target verb-noun and adjective-noun collocations for the experimental groups in both experiments might be that the interactive activities the experimental group participants used to learn the target collocations offered them an opportunity to notice some aspects of these sequences. As outlined in the literature review section of this study, the Noticing Hypothesis (Schmidt, 1986) assumed that without attention, noticing the aspects of the input may not be enough for learning. It is therefore necessary to draw learners' attention to the target linguistic feature being studied. One way of achieving this could be through the use of different input enhancement (Smith, 1991) techniques.

The differences in learners' retention rates of the target collocations can be explained in part by the input enhancement techniques employed when designing the tasks. In Task 1, to facilitate noticing of the form of the target collocations, learners' attention was directed towards these sequences through bolding. This task presented the target collocations bolded to learners to direct their attention to these new word combinations (see Appendix A). In Task 2 and since participants working in pairs had to survey each other (see Appendix A), the task provided them with opportunities to practise the pronunciation and recognize the spelling of the target collocations, which necessitated understanding of the collocations in different contexts in order for participants to respond to the questions. At this stage, learners might be negotiating the meaning of the sequence or making observations about its form if they were unable to establish the form-meaning link in the introductory translation activity in Task 1.

In SL vocabulary research, N. Ellis (1994) distinguished between two aspects related to vocabulary learning: form and meaning. A crucial step in the process of learning new words, involves the ability to link the knowledge of form (spoken or written) to the knowledge of meaning. What Ellis called the "mediational aspect" (p. 212), requires learners to practise the spelling of words, their pronunciation, and their meaning in the initial stage of vocabulary learning. In a FL context, this would require an explicit teaching approach (Nation, 2001) to give learners the opportunity to strengthen this form-meaning link through engaging in different types of classroom activities. This was the rationale behind the use of the first two tasks.

Task 3 was an information gap task that required learners working in pairs to exchange information to successfully complete the task. The efficacy of these types of tasks in orienting learners' attention to the form and meaning of the linguistic item being studied has been widely reported (e.g., Leeman, 2003; Pica, Kang, & Sauro, 2006; Nunan, 1989). This task could not be completed without learners exchanging information to identify the missing collocations. The task design features also involved an outcome (classification table) without which learners noticing and processing of the form and meaning of the collocations could not be evaluated.

This consistent input enhancement through bolding used in the four tasks would certainly have benefited the experimental group participants and helped them notice the salient features of the target collocations. The considerably high scores of experimental group participants in all collocation measurements in this study suggested that these sequences were better entrenched in their memories. According to Langacker's (1987) entrenchment theory, rehearsal of a given structure or lexical item would increase their strength of representations in the memory of language users. In addition to rehearsal, perceptual salience could also contribute to the memory consolidation of a given structure or lexical item (Geeraerts, Grondelaers, & Bakema, 1994), and as Schmid (2014) argued "since salient forms and referents are more likely to attract attention and therefore invite repeated processing, they are also more likely to become entrenched" (p. 10). In the current study, it may be the case therefore that the bolding technique, along with some task design features were more effective in drawing learners' attention to notice the form and meaning of the target collocations than the non-interactive exercises used with the control groups.

The findings of the current study broadly support the work of other studies in this area linking input enhancement to gains in formulaic sequences retention. These findings seemed to confirm those of Peters (2012) who used bolding and underlining to make the target formulaic sequences in her study typographically salient. She reported that the group that learned the formulaic sequences with the input enhanced had significantly outscored the control group. The findings also seem to lend support to Szudarski and Carter (2016) who used underlining with L1 Polish EFL learners to make the verb-noun and adjective-nouns collocations in their study more salient. They reported considerable gains in the retention of collocations at the level of passive form recall and recognition but not at that of active (productive) recall and recognition. This could be an indication that input enhancement techniques might not be sufficient to improve collocations' productive knowledge and that other techniques might be needed for this type of knowledge, though in the current study, the bolding technique seemed to benefit both receptive and productive knowledge of collocations.

It is also possible that learners of the control groups in the current study failed to notice the target verb-noun and adjective-noun collocations in the written input since there was no input enhancement in the exercises used by these groups, and consequently did not pay attention to their characteristics (spelling, pronunciation, and meaning). The written input presented to these learners did not contain any visual enhancement (bolding) to help them attend to the salient aspects of this input since their attention was not directed towards the target sequences and they were not forced to notice them through bolding. This could be a possible explanation of the low scores of the control group participants in both experiments 1 and 2.

6.2.1.2. The importance of interaction as practice. In addition to the contribution of the input enhancement technique to the consistently higher scores of all experimental groups in this study, and to understand the reasons for their remarkable achievement, we need to consider what they did in class with the collocations they were learning. Theoretically, in the context of cognitive psychology, language learning has been considered as a cognitive skill

(Dekeyser, 2007). As discussed in the literature review section of this paper, to acquire/learn this skill, the declarative knowledge (the information presented) should be proceduralized. In order for this knowledge to be proceduralized, there should be enough opportunities for extensive practice (Dekeyser 2007, p. 99).

The problem associated with the skill learning theory discussed in the literature review was the assumption that when learners practice the target language, then learning would take place. This rather vague definition of practice does not seem to help learners and teachers since it does not specify what needs to be done at the classroom level to improve the learning process. Equally problematic was the type of practice advocated by the Lexical Approach (see Section 3.2.1) which stated nothing about how learners can move from noticing to retaining unknown chunks in their long-term memory. For Lewis (1997), the most important factor was to plan for activities that could “generate and maintain interest while meaning is explored” (p. 38) but even this suggestion would still be of less interest to practitioners since what is needed is how these activities can be designed and implemented in language classrooms.

In an attempt to eliminate this fuzziness surrounding the notion of practice, in the current study practice of the different aspects of the target collocations (meaning and form) was achieved through using communicative interactive activities that necessitated interaction to offer learners the opportunity they needed to first establish the declarative knowledge about the target collocations and strengthen the associations of their constituents in participants’ minds through controlled input processing. In what follows, I discuss how interaction as practice was incorporated in the tasks used in both experiments and how it might explain the difference in participants’ learning gains.

In this study, both the experimental and control groups had opportunities to practice the target verb-noun and adjective-noun collocations through different activities. The experimental group in EX1a practised the 20 verb-noun collocations four times in four tasks and the control group four times in four exercises. In EX1b, the number of encounters (opportunity for practice) of the collocations was increased to eight for the control group and kept at four times for the experimental group. It was assumed that participants in the control group would have repeated exposure to the target collocations and they would be able to establish the form-meaning connections, and with repeated practice it was hoped that the target sequences would be remembered on the immediate and delayed post-tests. The question that needs to be addressed here is why did the experimental group participants obtain higher scores on all receptive and productive tests when they had less encounters with the target collocations than the control group participants in EX1b and EX2b?

These rather unexpected results might be a possible outcome of the types of activities both groups used to learn the sequences. The *Task-Supported Language Teaching* approach (Ellis, 2003) associated with the experimental groups in this study seemed to provide a better context for practice through interaction. In SLA research, there had been many suggestions about the importance of interaction for successful L2 learning (Gass, 1997; Long, 1996; Pica, 1994). Gass (1997) specifically suggested that with interaction learners might have better chances to reinforce the link between L2 form and meaning. For example, in Task 2 (see Appendix A), *learner A* was supposed to obtain the required collocations from *learner B* through negotiation of the meaning of different linguistic items in the sentence, paraphrasing, expanding on the ideas expressed, or explaining their meaning. In this way, negotiation through interaction may direct learners' attention towards the missing collocations and as such could offer learners more practice with the linguistic features of the target collocations. This type of practice through interaction would "connect input, internal learner capacities, particularly selective attention, and output in productive ways" (Long, 1996, p. 452), and as a result might direct learners to notice gaps in their declarative knowledge about the collocations being studied and attend to them.

The optimal opportunities for practice were also incorporated in tasks 3 and 4. Experimental group participants were practising the target collocations first in oral modality asking each other questions, listening and giving feedback to each other, and thinking about the collocations. Then, they practised them in the written modality when they were classifying them in the tables given (see Appendix C) which offered them more practise in spelling the words and strengthening the association between form and meaning.

It is also likely that the lower retention rates of the control group learners were due to the absence of interaction when they were learning the collocations. They were asked to do the exercises individually and they might only interact with the teacher. It might also be possible that working individually deprived them from the processes involved in interaction such as asking for and giving clarifications about aspects of the input, rewarding segments of the input, or giving/getting feedback (Pica, 1996). This might have affected their retention rates of the target collocations since they did not have the opportunity to practice them through interaction and establish a stronger form-meaning link.

Although the findings of interaction research point to the importance of these processes in improving learners' L2 competence in general (see Section 3.4.6 of the literature review), many of the claims about interaction were formulated in a broad way that is often of little help to specific classroom contexts. The claims made by Pica (1994), Swain and Lapkin (1998) and Mackey et al. (2012) that interaction is crucial for L2 learning may lack specificity and leave the door open for different interpretations. The results of the current study may be taken to indicate that when the activities learners do offer contexts for interaction, practice becomes meaningful for learners and significant collocation learning gains can be achieved. The communicative interactive activities used in this study, unlike the non-interactive individual exercises associated with the control groups, involved many interaction processes including noticing salient features of the input, negotiation for meaning, peer feedback, modified output, etc. Therefore, with the superior results of the learners who used these activities, tasks involving interaction as a means for practice could be a major factor that contributed to these significant collocation gains.

The results of my study are suggestive of a link between collocation retention and interactive activities. They may provide a solid ground for a teaching method that incorporates different interaction processes in a communicative context where learners may establish the declarative knowledge about collocation and consolidate this knowledge through a sequence of tasks that offer them practice of their form and meaning.

Unlike the suggestions put forward by the Lexical Approach (LA), the teaching of lexical phrases in the current study incorporated the necessary elements that could make its implementation possible in EFL contexts. The LA recommended "pedagogical chunking" (see Section 3.2.1) to help learners notice aspects of the input through the "observe-hypothesize-experiment" cycle. What was problematic in this view was that nothing was stated about the *how* of chunk learning. It assumed that learners would notice the recurrent chunks in the input without any intervention from the teacher or the material designer. However, and especially in EFL contexts, as Boers and Lindstromberg (2009) argued learners often fail to recognize collocating words as chunks. What was different in the interactive activities used in this study was that they created opportunities both for noticing and practice through awareness raising (bolding) and different cognitive processes involved in interaction.

The significant difference in the learning gains of experimental and control groups in this study may also have important implications for the way educators need to think about practice. In all the individual exercises that the control groups used, practice entailed decontextualized sentences or words similar to the mechanical drills of the Audiolingual Approach (Lado, 1964). Learners practiced the form and meaning of the target collocations in different exercises. However, comparing results of both groups revealed that the experimental groups had gained more knowledge about the target sequences though they practiced the collocations less than learners in the eight-time encounter condition which raises the possibility that the kind of practice these learners had was more effective and that the interactional practice that the tasks offered seemed to make the difference. It may be the case therefore that the interaction processes involved in the tasks might have established a stronger form-meaning link in the memories of these learners, and as such, along with the input enhancement techniques used, helped them remember these collocations and got better test results even after one month on the delayed post-tests.

6.2.1.3. The contribution of the quality and quantity of encounter. Second language vocabulary acquisition research has consistently reported the positive effects of two key factors that may determine how new words are learned. Many researchers reported that the quality of encounter (what learners actually do with the words) might play a major role in vocabulary retention (e.g., Hulstijn & Laufer, 2001; Keating, 2008; Pichette, De Serres & Lafontaine, 2011). Others, however, stressed the importance of the quantity of encounter (how many times learners are exposed to the word) in improving vocabulary retention (e.g., Folse, 2006; Lee & Hirsh, 2012; Nation & Wang, 1999; Waring & Takaki, 2003; Webb, 2007). Although the effects of these two factors have been extensively explored in learning single words, in relation to collocation learning, no study has attempted to determine which factor is more effective. The results of the current study suggested that although the quantity of encounter could be important in collocation learning, the quality of exposure or the activities that learners engage in would be more important.

If we consider the results of the control groups in this study, it seemed that increasing the number of encounter from four to eight times in EX1b and EX2b improved their retention rates both on the immediate and delayed post-tests. CG1b and CG2b (eight-encounter condition) learned on average one collocation more on the immediate post-tests and almost two collocations more on the delayed post-tests than CG1a and CG2a (the four-encounter condition) (see sections 5.1 and 5.2). What these results suggested was that doubling the number of encounters and also the number of exercises for the control groups from four to eight times yielded an increase from one to two in the number of collocations retained. However, this increase was still discouraging compared to that of the experimental groups with four encounters only.

The effects of the frequency of occurrence on learning vocabulary has been traditionally investigated through reading and the findings differ significantly. As far as collocations are concerned, only two studies investigated these effects. Webb, Newton, and Chang (2013) tried to explore the effect of repetition on incidental learning of collocations through listening and reading a graded reader. They reported a positive effect of multiple encounters on learning the target collocations stating that their learners needed 15 encounters for “sizeable” learning gains. Peters (2014) also reported a large effects of the frequency of occurrence on the retention of both single words and collocations. She claimed that “items occuring five times were recalled three times as often compared to items occuring only once” (p. 89). The findings of the current study seemed to lend some support to these claims. However, from an instructional perspective, the 15 encounters suggested by Webb et al. (2013) to learn some aspects of collocations would be challenging for teachers and material designers in an EFL context like the UAE, with limited classroom time. In the current study, and with a combination of minimal number of encounter (four times) and communicative tasks, many learners were able to remember the collocations they learned as measured by the immediate and delayed post-tests.

It should also be noted that Webb et al.’s (2013) results should be interpreted with caution since different pre- and post-tests were used which could have affected the results of the collocation retention measurements. The pre-test measured only the receptive knowledge of the form of the target collocations, while the post-tests measured both receptive and productive knowledge. Also, the format of the pre- and post-tests were also different. The pre-test had a multiple-choice format, whereas the post-tests used, in addition to the multiple-choice format, receptive and productive translation format, and fill-in format. It should also be noted that there was no measurement of the long-term gains since there was no delayed post-test, and as such it is unclear if the target sequences were retained long-term.

Since the amount of exposure to unknown words could be the most important factor in their retention, according to SL vocabulary research, one might argue that increasing the number of encounters for the control group would yield better results than the four tasks coupled with four encounters. However, data analysis in EX1b and EX2b (the eight-time encounter condition) suggested that even when the control group encountered the collocations eight times, the experimental group participants who were exposed four times only to the target collocations still had better retention rates both receptively and productively. This is somewhat surprising since repetition has been often linked to better learning of unknown words in vocabulary research. Then, the argument that follows from experimental evidence of the current study is that the quality of encounter is more important than the number of encounters in collocation learning.

If we consider the comparison between the results of experimental and control groups in this study, a major finding was that in the four-time encounters condition in EX1a and EX2a , the experimental groups learned between three to four collocations more than the control groups on the immediate and delayed receptive and productive post-tests (see Tables 4.2 and 4.3). Surprisingly, in EX1b and EX2b, when the number of encounter was raised to eight times for the control groups and kept at four encounters only for the experimental groups, the latter still learned almost four more collocations on the receptive and productive post-tests (see Section 5.3). These descriptive statistics suggested that four encounters through doing interactive activities associated with the experimental groups, yielded better collocations retention rates than four or eight encounters while doing non-interactive exercises.

This significant difference in the number of collocations learned in EX1 and EX2 with the varying combinations of the type of activity and the number of encounter may be partly explained by the difference in the involvement load index (Laufer & Hulstijn, 2001) that tasks and exercises in this study had. Laufer & Hulstijn's *Involvement Load Hypothesis* discussed in the literature review section of this paper (see section 3.4.7) posited that the retention of unknown words could be substantially enhanced by three factors—need, search, and evaluation, and that activities with higher involvement load index (ILI) could be more effective for vocabulary learning.

In the current study, the translation activity in Task 1 had an ILI of 4 (Need = 1, Search = 1, and Evaluation = 2). *Need* was moderate since it was imposed by the activity and not stemming from learners' internal desire to know the collocation. *Search* was present because they had to check online sources to find the Arabic equivalent for the given sequence. Finally, *evaluation* was strong as the task involved contrasting the meaning and form of the target collocation in L1 and L2. When this activity was turned into an individual exercise (Exercise 1) to be used by the control groups, the Arabic equivalent was given to participants. It seemed that the provision of the Arabic translation and carrying out the exercise individually lowered the ILI to a value of 2 only (Need = 1, Search = 0, Evaluation = 1), and this might have affected the level of processing of the target collocations.

It should also be noted that translation was used to measure the receptive and productive collocation gains. In the receptive post-test the English collocation was given and learners needed to provide the Arabic translation to check if they could recall the meaning of the target sequences. The productive post-test also used translation to gauge learners' ability to produce the written form of the target collocations based on the meaning cued by the translation and the sentence context. At this initial stage of collocation learning, the translation activity the experimental group did in Task 1 carried a higher task-induced involvement load and consequently might have had a stronger impact on the initial form-meaning mapping of the target collocations. This could have contributed to the better retention rates of all experimental groups.

These findings are in line with Laufer and Girsai (2008) who reported the effectiveness of using contrastive analysis and translation to teach collocations. In their study, the contrastive analysis and translation group that carried out tasks with a higher involvement load learned considerably more collocations (8.7/10 receptively and 6.1/10 productively) than the non-contrastive group. This suggests that there may be a place in EFL classrooms for the use of translation activities with high involvement load when teaching/learning collocations.

If we consider Task 2, experimental group learners were supposed to be surveying each other to determine their motivation score based on a score calculation sheet provided by the teacher. According to Ellis's (2001) classification of tasks, this would be an awareness-raising task. Many studies reported that these tasks are effective in improving the L2 declarative knowledge (e.g., Fotos and Ellis, 1991; Leow, 1997). The rationale behind the choice of this task was that, after establishing the declarative knowledge in the translation task, raising learners' awareness about the form, meaning, and use of the target collocations would help them remember these sequences.

This task had an ILI of 3. When surveying each other, learners would be asking questions and recording their partner's answers, and they would not be able to tick the correct box unless they understood the meaning of the collocation in question. Therefore, if they could not remember the meaning from the translation activity, they might ask their partner about the meaning of the collocation which would reinforce the initial form-meaning link. Evaluation was also present in this task since learners would not be able to tick the correct box without evaluating whether their peer responded correctly to the question.

Unlike Task 2, Exercise 2, used with the control groups, had a lower ILI value of 1 as it involved moderate need only. Learners had to respond to the survey questions individually and had no opportunity to search for the meaning of the collocations nor engage in any kind of evaluation. Learners would read the survey questions and tick *Yes* or *No* even if they were not sure of the meaning expressed by the collocations. As such, the low involvement induced by this exercise could have prevented learners from a deeper level of processing of the target collocations which did not reinforce the form-meaning link after their first encounter with the sequences in Exercise 1.

Task 3 was the highest in terms of its ILI. It had a total value of 4 (Need = 1, Search = 1, and Evaluation = 2). It was a two-way information gap activity where learners had to exchange information to complete the missing collocations in their handouts. Learners had to get the missing collocation from their partners through asking questions. Once the collocation was obtained, then there might be a comprehension check and discussion with their partners about the meaning or the form of the target sequence or any other word in the sentence. Engaging in this possible discussion would certainly give learners more practice with many aspects of the collocation such as meaning, orthography, pronunciation, etc. When this communicative task was done as an individual exercise (Exercise 3) with the control group, learners were only required to fill in with a verb from a given list to complete the given sentence. Although this exercise had a moderate ILI ((Need = 1, Search = 0, and Evaluation = 2), the fact that it was done individually might have affected the level of processing of the target sequence since learners had the noun component in the sentence and they only needed to select the verb from the list.

The problem solving activity in Task 4 also had a considerably high ILI (Need = 1, Search = 1, and Evaluation = 2). The activity entailed pair discussion where students had to match each candidate to the most suitable job based on the requirements expressed by the target collocations on the one hand, and the description of each candidate profile. This discussion would usually involve higher level cognitive skills such as agreeing/disagreeing and expressing/defending one's opinion. In addition, the input enhancement technique would keep learners focussed on the target collocations, which would ultimately result in a better retention of their form and meaning.

Unlike Task 4, the collocation search in *Exercise 4* associated with the control group had a lower ILI (*Need* = 1, *Search* = 0, and *Need* = 1). It involved recalling the constituents of the collocations from previous encounters and then trying to find the nouns usually used with the given verbs in the grid. It also gave learners an opportunity to practise the written form of the collocations through scanning the grid, but this depended on their ability to recall the two constituents of these sequences. Compared to Task 4, this activity was not cognitively demanding and did not involve any kind of interaction or negotiation of meaning, and this might have disadvantaged the control groups and they were unable to recall more collocations on the post-tests.

This discussion of the ILI of different tasks and exercises implied that when the experimental group encountered the collocations four times using tasks with high ILI and the control groups encountered them four times using exercises with relatively low ILI, the former had better retention rates of the target collocations. Working with such tasks that involved different cognitive processes would engage learners and orient them towards the type of input processing that could support their L2 development in general.

In accordance with the present results, Laufer and Rozovski-Roitblat (2015) found that that the type of task learners did had a great effect on the retention of single vocabulary items in their study. They showed that engaging in word-focused activities while reading significantly increased retention rates. However, despite the careful design of their study, there were some confounding variables that might have affected the results of Laufer and Rozovski-Roitblat (2015). First, it should be noted that the study included words of different parts of speech (verbs, nouns, adverbs and adjectives). In the current research, the type of collocations were carefully controlled and the study included only verb-noun collocations in EX1 and adjective-noun in EX2. Also in their participants had different first language (Hebrew, Arabic, and Russians), and although it was reported that the target words were unknown to participants, congruency could have had a facilitative effect (Wolter & Gyllstad, 2013) on retaining the target words. In an attempt to control these confounding variables, the current study included only participants with Arabic L1 and all the collocations were congruent (see 4.3.2 of the methodology section).

The argument that follows from this discussion is that learning new collocations is not an either/or approach. While it is true that repeated exposure to unknown collocations might increase the likelihood of their retention, as suggested by the improvement of the control groups' retention rates when the number of encounters was increased to eight times, the type of activities learners use to learn them seemed more influential in making these sequences salient in the written input, leading to better learning gains. This finding would be very important for practitioners in an EFL context and provides evidence for them to prioritise the quality of the task over the number of encounters when teaching collocations.

Hence, it could conceivably be hypothesized that the retention of collocations may not depend on the quantity of encounter only, but rather on many interacting factors. The current study has identified interactive activities as a possible alternative to non-interactive instructional methods since these activities could incorporate three important variables that could lead to better collocation retention rates. Interactive activities could make the input more salient for learners to notice its different aspects, engage them through meaningful interaction that offered better quality of practice, and provide a minimal number of encounter (repetition) needed for the sequences to be remembered through sequenced tasks.

6.2.2. Discussion of research question 2. How does the learning activity (interactive vs. non-interactive) affect the receptive and productive knowledge of collocations?

The second research question investigated the relationship between the instructional method and the development of the knowledge of the target collocations in this study. The discussion of the first research question above revealed that the experimental groups associated with the interactive activities learned more verb-noun and adjective-noun collocations than the control groups who used non-interactive individual exercises. However, comparing mean scores only might leave out important details about the development of collocation knowledge over time. With the absence of collocation studies that might explain how the development of this knowledge could be affected by what learners do to learn collocations, the current study might be the first step in this direction.

The most obvious finding that emerged from data analysis was that the *no learning* cases (when the collocation was unknown on both the immediate and the delayed post-tests) were lower for the experimental groups in all experiments. In fact, in EX1a (the four-time encounter condition), these figures were 29.8% on the receptive tests and 48.4% on the productive tests of the 580 cases for EG1a compared to 50.2% and 68.5% on the receptive and productive tests respectively for CG1a (see Table 5.31). Despite the increase in the number of encounter in EX1b to eight times for CG1b, the number of the *no learning* cases was still high for this group. On the receptive tests, there was no learning in almost 43% of the 540 cases analysed, and the number was even higher on the productive tests and reached 61%. These figures did not differ significantly in EX2 and the number of the *no learning* cases was always lower for the experimental groups in both the four-time and the eight-time encounter conditions (see Tables 5.31 and 5.32).

When looking into the cases where the target collocations were unknown on test 1 and test 2 (the no learning category) and comparing them to the other types of knowledge, an interesting pattern emerged from the data analysis in section 5.5. For experimental groups in both EX1 and EX2, it was only the receptive long-term knowledge that was consistently higher than the number of cases where there was no learning (see Table 5.34). For instance, EG1a maintained their receptive knowledge of the target collocations in almost 38% of the cases, while the no learning category was almost 30% of the total 540 cases for the receptive tests. This higher rate for the long-term receptive knowledge was also confirmed with EG1b and it was around 40% of the cases compared to only 25.6% of no learning instances.

Regarding the productive knowledge, in all experiments, for both the experimental and control groups, it was always significantly lower than the no learning cases. EG1a, for instance maintained their productive short-term knowledge in 20% of the cases and their long-term knowledge in only 28% of he cases when the no learning cases were around half of the 540 cases (48.4%). For CG1a the no learning cases were even higher at around 69%.

If the long-term receptive knowledge was consistently higher for all experimental groups, this suggested that what these learners did when learning the collocations helped them improve their receptive knowledge more than their productive knowledge. Knowing that the experimental condition involved the use of four sequenced tasks, then the conclusion may be that these tasks helped learners maintain their receptive knowledge of the target verb-noun and adjective-noun collocations over a period of one month. In other words, the way these learners were exposed to the target collocations yielded better receptive retention rates. So, what was different with the interactive exposure that positively affected the long-term receptive knowledge?

The "chunking" principle (N. C. Ellis, 2001) discussed in the literature review section of this paper might help us understand how the receptive knowledge rates of the target collocations of all experimental group learners always outnumbered the no learning cases in both experiments. Ellis argued that, in collocation learning, words that are experienced together would be recorded in the short-term memory as a "chunk" of information and would be considered as a single unit. What Ellis (2001) called the "law of contiguity" might be essential in explaining why experimental group learners were successful in remembering more collocations to their receptive state after one month. According to this law, words that are experienced together in the input would be stored as chunks and they tend to become associated in memory and one word could predict the other. If these words were encountered again, they would be treated as a chunk or single unit.

In Task 1 for example, the two constituents of the collocation 'raise awareness' for example were presented as one chunk to learners and the bolding technique was also used to reinforce the association between the verb *raise* and the noun *awareness* in learners' short-term memory. Once the collocations were identified as salient chunks, learners in the experimental condition worked with them in three more tasks in different contexts and the emphasis was always on presenting these collocations as whole units.

However, this conclusion needs to be interpreted with caution since the higher number of cases where the experimental groups maintained receptive knowledge of the target collocation might not be due to this chunking principle only. It is not the holistic exposure only to the target collocations that could have yielded better receptive knowledge but instead other factors such as learners' receptive vocabulary size and their overall English proficiency as well might be involved in the learning process. Despite the effects these variables might have had, it seemed that using the tasks to explicitly introduce the target collocations to learners and the focus on conscious learning had a positive effect on the receptive knowledge gains.

To understand the positive effects of conscious learning on the receptive knowledge of all experimental groups, we need to contrast the tasks to the individual exercises used with the control groups. In most of these exercises the control groups engaged in, the target collocations were broken down into their individual constituents. In the example above, the collocation ‘raise awareness’ was broken into the verb ‘raise’ that was part of the sentence and the noun ‘awareness’ that was on a separate list of nouns learners had to use. When completing the given sentence with the noun, learners would not realise that ‘awareness’ collocated with ‘raise’ and as such they might not have any trace of the association between the two constituents of the collocation ‘raise awareness’ in their short-term memory. In other words, learners were not conscious that they were dealing with a salient chunk that was ‘raise awareness’.

In the Arab context, Shehata (2008) and Alsakran (2011) found that Egyptian students’ productive collocation knowledge was lower than their receptive knowledge of collocations. Evidence from the present study also points to this direction and confirmed that the development of productive knowledge of collocations would be more challenging for learner in an EFL environment. The short-term and long-term productive knowledge for all groups in both EX1 and EX2 was always lagging behind their receptive knowledge. For instance, for EG2a, in almost 32% of the cases were learners able to remember the collocations on the productive post-tests 1 and 2, while they were able to remember them in 44% of cases for the receptive tests 1 and 2. This was also true for CG2a and the number of cases where they maintained their productive knowledge was always inferior to the receptive knowledge cases. If the finding that interactive activities were more effective for developing only the receptive knowledge of the target collocations was true, could this difference be attributed to the relative difficulty of the productive measure of collocations in this study?

The immediate and delayed productive post-test used in the study asked learners to complete the target collocations used in a sentence context (see Appendix C). To offer more guidance to learners, the initial two letters of the two constituents of the collocation were also provided, and to eliminate any effect of unknown words in the context sentence, the Arabic translation was also given. Thus, the productive test was indeed measuring whether learners could produce the written form of the sequence. I believe that this test was a valid measure of the mastery of form of the target collocations, and, therefore the results obtained were not the artefact of the difficulty of this test since learners practised the spelling of the sequences in different activities and the form-meaning link was always strengthened.

With respect to the control groups in this study, it seemed that the overall conclusion was that breaking down the collocations to their individual constituents did not help them get high test scores. However, if we look into their results in more depth, an interesting finding can be discerned. When the number of encounters was raised to eight times, the no learning cases decreased significantly compared to the four-time encounter condition. In EX1, the no learning cases for CG1a decreased from 68.5% to 61% and in EX2 from 61% to almost 57% for the productive knowledge. As for the receptive knowledge, the no learning cases went down from 50.2% to 42.7% in EX1 and from almost 43% to around 37% of the cases in EX2.

Although these results generally confirm the possible benefits of repetition for learning collocation discussed in the previous section, they are still discouraging for teachers and learners as well. Doubling the number of encounters from four to eight times for CG1a, for instance, yielded a decrease in the no learning cases by almost 7% for the productive knowledge and 8% for the receptive knowledge. Would this rate be worth the time spent and resources employed when designing the exercises for the control groups? If higher retention rates could be achieved using four tasks with four encounters only, where the target collocations were presented as chunks or single units, then this would be a more attractive alternative for L2 teachers in an EFL context.

This also confirms the conclusion in the discussion of research question 1 that interactive activities would offer learners a better context for learning collocations characterized by communicative interaction, stimulated noticing, and cognitive processes that could promote deep-level processing of the target sequences. The holistic exposure to unknown collocations using tasks would be more effective than repetition for learning verb-noun and adjective-noun collocations, according to these results. The argument that could follow is that the benefits of the number of encounter in this study are dependent on the task type.

The superiority of the results of the interactive or the “holistic” exposure over the non-interactive or non-collocational exposure (since collocations were introduced broken down to single words) through non-interactive exercises raise important implications for the two conflicting collocation acquisition/learning models discussed in the literature review section. While Ellis (2001) claimed that when words frequently co-occur together they will be recorded as “chunks” or single units in their memory, Wray (2002) hypothesized that L2 learners take a basically non-formulaic approach to learning collocations. She argued that when L2 learners are exposed to formulaic language, they tend to break it down into its individual constituents and would not retain any traces of which words went together in their memory.

Although the current study was not designed to test these two hypotheses, the findings raise an intriguing question about this collocation acquisition/learning debate: For ESL/EFL teachers and learners, does it really matter that collocations are presented as chunks or broken down into their individual constituents? Our findings suggested that this question is central to improving learners’ collocational competence in general. When the collocations were introduced to learners of the experimental groups as whole units, the results were more encouraging, and they were able to recall them after one month receptively and productively. In contrast, those who adopted a non-formulaic approach to learn these sequences, were unable to recall as many collocations receptively after one month as the experimental groups in this study.

The finding that interactive activities were more beneficial for developing the receptive knowledge of collocations more than the productive knowledge in this study also may be taken to indicate that the dichotomous distinction between receptive (passive) and productive (active) collocation knowledge, as part of vocabulary knowledge in general, might not be as ambiguous as Meara (2009) suggested. Fan (2000) and Laufer (2005) argued that receptive vocabulary knowledge may be larger than the productive knowledge. It seems that collocation knowledge is no different. There seems to be a continuum along which collocations can move from a receptive to a productive state. In all the experiments in this study, productive collocation knowledge of either the experimental or the control groups never exceeded their receptive collocation knowledge.

Since the overall purpose of vocabulary instruction is to help learners commit words to their long-term memory, then to gauge the effect of any instructional method, we need to consider the long-term retention rates this method might yield. When taking the collocation long-term gains into consideration, it becomes evident that the interactive activities (the holistic exposure) were far more effective than the non-interactive (the non-collocational exposure) in developing receptive collocation knowledge.

Taken together, my results do not support Laufer and Rozovski-Roitblat (2015) who found that in the passive recall (receptive) test, the task type was not found to be superior to the number of encounters. In their study learners' mean scores ranged between 1.50 out of 10 for those who did focused word exercises and 2.50 out of 10 for those who read a text and used dictionaries. However, these rather unexpected results for learners who spent 11 weeks learning the words in Laufer and Rozovski-Roitblat's study might be due to the interference of some confounding variables such as participants' different L1s and the inclusion of words belonging to different parts of speech.

Finally, the reported results suggested that in all experiments, the experimental groups learned almost half of the 20 target collocations to their receptive state. Bearing in mind that these groups encountered the collocations four times only using tasks and that the treatment lasted only two hours, then one might argue that these learning gains in receptive collocation knowledge seemed reasonable. In Chen and Truscott (2010) being exposed to 10 target words seven times through reading seven passages yielded a recall of the meaning of only one word out of 10. With such a discouraging result, one might argue that incidental learning through reading would not be the most judicious approach for collocation learning. Unlike studies that investigated retention of new words through reading, the current study suggested that explicit teaching of unknown collocations using tasks with holistic exposure could be more beneficial for learners.

6.2.3. Discussion of research question 3. Research question 3 asked if there might be any relationship between participants' vocabulary size and their ability to retain unknown collocations. Spearman's correlation tests in section 5.4.1 suggested that in both experiments 1 and 2, there was a significant positive correlation between the vocabulary size test (Nation & Beglar, 2007) and the different measures of collocations. This correlation was stronger with the receptive tests of collocations in both the verb-noun and adjective noun experiments.

The overall results of the correlation tests in EX1 suggested that for all groups the vocabulary size test (VST) strongly correlated with the immediate receptive test (see Table 5.27), and that the correlation was still significant after one month with the delayed receptive test. Although the correlation of the VST with the productive post-test was significant, it was not as strong as that with the receptive tests with all participants (see Table 5.28). This was also the case in EX2, and the correlation between the VST and the receptive post-tests measuring receptive knowledge of adjective-noun collocations was always stronger than that with the productive post-tests (see Table 5.29). In this experiment, only in two instances was the correlation coefficient higher for the productive post-test (see Table 5.30)

If we consider the results of the correlation tests in the two experiments, the overall conclusion is that the vocabulary size test might be a predictor of learning verb-noun and adjective-noun collocations to their receptive state, but not equally reliable in relation to their productive state. In both experiments, it appeared that the more single vocabulary items participants knew receptively, the better their receptive retention of collocations was. Since vocabulary is a skill like other language skills such as reading, writing, listening, and speaking, having a bigger receptive vocabulary size could contribute to making a learner more proficient in "all aspects of L2 proficiency" as Meara (1996a, p, 37) suggested. When the form and meaning of a single vocabulary item could be easily recognised, this would make learners ready to strengthen and increase the number of connections around that word. When the network of interrelated words in the mental lexicon becomes "denser" according to Vermeer (2001, p. 231), the ability to recognise and understand the meaning of collocating words may improve.

The difference in the strength of association between the VST and the receptive and productive collocations tests used in the two experiments might have different explanations. First, the VST (Nation & Beglar, 2007) has a multiple choice format, and it was used to measure receptive or passive recognition of meaning and form of vocabulary items. It presented participants with a decontextualized word in a non-defining context and asked them about its meaning using a multiple-choice format as in the following example from the test:

figure: Is this the right <figure>?

a- answer
b- place
c- time

d- number

According to Nation (2007) this item is measuring written receptive vocabulary knowledge. It tests the ability to recognize the written form of the given word and recall its meaning. Choice of the correct word (*number* in the example above) would indicate that there could be a strong form-meaning connection already established in test takers' minds. The test was validated by Beglar (2010) and a considerably high reliability was reported (between .96 and .98) which would minimize the effect guessing might have on its results. Similarly, the receptive post-test used in the current study also measured receptive recognition of meaning and form. Participants were presented with the English collocation and asked to supply the meaning in Arabic as in the following example:

Collocation	Arabic Translation
daunting task	____________________ I DON'T KNOW

In this example, test takers would be moving from the form of the collocation *daunting task* to the meaning. What was tested here was also the ability to recognize the form of the collocation and recall its meaning, which would indicate the strength of the form-meaning link. This correspondence between the type of knowledge measured by the VST and the receptive post-test could have contributed to the strong correlation between both tests.

On the other hand, the productive post-test used to measure productive knowledge of collocations was an active recall test. It asked learners to supply the form of the collocation based on the Arabic L1 equivalent as in the example below:

An advantage of involving students in group work is that having **sh**___________ **re**____________ makes them more engaged and willing to help each other.	**مسؤولية مشتركة**

The type of knowledge tested in this example pre-supposed, in addition to the ability to recognize the form-meaning link, the ability to recall the form and produce it. If we take the stance that receptive knowledge usually precedes productive knowledge (Laufer & Paribakht, 2000, p. 369) and that, as suggested by many researchers, receptive knowledge is also larger than productive knowledge (e.g., Fan, 2000; Laufer, 2005; Melka, 1997), one might conclude that it is unlikely that the passive vocabulary size would be an indicator of the ability to learn collocations to a productive state. Instead, a vocabulary size test that measures productive knowledge would be more accurate. In the current study, Nation and Beglar's (2007) VST was used because the test was administered online and the scores were automatically generated.

Another possible explanation of the strong correlation between the VST and the receptive but not the productive post-test might be attributed to the type of activities all participants used to learn the target collocations. In the tasks and exercises used by different experimental and control groups, participants were most of the time practising receptive aspects of the target collocations. In general, productive vocabulary knowledge according to Nation (2001) "involves wanting to express a meaning through speaking or writing and retrieving and producing the appropriate spoken or written word form" (p.38). Despite the communicative nature of the tasks used with experimental group participants, and the ample opportunity for practice offered by the non-interactive exercises, creative use of the target collocations in new contexts was not prompted by these activities.

The finding that there was a close association between participants' vocabulary size and their ability to learn verb-noun and adjective-noun collocations to a receptive state do not seem to lend support to some published studies (e.g., Bahns and Eldaw, 1993; Schmitt et al., 2004). It has been suggested that there was no significant correlation between the two constructs. However, the results of my study are in agreement with Gyllstad's (2007) and Mutlu and Kaşlioğlu (2016) who found a strong correlation between vocabulary size and receptive collocation knowledge.

Although these results seem to be consistent with previous research that found an association between vocabulary size and the receptive knowledge of collocations, a note of caution is due here since, as discussed in the literature review, vocabulary knowledge is multifaceted in nature. Even if the knowledge of collocations is one aspect of word knowledge (Nation, 2001), the relationship between both constructs might not be straightforward. The "afferent links" that connect passive vocabulary items to the network of the mental lexicon, as Meara (2009, p.61) suggested, might be different from those linking the constituent of a given collocation to each other and to the network of associations with other words in the vocabulary network. Nevertheless, Meara's (1996a) statement that "All other things being equal, learners with big vocabularies are more proficient in a wide range of language skills than learners with smaller vocabularies" (p.37) might be right as indicated by the results of the current study where participants with larger vocabulary size obtained better scores in collocations measures.

6.2.4. Discussion of research question 4. What individual variables are involved in learning collocations?

Since the focus of the current study was to understand the effects of the instructional method on learning unknown verb-noun and adjective-noun collocations, and given the reported effect of learner variables on success in L2 learning in general (e.g., Dörnyei, 2005; Masgoret & Gardner, 2003), the study also sought to determine individual variables that might be involved in learning collocations. The overall finding suggested that two individual variables (English anxiety and parental encouragement) were related to the different measures of collocation knowledge in the current study.

Over the two experiments, participants' retention of collocations was measured 16 times. In Experiment 1a (verb-noun collocations), two tests of receptive knowledge and two tests of productive knowledge were used, and there was a similar number of tests in Experiment 1b. In Experiments 2a and 2b (adjective-noun collocations), participants took a total of four receptive tests and four productive tests. When looking at the results of all experiments together, a consistent pattern emerged: In the motivational survey administered to participants after the immediate post-tests, the only individual variable that correlated with *all* the 16 tests of collocations was English anxiety.

The four multi-scale items in the motivational survey that were used to measure English anxiety were related to feeling nervous when speaking in English classes, feeling uneasy when speaking to an L1-speaker, feeling stressed when asked for directions by a foreigner in English, and being afraid of making mistakes (see Appendix F). Although anxiety as a construct is complex and multi-faceted, one often-cited definition of this individual variable in the L2 motivation literature is that it is primarily an emotion (Dewaele, 2010; Gray, 1982). According to Arnold and Brown (1999), "anxiety is quite possibly the affective factor that most pervasively obstructs the learning process" (p. 8). From this perspective, understanding the causes of anxiety for EFL teachers would be very important in order to create a more effective classroom environment that is conducive to learning.

In the current study, survey data analysis showed that the effect size of the relationship between English anxiety and the 16 measures of collocations in the two experiments ranged from $R^2 = .170$ to $R^2 = .514$, which meant that this variable shared between 17% and 51.4% of the variability in ranks of the 16 receptive and productive tests. In other words, English anxiety can directly affect both the short-term and long-term retention of collocations as measured by the immediate and delayed post-tests in both experiments.

In order to understand the effect of anxiety on learning collocations and on language learning in general, students' background experience needs to be considered. All students who join the Higher Colleges of Technology (HCT) are coming from public high schools where education is free and compulsory. In these schools, English is taught as a foreign language mainly by Arab nationals and Arabic is the language of instruction for all other subjects. It is important to know that many high school English teachers would resort to Arabic whenever their students could not understand the focus of their classes. Moreover, students would also feel more comfortable if their teachers used Arabic.

When they join HCT, in their first semester, students would be taught by western expatriates with English as the language of instruction for all subjects. Unlike high schools, policies and procedures are very strict at HCT and students need to acquire new ways of behaviour to meet the expectations. Although the entry requirement into HCT programmes is IELTS band 5, students usually come with a relatively low English proficiency. This was confirmed by their vocabulary size in this study.

When they began their transition into the new educational environment characterized by heavy reliance on English when communicating with academic or administrative staff, predominantly L1-speakers of English, the majority of semester-one students would realize that their English skills were still insufficient, which in turn could have created a feeling of isolation that may increase their anxiety. Also, the expectations that students should only use English inside the classroom to interact with their classmates or with their English teachers who were mostly L1-speakers would increase the feeling of being nervous and as such increase their anxiety level. Even if students would have the basic English proficiency to interact with others during their English lessons, the fear of making mistakes would negatively affect their performance as suggested by the correlation tests in this study (see Table 5.34). What these results suggested was that those who were more anxious would achieve lesser learning gains.

These findings are generally in line with research focusing on anxiety that reported that it is related to different classroom activities in the skills of reading, writing, listening, and speaking (e.g., Hilleson, 1996; MacIntyre & Gardner; 1994; Steinberg and Horwitz, 1986). Higher levels of anxiety were also believed to be correlated to low language performance or achievement. When learners are afraid of speaking, making mistakes, or interacting with a L1-speaker, this would certainly negatively affect their L2 learning experience and ultimately yield lower learning gains (e.g., Dewaele & Thirtle, 2009; Gregersen, 2003). It should also be noted here that English anxiety in the current study was not only related to the classroom environment but also to the wider college context involving interaction with administrative and academic staff directly involved in students' college life.

The second most important variable that had a statistically significant correlation with the different measures of collocations was parental encouragement. The survey items that measured this variable were related to offering support with studies at home and reminding children of the need to practise and learn English. Previous research on parental involvement in their children's education in general has reported its positive effects on their academic achievement (e.g., Li & Lerner, 2011; Wang & Holcombe, 2010; Wang & Sheikh-Khalil, 2014). In these studies, an improvement in the academic and emotional functioning of students with supportive parents was reported.

Consistent with the literature, the current study found that learners who reported having more supportive and encouraging parents, would be better suited to benefit from L2 instruction in general and achieve better results. According to data analysis in chapter five, parental encouragement correlated with seven out of the 16 tests used to measure participants' retention of collocation. The lowest effect size was $R^2 = .223$ and the largest was $R^2 = .546$. So, parental encouragement can share more than 50% of the variability of learners' scores in the collocation tests used in this experiment. Although the impact this variable could have on the retention of collocations as suggested by the correlation tests was less evident than English anxiety, it could still explain some of the variations in learners' achievement related to learning collocations.

These results might be taken to indicate that students in their first semester at HCT appeared to be extrinsically motivated by their parents to learn English and pursue their education. This generation of parents had their high school education in the mid eighties, and at that time the UAE as a young nation (the UAE Union Day was in 2nd of December, 1971) was still building its armed forces (Morton, 2016, p. 72). Emirati males had great incentives to join the army, and many did not finish their high school education. What might have encouraged them to join the army was also the absence of any higher education institution in the city of Fujairah (the city where the study took place), where some of them could have pursued their education. Once they got married and had children, it seemed that these parents wanted to compensate for their “lost” high education opportunity, and the only way of achieving this was through supporting their children and encouraging them to have a better education and consequently a brighter career.

6.3. Conclusion

This chapter has summarized the findings of the present study and discussed them with reference to the main research question and the three sub-questions. The survey of the literature related to the acquisition/learning of collocations helped in framing this discussion and relating the results to previous collocation research.

In relation to the main research question, the study suggested that, from an instructional perspective, using interactive activities is more effective than non-interactive individual exercises. This was demonstrated by contrasting different combinations of the type of activities to the number of encounter. It was argued that, regardless of whether there were four or eight encounters, *what* learners use to learn verb-noun and adjective-noun collocations may be more effective than *how many times* they encounter them in the written input.

The discussion showed that tasks, as a pedagogical practice, could be more cognitively plausible than non-interactive exercises because they were consistent with the findings of second language acquisition research and the theoretical perspectives related to the way people learn/acquire language in general. The interactive activities used in the present study allowed participants to notice the salient aspects of the target collocations and adopt a conscious learning approach. They also offered them the opportunity for meaningful practice through interaction and kept them engaged while learning different aspects of these sequences. The results were also consistent with the claims advanced by the Involvement Load Hypothesis stating that, for information to be remembered, engagement through cognitive processes is a key factor as evidenced by the considerable learning gains of participants who used tasks with high involvement load index.

In relation to the second research question, the findings generally indicated that activities that presented the target collocations as holistic units were more beneficial for the receptive long-term retention of these sequences. The groups using tasks and exposed to the target collocations as chunks were able to maintain their receptive knowledge of these sequences in almost 50% of the cases. The way participants' responses were categorised permitted the researcher to identify possible changes that might happen to the knowledge of collocations over one month from the immediate post-tests to the delayed post-tests. This analysis confirmed that the type of exposure in the current study helped learners maintain their receptive knowledge more than the productive knowledge of collocations. It also showed that when collocations were presented as whole units, there was a better chance for learners to strengthen the association between collocating words, and thereby increasing the possibility of their retention.

As for research question three, measures of participants' vocabulary size was found to strongly correlate with different collocations measures used in all experiments, though the correlation was more significant with the receptive tests. It was argued that the correspondence between the VST and the collocation tests in terms of the construct they measured (receptive knowledge) could be a possible explanation.

Finally, in relation to the fourth research question, among the six variables investigated, only one was associated with different test scores. *English anxiety* was the only variable that correlated with all tests in all experiments. This confirmed the findings of previous research that anxiety could have a significant effect on L2 learning in general. Participants' low English proficiency was advanced as the main reason for this anxiety.

CHAPTER 7 CONCLUSION

7.1. Introduction

This chapter summarises the major findings of this study. First, it considers the psycholinguistic plausibility of activities involving interaction as an alternative to classroom pedagogy that involves no interaction. Then, it outlines the contribution to the debate in the field of vocabulary research about the importance of the quality of encounter vs. the quantity of encounter. Implications for practitioners and material designers are then considered. Finally, limitations of the current research, as well as directions for future studies are presented.

7.2. Summary of Key Findings

The main goal of this study was to explore the effectiveness of the use of interactive activities to improve learners' retention of unknown collocations. Data analysis in chapter 5 confirmed that learners who used communicative tasks to learn verb-noun and adjective-noun collocations achieved better learning gains than those who used non-interactive individual exercises. Since language teaching is supposed to make language learning possible, any instructional method should be consistent with research findings in general and should take into consideration the available theoretical knowledge about the way second/foreign language is learned. From this perspective, a task-based approach that prioritises interaction seems deeply rooted in SLA research in general and would be a better alternative for language teachers.

The discussion in Chapter 6 proved that interactive activities can be more psycholinguistically plausible than practice with no interaction. Tasks could help learners notice salient aspects of the input, they offer opportunities for practice through interaction, and more importantly, they engage learners through different cognitive processes. The benefits of noticing, interaction, and cognitive engagement have been consistently reported in SLA research, and in the current study, their benefits for collocation learning were proven with empirical evidence.

Not unrelated to the effectiveness of tasks is the debate regarding which factor is more important in learning vocabulary in general, the number of encounters or the quality of encounter. Previous research has not been conclusive and many researchers reported the importance of both factors in relation to vocabulary learning. The current study investigated the importance of these two factors in collocation learning and the main finding was that the quality of encounters or the activities learners use to learn collocations could be more influential.

Although data analysis showed a possible effect of the number of encounter with control groups when it was increased from four to eight encounters, the gains were very low compared to those of experimental groups who had less encounters with the target collocations. In other words, a carefully designed task could compensate for a high number of encounters.

Quality of encounter was also found to have an effect on the receptive knowledge of collocations. Tasks that presented learners with the target collocations as chunks helped them maintain their receptive collocation knowledge over a period of one month. In contrast, those who were exposed to the collocations broken down into their individual constituents had lower retention rates. The implication of this is that approaching collocation learning as chunks would be more beneficial for language learners.

A secondary aim of the study was to understand the relationship between vocabulary size and the ability to learn collocations. The study confirmed the finding of previous research that the number of single words a learner knows can facilitate collocation learning. However, the study suggested that vocabulary size might only predict success in learning collocations to their receptive but not to their productive state. The explanation advanced for this was that both the vocabulary size test and the receptive test of collocations used in this study tested the same construct which was receptive knowledge.

Another finding that is consistent with SLA research is that anxiety as a learner variable can have a direct effect on collocation learning gains. Survey data analysis showed that learners who were more anxious and afraid of making mistakes when speaking during English classes, and who might be stressed when interacting with an L1-speaker achieved lower collocation learning gains.

7.3. Implications

The results of the current research have confirmed that interactive activities should be prioritized over non-interactive exercises given the fact that they offer learners a better context to learn collocations. Clearly, noticing salient features of the input, meaningful practice through interaction and engaging learners through cognitive processes would benefit L2 instruction. Moreover, the confirmed advantage of chunk learning has important implications for practitioners and material designers.

First, at the instructional level, for teachers, it is clear that using communicative tasks that direct learners’ attention towards unknown collocations through input enhancement techniques such as bolding would yield better learning gains. Foreign language learners usually fail to notice collocating words in the written input and most of the time they think of lexis in terms of single words. It is therefore important for teachers to use available techniques to make these sequences salient and help learners notice them. The initial stage of learning new words often involves form-meaning mapping, and when learners become conscious that they are learning chunks, this could have positive effects on their recall. In the current study, the use of the bolding technique with the experimental groups to draw their attention to the collocations helped them remember these sequences even after one month.

As instructional treatment, tasks also necessitate interaction, and in the current study interaction was shown to benefit collocation retention. It is through interaction that learners practised the form and meaning of the target collocations and this type of interactional practice proved to be more beneficial for the experimental groups in this study. The implication for teachers is that classroom activities should incorporate interaction processes. The information-gap and problem-solving task used with experimental groups were highly interactive and helped learners focus on the form and meaning of the collocations. This type of task should be a common classroom practice, and many researchers have reported their efficacy in language learning.

Regarding the frequency and quality of encounter, the study has raised an important question regarding the factor that should be the highest priority for L2 pedagogy. The experimental group learners in this study used four tasks to learn the target verb-noun and adjective noun collocations and they encountered them four times unlike the control group learners who were exposed to these sequences eight times through eight individual exercises, and the results were more encouraging in the experimental condition. If four encounters using tasks could yield better learning gains than eight encounters through doing non-interactive exercises, then tasks should be a basic aspect of classroom instruction.

The insights gained from this study may also be of great assistance to material designers. The current study has shown that drawing learners' attention to salient chunks in the written input leads to better retention rates through communicative tasks. Since the use of information-gap and problem-solving tasks has been reported to improve language proficiency (see Foster, 1998; Gass, Mackey, & Ross-Feldman, 2005; Long, 1980; Newton, 2013; Slimani-Rolls, 2005), it is therefore necessary that such tasks should be the unit of analysis of the classroom syllabus

(Long, 2015). When designing the curriculum, material writers should first consider learners' needs to find out more about their local context, their language developmental stage, and relevance of the materials to these learners.

In the current study, the *Reading and Writing 1* course learning outcomes specified that learners needed to learn the first 5000 words of the Academic Word List (Coxhead, 2000). To achieve this objective, the teacher/researcher used content that was relevant to students' context to introduce and practise the target collocations. For example the information-gap task 3 (see Appendix A) was about learners' first semester at the Higher Colleges of Technology, and the problem-solving task 4 (see Appendix A) used extracts from the bylaws of the college student council to practise the target collocations. This relevance of the materials to learners' needs is certainly a motivating factor that can keep students engaged when learning new forms or skills.

Another important implication of the finding that learners would benefit more from a holistic exposure to collocations is that the "chunking" principle (N. C. Ellis, 2001) should be prioritised when teaching collocations. What Long (2015) called "commercially published textbooks" (p. 6) used in the UAE context often include matching and fill in exercises (similar to those used with the control groups in this study) where learners are required to assemble the two constituents of verb-noun and adjective-noun collocations. The risk is that these exercises might carry "erroneous connections" and would leave "undesirable traces in learners' memory" (Boers et al., 2014, p. 54). The way these activities are designed is unlikely to aid retention according to the findings of this study. Therefore classroom materials should be designed in a way that presents collocations as intact wholes to help learners recognize them as chunks and notice their salience.

7.4. Limitations and Directions for Future Research

Despite my efforts to overcome the effects of potential confounding variables identified by previous collocation research, the current study, due to the complexity of its design and the use of multiple collocation measures, could have some limitations despite the significance of the findings.

The first limitation relates to the Hawthorne effect. The classroom context in the UAE is predominantly teacher-fronted and the teaching techniques rarely involve interaction between learners. The introduction of communicative interactional tasks into the classroom context could have affected participants' performance. In other words, participants' success in remembering the collocations on the immediate and delayed tests might not be the result of the type of tasks but rather they could be the product of the fact that these tasks are new to them. To counteract this effect, I started using some pedagogic tasks two weeks prior to the treatment so that participants would become familiar with these types of activities.

It should also be noted that learners of the control groups were not disadvantaged by using non-interactive exercises with them. These exercises are the norm in teaching practice in the UAE. Also, once the experiments were over, the interactive activities used with experimental groups in this study were also tried out with the control group participants. This was a good opportunity for them to reflect on both types of activities, and most of them preferred doing the interactive activities.

The major limitation of the study is the fact that the delayed post test was administered one month after the treatment. Just like any research that involves a delayed test, there is no guarantee that participants would not encounter some of the target collocations or that they practice them individually outside the classroom. To minimize this effect, the experiments took place before the UAE National Day holiday and the fall semester break which took students away from college for 29 days. As such, students would have less opportunities to think about the collocations since most of them usually travel abroad or do leisure activities during their holidays.

Despite these limitations, this research has thrown up many questions in need of further investigation. Further work is needed to understand the potential benefits of interactive activities as instructional method to teach other types of collocations. The current study has only explored transparent verb-noun and adjective noun sequences, and it would be interesting to investigate the effects of interactive activities on learning other types of collocations such as idioms.

Further research could also be conducted to shed more light on the relationship between knowledge of single words and knowledge of collocations. The results of my study suggested that receptive vocabulary size might be a predictor of success in learning collocations to their receptive state. Future research could use a productive vocabulary size to try and examine its relationship with productive collocation knowledge.

Finally, if the debate about collocations is to be moved forward, a qualitative approach needs to be adopted. The current study initially involved a semi-structured interview but then it was left out because the topics it covered were not directly related to the main research question.

Carefully observing learners while they are interacting and using a think-aloud protocol for example might reveal important aspects of the process of learning collocations. The current research suggested a possible link between interaction and success in learning collocations, and what is needed is a qualitative methodology that might better inform the language teaching field about how interaction can lead to success in language learning.

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Appendix B

Experiment 1: Verb-Noun Collocations

Collocations: Verb + Noun	Frequency	Mutual Information
provide assistance	432	6.02
conduct research	298	5.77
assume responsibility	216	7.48
stimulate debate	38	7.03
maintain contact	111	5.74
demonstrate competence	31	7.68
relieve stress	149	9.52
establish rapport	40	9.93
gain access	760	8.40
avoid conflict	102	5.48
prohibit discrimination	40	9.42
promote cooperation	41	6.23
improve outcomes	101	6.41
deserve credit	90	7.02
encourage participation	80	6.56
develop strategies	166	6.45
receive compensation	49	6.70
explore alternatives	44	5.83
raise awareness	545	8.75
analyse data	160	6.55

Appendix D

Tasks for the Experimental Group

Task 1: Translation Activity

Work with your partner to identify the meaning of the bolded collocations and write the Arabic translation. You can use any online source to translate the sequences.

#	**Arabic Translation**	**Context**
1		The HCT Student's Success Centre offers students opportunities to attend free classes that **provide assistance** with English language training and practice of skills needed for success.
2		Many studies have shown that when students **conduct research**, they develop their communication skills, including reading, writing, and presenting their findings.
3		Making students feel safe and secure in the classroom is the first step for teachers to **establish rapport** with them.
4		Today's college student is faced with an even greater need to be able to **assume responsibility** for his learning because more college courses and programs are being delivered through online environment.
5		Many studies have found that successful learners are those who most often try to **avoid conflict** at all costs with teachers, other students, and administrators.
6		Successful college life requires that students **demonstrate competence** in spoken communication. Students who have difficulty with the English language may be required to take additional language courses.
7		Some teachers use controversial topics such as the climate change to stimulate debate and encourage students to think about these issues.
8		The learning-by-doing projects approach helps students **explore alternatives** and debate solutions to overcome problems that may prevent them from being successful learners.
9		Play helps students **relieve stress**; it allows them to try out different ways of thinking and behaving.
10		Teachers, counselors, and administrators should work together to **develop strategies** that create a more positive learning environment which encourages appropriate student behavior.

11		When students engage in learning-by-doing projects, it is expected that they **analyse data** they collected and write effective reports.
12		The overall aim of the student council is to **raise awareness** among students about how leading a healthy life can improve their academic achievement.
13		The college administration and the student council strongly **encourage participation** of students and teachers, and their families in celebrating the UAE National Day.
14		Most Emiratis think that sheikh Zayed **deserves credit** for playing a major role in bringing all the emirates together to form a modern nation.
15		Online learning involves the use of Blackboard Learn to **maintain contact**, provide resources, and to deliver assignments during the mid-semester break.
16		In order to **promote cooperation** between students and faculty, the college organizes the Open Day once a month. It includes various sports and fun activities. Parents can as well participate in this event.
17		College laws **prohibit discrimination** against students, faculty, and staff on the basis of their nationality or religion.
18		Team work provides a practical way to largely **improve outcomes** for students, and to encourage building effective communication skills.
19		Students who are enrolled in the work-experience program **receive compensation** for travel, accommodation and food during the second semester.
20		Current students **gain access** to all services at the Career Services Center, including career advising, workshops, reference libraries, and much more.

Task 2: How Motivated Are You?

Work in pairs. Ask each other the following questions and record your partner's answers. Use the chart provided by your teacher to see how motivated your partner is.

	Questions	Yes	No
1.	Do you **provide assistance** to your classmates when they need it?		
2.	Are you willing to **conduct research** to improve college life?		
3.	Do you try to **establish rapport** with others when you first meet them?		
4.	Do you do any type of exercise to **relieve stress** after college day?		
5.	When you argue with others, do you try to **avoid conflict**?		
6.	Do you think that students who never miss classes **deserve credit**?		
7.	When learning something new, do you **explore alternatives** to traditional learning?		
8.	If you face any problems, do you try to **develop strategies** to deal with them?		
9.	Do you think you will be able to **demonstrate competence** in all subjects being taught in semester one?		
10.	Are you interested in knowing how to **analyse data** after doing research?		
11.	Can you do anything to **raise awareness** about the problem of bullying?		
12.	Do you **assume responsibility** for your own learning?		
13.	If you are the president of the student council, will you **encourage participation** in college activities?		
14.	Are you interested in taking part in college activities that **stimulate debate** about the health risks of fast food for students?		
15.	Is it important that you **maintain contact** with students and teachers from other departments?		
16.	When working in groups, do you use your personal skills to **promote cooperation** between the group members?		
17.	Do you behave in a way that **prohibits discrimination** against students from other colleges?		
18.	Do you usually help your teachers **improve outcomes** for slow learners by helping them with their homework?		
19.	Do you think you should **receive compensation** for being a college student?		
20.	Do you usually try to **gain access** to available library resources on your own?		

Total number of ***Yes*** answers: **_______** Total number of ***No*** answers: **_______**

Task 3: Student A

Work in Pairs

A- Look at the following extracts from the Student's Handbook of Success and underline the most important information. Share information with your partner and complete the missing words (2 words).

Although it can be difficult in the beginning of your first semester, ______________ ____________ with all your classmates and friends.

Whenever possible, you should always try to **avoid conflicts** with all the teaching and administrative staff during your first semester.

As you start your first semester, it is very important that you participate in the college social events to **relieve stress** and have more energy.

In semester two, you will be asked to ______________ ____________ about different topics and **analyse data**. You should also ____________ ____________ to deal with difficulties you may face.

Your goal in semester one should be to ____________ ____________ in the core academic subjects and try to **deserve credit** for being an independent learner.

______________ ____________ to your classmates when they need it. This will help you **explore alternatives** to individual learning as you start your second semester.

A- Now, complete the following table.

In semester one, a student is expected to ...	In semester two, a student is expected to ...
1- ______________________________	***1-*** ______________________________
2- ______________________________	***2-*** ______________________________
3- ______________________________	***3-*** ______________________________
4- ______________________________	***4-*** ______________________________
5- ______________________________	***5-*** ______________________________

Task 3: Student B

Work in Pairs

A- Look at the following extracts from a College student's handbook of success and underline the most important information. Share information with your partner and complete the missing information.

You are expected to **provide assistance** to your classmates when they need it. This will help you ______________ ______________ to individual learning during the second semester.

A student should try to **establish rapport** with all his classmates and friends even if you may find it difficult in the beginning of your first semester.

In semester one ______________ with all the ______________ teaching and administrative staff whenever it is possible.

In the first semester, the overall aim for a fresher is to **demonstrate competence** in the core academic subjects and ______________ for learning ______________ independently.

In semester two, your teachers will ask you to **conduct research** about different topics and ______________ ______________. You are also expected to **develop strategies** to deal with any difficulties you may face.

As you start your first semester, it is very important that you try to ______________ ______________ through attending the college social events.

B- Now complete the following table:

In semester one, a student is expected to ...	**In semester two, a student is expected to ...**
1- ______________	***1-*** ______________
2- ______________	***2-*** ______________
3- ______________	***3-*** ______________
4- ______________	***4-*** ______________
5- ______________	***5-*** ______________

Task 4

A- Look at the following extracts from the bylaws of The HCT Student Council and underline the most important information. Then, with your partner do activities *B* and *C* at the back of your handout.

HCT Student Council: Positions and Responsibilities

President

- During social events organized by the college, the president of the student council should work to **raise awareness** among the students regarding the issue of bullying.
- In the first week of classes, the president is expected to **encourage participation** of students in all the scheduled events and activities by visiting different classes.
- During the graduation ceremony, it is the responsibility of the president to give a speech about challenges that students face to **stimulate debate**.
- The president should **maintain contact** with other council members to inform them about all scheduled social events.

Vice-President

- The vice-president works closely with the president to **promote cooperation** among all council members to improve communication.
- During these events, it is the responsibility of the vice-president to **prohibit discrimination** against all students with disabilities.
- When organizing the council's meetings, the vice-president should **assume responsibility** for the proper application of college rules for appropriate behaviour.

Treasurer

- When planning for the council budget, the treasurer should use all the available resources to **improve outcomes**.
- The treasurer should not **receive compensation** for any paper work produced with the College Finance Team.
- The treasurer should have all necessary computer skills to be able to **gain access** to all the online council accounts with different local banks.

B- Now read the teachers' interview feedback about three possible candidates for the position of president, vice-president and treasurer. Can you match the candidates to the three positions and explain your choice.

Candidate 1

This candidate has a strong personality and excellent English speaking skills. He served on the college sports committee for two years and was successful in organizing last year's final championship match. He can understand sign language and can offer help to students with special needs. Most importantly, he is familiar with all college rules for appropriate dress code and behaviour.

Candidate 2

The most important thing about this candidate is his willingness to volunteer for being a member of the student council. He was a former player in the college basketball team. He always looks for ways to achieve better results. He also had a special training with the HSBC bank and knows how to handle different bank accounts.

Candidate 3

This student has good leadership skills. He knows how to motivate others and can find the appropriate arguments to convince them. He has good time management skills and can keep in touch with others easily. His only weakness is that he is not a sports fun. His English presentation skills are exceptional and can talk for hours in public.

C- Complete the following table.

Position	Candidate number	Reason
President	____________	________________________________ ________________________________
Vice-President	____________	________________________________ ________________________________
Treasurer	____________	________________________________ ________________________________

Appendix E

Exercises for the Control Group

Exercise 1: Translation

Look at the Arabic translation and find the equivalent English sequence.

#	Arabic Translation	Context
1	يوفر المساعدة	The HCT Student's Success Centre offers students opportunities to attend free classes that provide assistance with English language training and practice of skills needed for success.
2	يقوم بالبحث	Many studies have shown that when students conduct research, they develop their communication skills, including reading, writing, and presenting their findings.
3	يوطد العلاقة	Making students feel safe and secure in the classroom is the first step for teachers to establish rapport with them.
4	يتحمل المسؤولية	Today's college student is faced with an even greater need to be able to assume responsibility for his learning because more college courses and programs are being delivered through online environment.
5	يتجنب الخلاف	Many studies have found that successful learners are those who most often try to avoid conflict at all costs with teachers, other students, and administrators.
6	يثبت الكفاءة	Successful college life requires that students demonstrate competence in spoken communication. Students who have difficulty with the English language may be required to take additional language courses.
7	يحفز النقاش	Some teachers use controversial topics such as the climate change to stimulate debate and encourage students to think about these issues.
8	يستكشف البدائل	The learning-by-doing projects approach helps students explore alternatives and debate solutions to overcome problems that may prevent them from being successful learners.
9	يخفف الاجهاد	Play helps students relieve stress; it allows them to try out different ways of thinking and behaving.
10	يضع استراتيجيات	Teachers, counselors, and administrators should work together to develop strategies that create a more positive learning environment which encourages appropriate student behavior.

11	يحلل البيانات	When students engage in learning-by-doing projects, it is expected that they analyse data they collected and write effective reports.
12	يرفع الوعي	The overall aim of the student council is to raise awareness among students about how leading a healthy life can improve their academic achievement.
13	يشجع المشاركة	The college administration and the student council strongly encourage participation of students and teachers, and their families in celebrating the UAE National Day.
14	يستحق الثناء	Most Emiratis think that sheikh Zayed deserves credit for playing a major role in bringing all the emirates together to form a modern nation.
15	يبقى على اتصال	Online learning involves the use of Blackboard Learn to maintain contact, provide resources, and to deliver assignments during the mid-semester break.
16	يعزز التعاون	In order to promote cooperation between students and faculty, the college organizes the Open Day once a month. It includes various sports and fun activities. Parents can as well participate in this event.
17	يمنع التمييز	College laws prohibit discrimination against students, faculty, and staff on the basis of their nationality or religion.
18	يحسن المخرجات	Team work, favoured most teachers, provides a practical way to largely improve outcomes for students, and to encourage building effective communication skills.
19	يحصل على مكافأة	Students who are enrolled in the work-experience program receive compensation for travel, accommodation and food during the second semester.
20	يحصل على الوصول	Current students gain access to all services at the Career Services Center, including career advising, workshops, reference libraries, and much more.

Exercise 2: How Motivated Are You?

Read the following questions and tick the correct box.

	Questions	Yes	No
1.	Do you provide assistance to your classmates when they need it?		
2.	Are you willing to conduct research to improve college life?		
3.	Do you try to establish rapport with others when you first meet them?		
4.	Do you do any type of exercise to relieve stress after college day?		
5.	When you argue with others, do you try to avoid conflict?		
6.	Do you think that students who never miss classes deserve credit?		
7.	When learning something new, do you explore alternatives to traditional learning?		
8.	If you face any problems, do you try to develop strategies to deal with them?		
9.	Do you think you will be able to demonstrate competence in all subjects being taught in semester one?		
10.	Are you interested in knowing how to analyse data after doing research?		
11.	Can you do anything to raise awareness about the problem of bullying?		
12.	Do you assume responsibility for your own learning?		
13.	If you are the president of the student council, will you encourage participation in college activities?		
14.	Are you interested in taking part in college activities that stimulate debate about the health risks of fast food for students?		
15.	Is it important that you maintain contact with students and teachers from other departments?		
16.	When working in groups, do you use your personal skills to promote cooperation between the group members?		
17.	Do you behave in a way that prohibits discrimination against students from other colleges?		
18.	Do you usually help your teachers improve outcomes for slow learners by helping them with their homework?		
19.	Do you think you should receive compensation for being a college student?		
20.	Do you usually try to gain access to available library resources on your own?		

Exercise 3: ***Fill in with the verb from the list that best completes the sentence.***

avoid – relieve – deserve – conduct research – analyse – provide – explore – develop - establish– demonstrate

1- During the first semester, interacting with your classmates and friends, getting to know them better, and showing them respect will help you ___________ rapport with them.
2- Whenever possible, you should always try to ___________ conflict with all the teaching and administrative staff during your second semester as this might distract you from focusing on your studies.
3- As you start your first semester, it is very important that you take part in the college social events to ___________ stress and have more energy.
4- In semester two, you will be asked to ___________ research about different topics and write simple reports to explain the major steps.
5- You will be a better learner if you focus on learning more study skills and managing your time. In this way you will certainly ___________ strategies to deal with difficulties you may face in your first semester.
6- In the first semester, the overall aim for a fresher is to ___________ competence in the core academic subjects including English and mathematics.
7- In your second semester, you should also aim to ____________ credit for being an independent learner.
8- To improve your understanding of the content of different courses of the first semester, and to be an active learner, you can ___________ assistance to your classmates when they need it.
9- When you work with other learners in learning-by-doing projects, you will improve your communication skills and ___________ alternatives to individual learning as you start your second semester.
10- During the second semester, your teachers will help you with your reports and they will also show you how to ___________ data you gathered.

Now write the things you do in semester 1 and semester 2 (Verb + Noun)

	Semester 1		**Semester 2**
1		**6**	
2		**7**	
3		**8**	
4		**9**	
5		**10**	

Exercise 4: Matching

A- Look at the following articles from the constitution of The HCT Student Council and complete each sentence with a noun from the list.

HCT Student Council: Positions and Responsibilities

President

- During social events organized by the college, the president of the student council should work to raise ________________ among the students regarding the issue of bullying.
- In the first week of classes, the president is expected to encourage ________________ of students in all the scheduled events and activities by visiting different classes.
- During the graduation ceremony, it is the responsibility of the president to give a speech about challenges that students face to stimulate ________________.
- The president should maintain ________________ with other council members to inform them about all scheduled social events.

Vice-President

- The vice-president works closely with the president to promote ________________ among all council members to improve communication.
- During these events, it is the responsibility of the vice-president to prohibit ________________ against all students with disabilities.
- When organizing the council's meetings, the vice-president should assume ________________ for the proper application of college rules for appropriate behaviour.

Treasurer

- When planning for the council budget, the treasurer should use all the available resources to improve ________________.
- The treasurer should not receive ________________ for any paper work produced with the College Finance Team.
- The treasurer should have all necessary computer skills to be able to gain ________________ to all the online council accounts with different local banks.

NOUNS

discrimination
debate
responsibility
outcomes
access
awareness
cooperation
compensation
participation
contact

Now write the verb and the noun used with it in the table below

	Verb + Noun		**Verb + Noun**
1		**6**	
2		**7**	
3		**8**	
4		**9**	
5		**10**	

Exercise 5: Collocation Search

Find the constituents of the following collocations in the grid below. The first one has been done for you. There is a random letter that separates the two constituents.

~~relieve stress~~ - avoid conflict - meet criteria - conduct research - analyse data - provide assistance - explore alternatives - develop strategies - establish rapport - demonstrate competence- prohibit discrimination - stimulate debate - assume responsibility - gain access improve outcomes- raise awareness - maintain contact - promote cooperation - receive compensation - encourage participation

q	m	i	e	g	e	v	b	n	q	c	y	p	g	m	t	g	p	e	r	u	r	z	a	l
q	j	r	o	a	d	i	q	j	i	e	x	r	z	a	s	b	r	r	e	f	z	d	n	u
g	t	r	f	j	e	l	s	t	m	n	y	o	e	i	f	c	o	a	c	s	r	j	a	x
d	w	x	d	k	m	b	j	q	p	c	m	h	s	n	n	f	v	i	e	u	f	w	l	a
e	b	a	p	s	o	o	p	w	r	o	l	i	t	t	d	r	i	s	i	m	g	v	y	s
v	k	a	j	n	n	l	v	o	o	u	l	b	a	a	j	p	d	e	v	d	x	x	s	s
e	r	j	w	c	s	d	a	z	v	r	v	i	b	i	n	r	e	n	e	j	j	y	e	u
l	c	z	m	o	t	p	v	s	e	a	h	t	l	n	h	o	z	a	c	m	t	q	d	m
o	r	s	e	n	r	t	o	t	j	g	q	f	i	h	y	m	a	w	c	r	a	g	d	e
p	r	x	e	d	a	m	i	i	o	e	p	d	s	c	v	o	s	a	o	t	o	a	a	v
c	e	p	t	u	t	t	d	m	u	g	b	i	h	o	i	t	s	r	m	f	g	g	t	r
s	l	m	s	c	e	e	q	u	t	p	d	s	q	n	b	e	i	e	p	e	c	a	a	e
t	i	f	c	t	b	v	c	l	c	a	d	c	r	t	c	u	s	n	e	j	m	p	c	s
r	e	o	r	z	c	d	o	a	o	r	l	r	a	a	q	c	t	e	n	m	q	i	g	p
a	v	a	i	r	o	i	n	t	m	t	e	i	p	c	n	o	a	s	s	g	n	g	a	o
t	e	q	t	e	m	h	f	e	e	i	t	m	p	t	c	o	n	s	a	y	z	v	i	n
e	j	o	e	s	p	z	l	q	s	c	b	i	o	q	n	p	c	s	t	o	a	z	n	s
g	s	v	r	e	e	d	i	d	b	i	d	n	r	d	l	e	e	q	i	y	a	p	q	i
i	t	v	i	a	t	d	c	e	f	p	h	a	t	q	k	r	s	i	o	i	o	d	a	b
e	r	r	a	r	e	o	t	b	x	a	x	t	d	b	f	a	b	s	n	l	x	o	c	i
s	e	p	b	c	n	q	y	a	c	t	q	i	t	h	e	t	h	m	h	u	u	a	c	l
q	s	y	d	h	c	b	s	t	o	i	f	o	j	k	y	i	y	v	i	i	k	r	e	i
f	s	s	m	w	e	l	x	e	p	o	v	n	a	w	p	o	k	v	h	f	b	s	s	t
m	l	h	k	i	j	l	i	r	f	n	o	r	z	k	o	n	w	b	m	u	e	e	s	y
e	x	p	l	o	r	e	j	a	l	t	e	r	n	a	t	i	v	e	s	t	p	i	v	w

Exercise 6: Matching

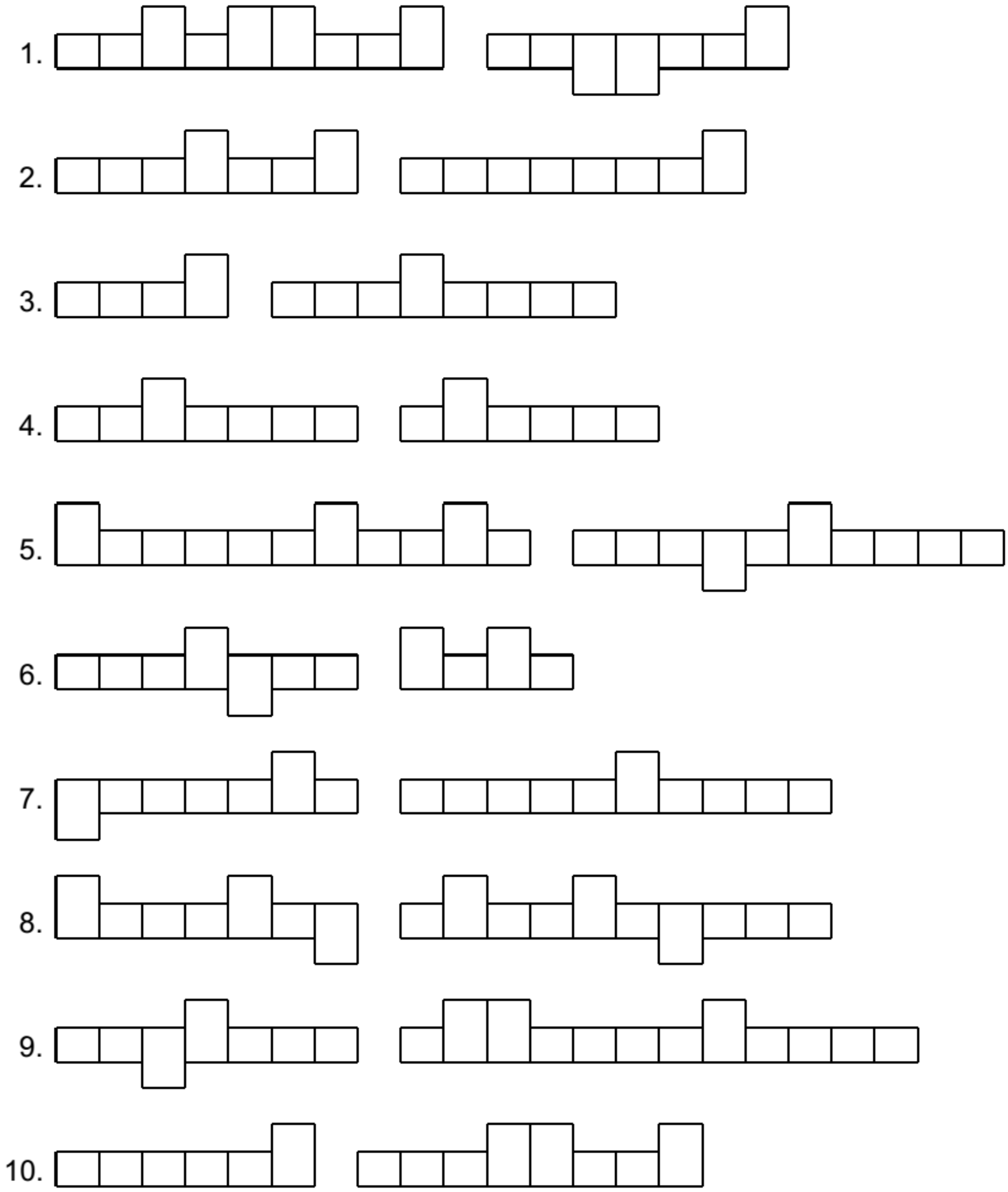
Match each verb in *Column A* with a noun in *Column B*. write the number in the given space.

Column A		**Column B**	
1.	conduct	___	assistance
2.	explore	___	credit
3.	provide	___	research
4.	establish	___	alternatives
5.	analyse	___	competence
6.	develop	___	conflict
7.	deserve	___	rapport
8.	demonstrate	___	strategies
9.	avoid	___	stress
10.	relieve	___	data

Now complete the missing vowels. There is one vowel in each space.

1. conduct r__s__ __rch
2. analyse d__t__
3. provide __ss__st__nc__
4. avoid c__nfl__ct
5. meet cr__t__r__ __
6. explore __lt__rn__t__v__s
7. develop str__t__g__ __s
8. establish r__pp__rt
9. demonstrate c__mp__t__nc__
10. relieve str__ss

Now put the words in the following shapes.



Exercise 7: Matching

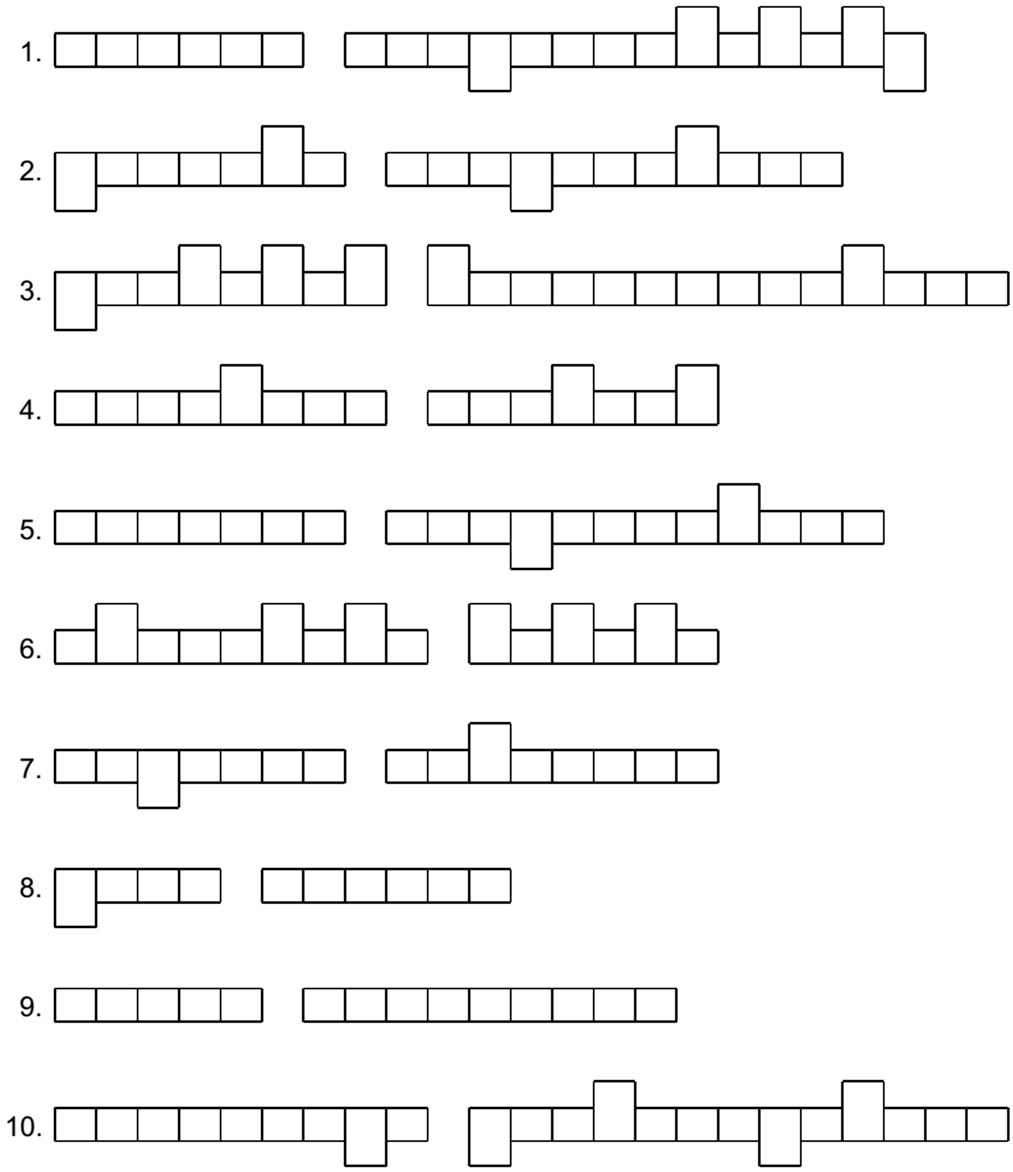
Match each verb in *Column A* with a noun in *Column B*. write the number in the given space.

Column A		**Column B**	
1.	prohibit	___	debate
2.	stimulate	___	participation
3.	promote	___	compensation
4.	gain	___	discrimination
5.	assume	___	outcomes
6.	maintain	___	cooperation
7.	improve	___	access
8.	receive	___	responsibility
9.	encourage	___	contact
10.	raise	___	awareness

Now complete the missing vowels. There is one vowel in each space.

1.	pr__h__b__t	discrimination
2.	st__m__l__te	debate
3.	__ss__m__	responsibility
4.	g__ __n	access
5.	__mpr__v__	outcomes
6.	r__ __ s__	awareness
7.	m__ __ nt__ __n	contact
8.	pr__m__t__	cooperation
9.	r__c__ __v__	compensation
10.	__nc__ __r__g__	participation

Now put the words in the following shapes.



Appendix F

Experiment 2: Adjective-Noun Collocations

	Collocations: Adj + Noun	Mutual Information
1	profound impact	8.50
2	previous research	7.34
3	instant rapport	8.20
4	emotional stress	6.71
5	daunting task	10.94
6	guiding principle	10.90
7	standard procedure	7.32
8	preferred method	7.91
9	excessive reliance	9.55
10	reliable data	6.11
11	smooth transition	8.49
12	shared responsibility	7.12
13	voluntary participation	7.82
14	lively debate	8.44
15	particular emphasis	6.24
16	inevitable consequence	9.29
17	central feature	5.96
18	desired outcomes	8.48
19	significant contribution	7.91
20	exclusive access	6.78

Appendix G

The Experimental Group Treatment

Task 1: Translation Activity

Work with your partner to identify the meaning of the bolded collocations and write the Arabic translation. You can use any online source to translate the sequences.

#	Target sequence	Context
1		Twitter, Facebook, and Whatsapp are having a **profound impact** on how millions of people communicate these days.
2		**Previous research** has shown that having enough sleep can improve your overall physical health.
3		Choosing the right title for your essay is one way to build **instant rapport** with your readers.
4		Bullying decreases the sense of safety and creates a lot of **emotional stress** for all college students.
5		Submitting class projects on time can be a **daunting task** for semester-one students if they don't know how to manage their time effectively.
6		Listening to students and supporting them is the **guiding principle** of the college new counselor.
7		Online testing has become **standard procedure** for most courses taught in different HCT programs.
8		Emails are still the preferred method for seeking library help among our college students.
9		Some researchers suggest that **excessive reliance** on technology may result in loneliness and difficulties interacting with others.
10		Recent **reliable data** on the effects of genetically-modified food on human health is not available.
11		The *Life and Study Skills* course will ensure a **smooth transition** from high school to college life for all semester-one students.
12		Education is a **shared responsibility** between schools, families, and the community, with the best results coming when all three work together.
13		**Voluntary participation** in the local community activities can offer students valuable learning opportunities.

14		The **lively debate** over newly arrived immigrants' rights is still going on in many European countries.
15		It is important to teach students reading strategies with a **particular emphasis** on dealing with unknown words.
16		Damage to the environment is an **inevitable consequence** of the continuous increase in the world population.
17		Many studies suggest that having support from parents is considered as a **central feature** of a child's continued success in education.
18		When you work hard on a learning task and see that your **desired outcomes** can be achieved, that is really rewarding.
19		The late Sheikh Zayed made a **significant contribution** to the establishment of the United Arab Emirates in the 1970s.
20		The HCT Library Services provide **exclusive access** to a huge range of electronic resources to registered students in all programs.

Task 2: How Motivated Are You? Work in pairs. Ask each other the following questions and record your partner's answers. Then count the number of ***Yes*** and ***No*** answers. Use the chart provided by your teacher to see how motivated your partner is.

	Questions	**Yes**	**No**
1.	Do you think that attending classes on time can have a **profound impact** on your understanding of different subjects?		
2.	Are you willing to know about **previous research** carried out by other college students?		
3.	Are you interested in learning about ways of building **instant rapport** with students from other departments?		
4.	Are you willing to help your classmates when they are under **emotional stress**?		
5.	Do you think that the most **daunting task** for students in their first semester is to improve their study skills?		
6.	Do you think that self-motivation should be the **guiding principle** of students' learning in all courses?		
7.	Are you interested in knowing about the **standard procedure** for submitting any excused absence documents?		
8.	Are you interested in knowing about the **preferred method** of writing formal emails in a college context?		
9.	Do you think that **excessive reliance** on the teacher's explanation can make you a successful learner?		
10.	Are you interested in knowing how to collect **reliable data** when doing research in different college courses?		
11.	Do you think that the Student Services can help you make a **smooth transition** into college life?		
12.	Do you think that students' success is a **shared responsibility** between teachers, students, and their parents?		
13.	Is **voluntary participation** in different college and community activities important for you?		
14.	Are you interested in engaging in the **lively debate** over the health risks of fast food for students?		
15.	Are you interested in attending free evening classes with a **particular emphasis** on oral presentation skills?		
16.	Are low student's marks on different tests an **inevitable consequence** of not attending classes?		
17.	Should the learning-by-doing projects be a **central feature** of most HCT courses?		
18.	Do you accept to work with slow learners to help them achieve the **desired outcomes** to succeed in their first semester?		
19.	As a semester-one student, do you think you can make a **significant contribution** to the success of our Student Council?		
20.	Are you interested in gaining **exclusive access** to all online Blackboard and library resources when you are off campus?		

Total number of ***Yes*** answers: **_______** Total number of ***No*** answers: **_______**

Task 3: Two Courses

A- Look at the following extracts from the description of two HCT courses and underline the most important information. Share information with your partner and complete the missing words (2 words). Then, complete the summaries below.

LSC 1103: Reading and Writing 1

1. The course gives you practice in using the findings of **previous research** to write longer academic essays.

2. You will learn about APA, the most commonly used style guide for academic writing, which is also the **preferred method** for citing sources in all HCT reports.

3. The course gives you the opportunity to learn appropriate skills and strategies to understand and use more academic vocabulary without **excessive reliance** on dictionaries.

4. To assist you in developing your research skills, the course demonstrates how to collect and use **reliable data** to support your ideas when writing reports.

5. Editing your written work independently may seem like a **daunting task** when you first start, but using online tools introduced in this course will make this task much easier.

LSC 1503: Spoken Communication

1. The course focuses on listening and note-taking skills that will have a **profound impact** on your overall academic progress.

2. You will engage in **lively debates** with your teachers and classmates over interesting topics, which will enable you to present your views clearly using accurate English.

3. The communication skills you will learn in this course will help reduce your **emotional stress** when standing in front of a class and delivering a presentation.

4. You will be able to use different face-to-face communication strategies that will help you build **instant rapport** with your audience from the moment you take the stage.

5. The final assessment in this course will be a group project where the final presentation is a **shared responsibility** amongst group members.

- **Now complete the following summaries about the two courses above.**

Summary 1

The LSC 1103 is a first semester course focusing on basic research and academic reading and writing skills. Students will learn how to avoid plagiarism using the HCT ______ ________ of referencing: the APA style. Based on careful analysis of ______ ________ studies, students learn how to support their ideas with ______ ________. The ______ ________ of editing one's written work is the main focus of the course. Students will gradually move away from ______ ________ on textbooks towards a more interactive and engaging learning experience while writing essays.

Summary 2

In the LSC 1503 course, students explore the use of spoken English in academic and professional contexts. Students take part in ______ ________ and other speaking activities, such as delivering public speeches, and participating in interviews. The oral communication skills practised in this course will enable you to build ______ ________ with the audience and learn how to reduce your ______ ________ when presenting. These skills will have a ______ ________ on your success in all other courses. The final assessment requires students to have ______ ________ when they work in pairs or groups to develop their learning-by-doing course project.

Task 4: Student Clubs

A- **Read the following description of three HCT student clubs and underline the most important information. Then, with your partner do activity *B* at the back of your handout.**

The Community Service Club

In our club, we strongly believe in **voluntary participation** of both our students and faculty. Involvement in community projects is a **central feature** of the club. Past projects have included organizing *Iftar* for needy workers during the holy month of *Ramadhan*, collecting clothes for the Red Crescent, and beach clean-up campaigns. The overall objective of the club is to help students create plans for action to achieve their **desired outcomes** or goals through interacting with local community members. There are many more opportunities to come and the club is always open to creative ideas.

The Intercultural Club

Our club meets weekly to plan and organize events on campus and in the community. We discuss topics related to communication with people from different cultures, with a **particular emphasis** on how to avoid intercultural misunderstanding. The club's **guiding principle** is to promote activities that are designed to provide opportunities to meet people from other cultures and learn about their traditions and lifestyle. We are proud that our members always make a **significant contribution** to the success of the college social events. The club meets in room 145 every Thursday at 6 pm.

The Health and Wellness Club

College is a lot different than high school. Knowing that during the first week of college classes stress may be an **inevitable consequence**, the club focuses on providing new students a **smooth transition** into all aspects of college life by offering them the support they need. We focus on problem solving and we work closely with the college counsellor to make sure our members are connected to services when needed. As is **standard procedure**, the club management team will not release any information about its members to others. Join us and enjoy **exclusive access** to three online free counselling sessions with our wonderful counsellor.

B- Majid and Ahmad are two HCT students. They want to be active members of HCT clubs. Read their profiles carefully and then match each student to the club that satisfies his needs.

Majid

Matching club: _______________

About Me

I have always been interested in travelling abroad and willing to find out about ways to socialize with people from other countries. One of my personal goals for this academic year is to improve my ability to understand and interact effectively with diverse cultural groups. As a third year engineering student, I also want to participate in major college social events and make our college a better place for all students.

Ahmad

Matching club: ______________

About Me

After all the hard work I put into my first-semester studies, I felt like less of a person after I failed the final physics exam. I feel like the stress in my life is out of control. I have always succeeded with A's and occasional B’s. As of now, I have D's and 2 F’s ... I'm very disappointed and I don’t want this to happen again. I need some one to offer me all the confidential help and support I can get right now to keep me on track!

C- Is your decision correct? Discuss with your partner which collocations helped you match the students to the clubs.

Club	**Club Feature**	**Majid**	**Ahmad**
The Community Service Club	Voluntary participation		
	central feature		
	desired outcomes		
The Intercultural Club	particular emphasis		
	guiding principle		
	significant contribution		
The Health and Wellness Club	inevitable consequence		
	smooth transition		
	standard procedure		
	exclusive access		

Appendix H

The Control Group Treatment

Exercise 1

Look at the Arabic translation and find the equivalent English sequence.

#	Target FSs	Context
1	تأثير عميق	Twitter, Facebook, and Whatsapp are having a profound impact on how millions of people communicate these days.
2	بحث سابق	Previous research has shown that having enough sleep can improve your overall physical health.
3	علاقة فورية	Choosing the right title for your essay is one way to build instant rapport with your readers.
4	ضغط نفسي	Bullying decreases the sense of safety and creates a lot of emotional stress for all college students.
5	مهمة شاقة	Submitting class projects on time can be a daunting task for semester-one students if they don't know how to manage their time effectively.
6	مبدأ توجيهي	Listening to students and supporting them is the guiding principle of the college new counselor.
7	إجراء قياسي	Online testing has become standard procedure for most courses taught in different HCT programs.
8	طريقة محبذة	Emails are still the preferred method for seeking library help among our college students.
9	اعتماد مفرط	Some researchers suggest that excessive reliance on technology may result in loneliness and difficulties interacting with others.
10	بيانات موثوقة	Recent reliable data on the effects of genetically-modified food on human health is not available.
11	انتقال سلس	The *Life and Study Skills* course will ensure a smooth transition from high school to college life for all semester-one students.
12	مسؤولية مشتركة	Education is a shared responsibility between schools, families, and the community, with the best results coming when all three work together.
13	مشاركة تطوعية	Voluntary participation in the local community activities can offer students valuable learning opportunities.

14	نقاش حيوي	The lively debate over newly arrived immigrants’ rights is still going on in many European countries.
15	تركيز خاص	It is important to teach students reading strategies with a particular emphasis on dealing with unknown words.
16	نتيجة حتمية	Damage to the environment is an inevitable consequence of the continuous increase in the world population.
17	خاصية أساسية	Many studies suggest that having support from parents is considered as a central feature of a child's continued success in education.
18	نتائج مرجوة	When you work hard on a learning task and see that your desired outcomes can be achieved, that is really rewarding.
19	مساهمة كبيرة	The late Sheikh Zayed made a significant contribution to the establishment of the United Arab Emirates in the 1970s.
20	دخول حصري	The HCT Library Services provide exclusive access to a huge range of electronic resources to registered students in all programs.

Exercise 2: How Motivated Are You? Answer the following questions and record your answers. Use the chart provided by your teacher to see how motivated you are.

	Questions	**Yes**	**No**
1.	Do you think that attending classes on time can have a profound impact on your understanding of different subjects?		
2.	Are you willing to know about previous research carried out by other college students?		
3.	Are you interested in learning about ways of building instant rapport with students from other departments?		
4.	Are you willing to help your classmates when they are under emotional stress?		
5.	Do you think that the most daunting task for students in their first semester is to improve their study skills?		
6.	Do you think that self-motivation should be the guiding principle of students' learning in all courses?		
7.	Are you interested in knowing about the standard procedure for submitting any excused absence documents?		
8.	Are you interested in knowing about the preferred method of writing formal emails in a college context?		
9.	Do you think that excessive reliance on the teacher's explanation can make you a successful learner?		
10.	Are you interested in knowing how to collect reliable data when doing research in different college courses?		
11.	Do you think that the Student Services can help you make a smooth transition into college life?		
12.	Do you think that students' success is a shared responsibility between teachers, students, and their parents?		
13.	Is voluntary participation in different college and community activities important for you?		
14.	Are you interested in engaging in the lively debate over the health risks of fast food for students?		
15.	Are you interested in attending free evening classes with a particular emphasis on oral presentation skills?		
16.	Are low student's marks on different tests an inevitable consequence of not attending classes?		
17.	Should the learning-by-doing projects be a central feature of most HCT courses?		
18.	Do you accept to work with slow learners to help them achieve the desired outcomes to succeed in their first semester?		
19.	As a semester-one student, do you think you can make a significant contribution to the success of our Student Council?		
20.	Are you interested in gaining exclusive access to all online Blackboard and library resources when you are off campus?		

Total number of ***Yes*** answers: ________ Total number of ***No*** answers: ________

Exercise 3: Fill in the Blanks

A- *Fill in with the adjective from the list that best completes the sentence.*

previous - daunting– profound– emotional– shared– lively– reliable– excessive - instant– preferred

1- The course gives you practice in using the findings of ____________ research to write longer academic essays.

2- You will learn about APA, the most commonly used style guide for academic writing, which is also the ____________ method for citing sources in all HCT reports.

3- The course gives you the opportunity to learn appropriate skills and strategies to understand and use more academic vocabulary without ____________ reliance on dictionaries.

4- To assist you in developing your research skills, the course demonstrates how to collect and use ____________ data to support your ideas when writing reports.

5- Editing your written work independently may seem like a ____________ task when you first start, but using online tools explained in this course will make this task much easier.

6- The course focuses on listening and note-taking techniques that will have a ____________ impact on your overall academic progress.

7- You will engage in ____________ debates with your teachers and classmates over interesting topics. This will enable you to present your views clearly using accurate English.

8- The communication skills you will learn in this course will help reduce your ____________ stress when standing in front of a class and delivering a presentation.

9- You will be able to use different face-to-face communication strategies that will help you build ____________ rapport with your audience from the moment you take the stage.

10- The final assessment in this course will be a group project where the final presentation is a ____________ responsibility amongst group members.

B- ***Now complete the following summaries about the two courses in Activity 3-A***

Summary 1

The LSC 1103 is a first semester course focusing on basic research and academic reading and writing skills. Students will learn how to avoid plagiarism using the HCT preferred ____________ of referencing: the APA style. Based on careful analysis of previous ____________studies, students learn how to support their ideas with reliable ____________. The daunting ____________of editing one's written work is the main focus of the course. Students will gradually move away from excessive ____________on textbooks towards a more interactive and engaging learning experience while writing essays.

Summary 2

In the LSC 1503 course, students explore the use of spoken English in academic and professional contexts. Students take part in __________ debates and other speaking activities, such as delivering public speeches, and participating in interviews. The oral communication skills practised in this course will enable you to build __________ rapport with the audience and learn how to reduce your __________ stress when presenting. These skills will have a __________ impact on your success in all other courses. The final assessment requires students to have __________ responsibility when they work in pairs or groups to develop their learning-by-doing course project.

Exercise 4: Student Clubs

A - ***Read the following paragraphs about three HCT clubs and complete the sequence with a noun from the list.***

emphasis – access - feature – transition - contribution – consequence -procedure - outcomes – principle – participation -

The Community Service Club

The club provides many opportunities for students to follow their passions while doing service. Voluntary ___________ in many planned community projects is a central ___________ of the club. Past projects have included organizing *Iftar* for needy workers during the holy month of *Ramadhan*, collecting clothes for the Red Crescent, and beach clean-up campaigns. The overall objective of the club is to help students create plans for action to achieve their desired ___________ or goals through interacting with local community members. There are many more opportunities to come and the club is always open to new ideas as well.

The Intercultural Club

Our club meets weekly to plan and organize events on campus and in the community. We discuss topics related to communication with people from different cultures, with a particular ___________ on how to avoid intercultural misunderstanding. The club's guiding ___________ is to promote activities that are designed to provide opportunities to meet people from other cultures and learn about their traditions and lifestyle. Our club is the oldest at the college and our members always make a significant ___________ to the success of the college social events. The club meets in room 145 every Thursday at 6 pm.

The Health and Wellness Club

College is a lot different than high school. Knowing that during the first week of classes stress may be an inevitable ___________ of being a college student, the club focuses on providing new students a smooth ___________ into all aspects of college life by offering them the support they need. We focus on problem solving and we work closely with the college counsellor to make sure our members are connected to services when appropriate. As is standard ___________, the club management team will not release any information about its members to others. Join us and you will enjoy exclusive ___________ to twelve online free counselling sessions with our wonderful counsellor.

B- Now write the verb and noun in the following table:

The Community Service Club	The Intercultural Club	The Health and Wellness Club
___________ ___________	___________ ___________	___________ ___________
___________ ___________	___________ ___________	___________ ___________
___________ ___________	___________ ___________	___________ ___________
		___________ ___________

Exercise 4: Collocation Search

Find the following collocations in the grid below. The first one has been done for you. There is a random letter that separates the two constituents.

~~particular emphasis~~ - exclusive access - central feature - significant contribution

inevitable consequence - standard procedure - desired outcomes - guiding principle

voluntary participation - reliable data - lively debate - profound impact - emotional stress

previous research - daunting task - preferred method - shared responsibility

excessive reliance - instant rapport - smooth transition

r	d	v	o	l	u	n	t	a	r	y	g	p	a	r	t	i	c	i	p	a	t	i	o	n	p
w	y	x	n	p	b	q	g	u	i	d	i	n	g	i	p	r	i	n	c	i	p	l	e	p	j
t	v	a	q	c	t	w	o	e	g	h	q	z	t	g	v	i	e	w	t	y	o	p	b	a	d
b	q	x	t	s	m	o	o	t	h	b	t	r	a	n	s	i	t	i	o	n	p	r	t	r	g
s	t	a	n	d	a	r	d	i	p	r	o	c	e	d	u	r	e	i	y	r	r	e	x	t	l
o	r	a	f	f	g	i	n	s	t	a	n	t	b	r	a	p	p	o	r	t	g	f	h	i	v
a	d	a	u	n	t	i	n	g	h	t	a	s	k	i	l	g	r	e	e	t	k	e	r	c	x
i	n	e	v	i	t	a	b	l	e	f	c	o	n	s	e	q	u	e	n	c	e	r	d	u	e
k	v	f	d	e	z	q	i	o	j	b	h	w	w	o	k	g	e	y	b	w	c	r	e	l	m
e	x	c	l	u	s	i	v	e	a	a	c	c	e	s	s	y	x	l	c	d	z	e	s	a	o
d	n	f	x	a	h	x	a	h	o	w	d	h	u	u	z	h	c	i	j	k	c	d	i	r	t
i	q	x	t	z	x	m	h	x	v	b	q	w	e	n	a	u	l	v	p	y	z	n	r	v	i
p	r	e	v	i	o	u	s	f	r	e	s	e	a	r	c	h	u	e	r	d	a	m	e	e	o
u	l	g	n	z	m	y	n	y	u	m	m	o	s	r	h	c	s	l	e	h	c	e	d	m	n
k	p	r	o	f	o	u	n	d	n	i	m	p	a	c	t	q	i	y	z	d	q	t	u	p	a
g	i	r	e	l	i	a	b	l	e	d	d	a	t	a	n	x	v	h	u	w	z	h	o	h	l
t	m	w	u	y	c	m	v	m	u	t	g	y	o	g	m	c	e	d	y	z	d	o	u	a	d
c	z	d	j	z	v	d	x	a	z	c	w	s	m	h	q	s	w	e	h	l	c	d	t	s	s
l	m	g	x	t	q	s	v	f	w	q	i	a	s	n	u	n	a	b	n	h	e	o	c	i	t
d	n	q	e	t	q	p	n	c	p	c	f	t	q	e	q	w	c	a	k	r	s	z	o	s	r
h	k	u	h	x	d	z	w	c	i	m	j	u	v	j	z	p	c	s	w	k	n	b	m	j	e
m	v	u	k	v	k	j	b	x	g	s	i	g	e	s	m	q	e	t	x	z	l	r	e	b	s
c	e	n	t	r	a	l	y	f	e	a	t	u	r	e	u	l	s	e	t	e	m	k	x	z	s
k	p	o	i	r	g	o	s	n	g	m	p	e	g	p	c	j	s	w	m	q	p	a	n	a	b
w	v	s	h	a	r	e	d	a	r	e	s	p	o	n	s	i	b	i	l	i	t	y	n	k	l
p	s	i	g	n	i	f	i	c	a	n	t	u	c	o	n	t	r	i	b	u	t	i	o	n	a

Exercise 5: Collocation Box

Make ten verb + noun combinations out of the words in the box. Use each word once only.

profound	rapport	task	stress	data
method	lively	daunting	reliable	impact
research	shared	previous	reliance	excessive
responsibility	instant	debates	preferred	emotional

Write the verb + noun combinations below:

1- ____________________ ____________________

2- ____________________ ____________________

3- ____________________ ____________________

4- ____________________ ____________________

5- ____________________ ____________________

6- ____________________ ____________________

7- ____________________ ____________________

8- ____________________ ____________________

9- ____________________ ____________________

10- ____________________ ____________________

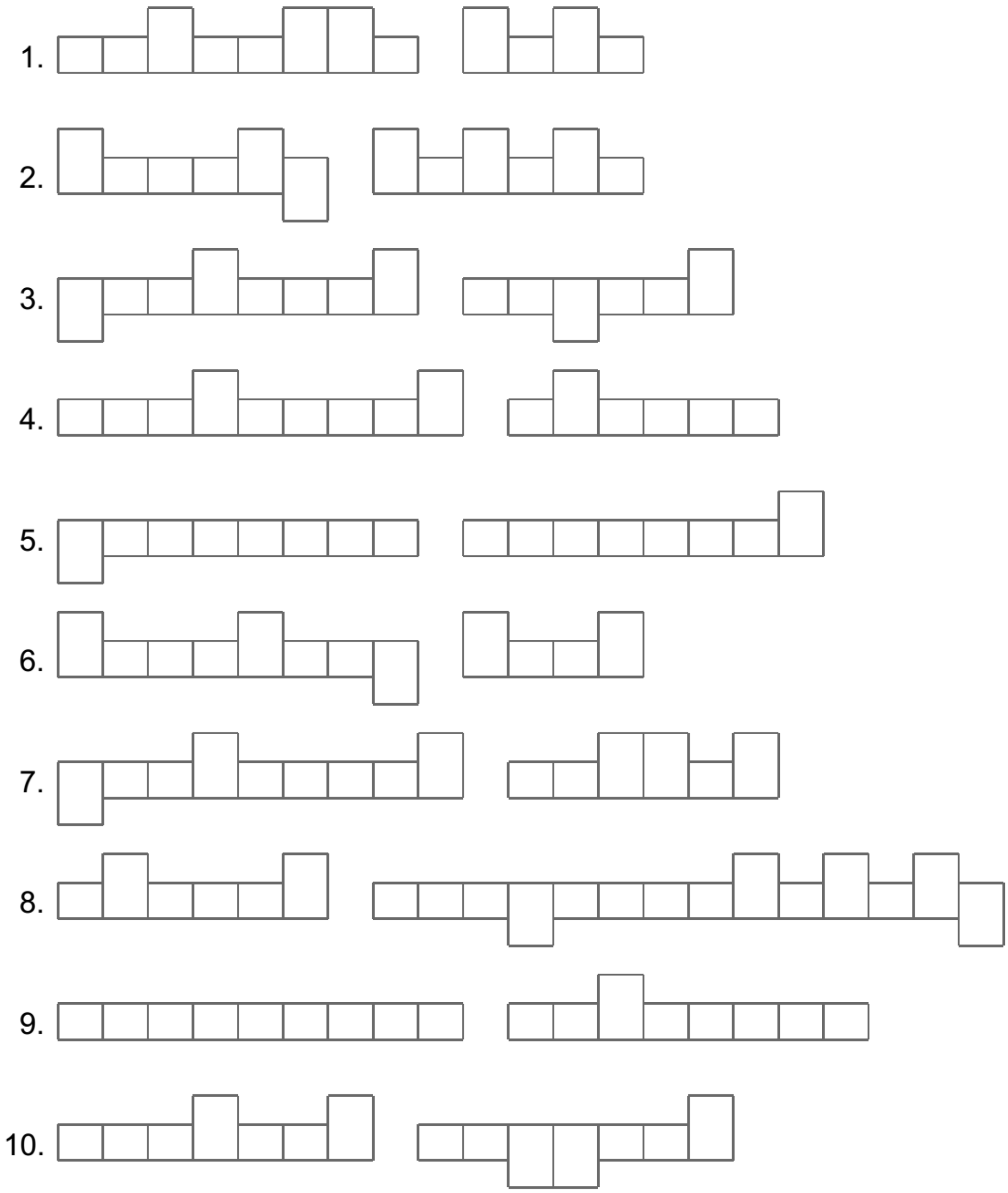
Exercise 6: Collocation Shape

Print the following collocations in the empty boxes above. The shape of the word must match the shape of the boxes.

reliable data   lively debate   profound impact   emotional stress   previous research

daunting task   preferred method   shared responsibility   excessive reliance

instant rapport



Exercise 7: Collocation Box

Make ten verb + noun combinations out of the words in the box. Use each word once only.

particular	inevitable	procedure	desired	principle
exclusive	smooth	standard	guiding	emphasis
central	contribution	feature	voluntary	participation
significant	consequence	transition	access	outcomes

Write the word combinations below:

1- __________________ __________________

2- __________________ __________________

3- __________________ __________________

4- __________________ __________________

5- __________________ __________________

6- __________________ __________________

7- __________________ __________________

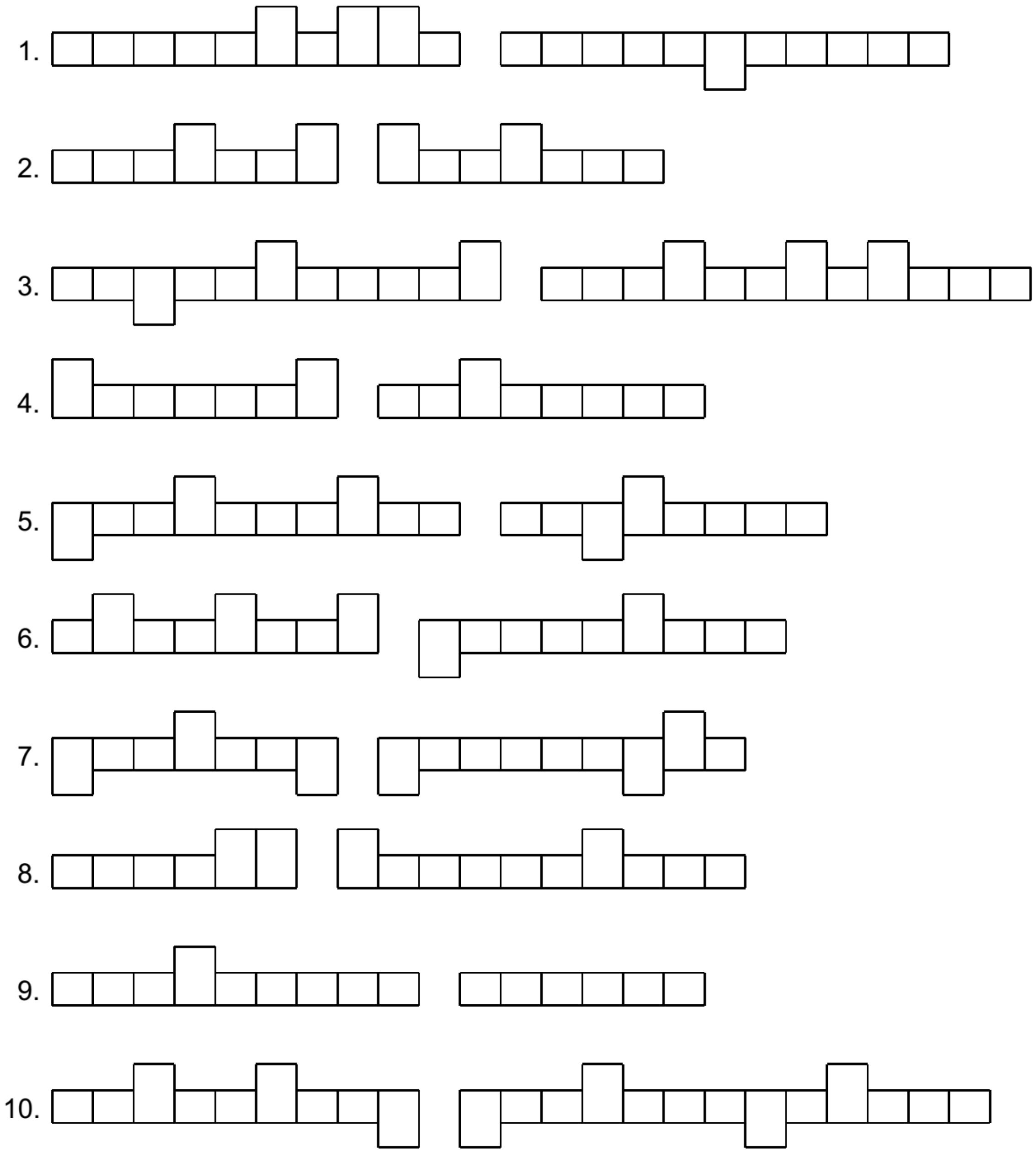
8- __________________ __________________

9- __________________ __________________

10- __________________ __________________

Exercise 8: Collocation Shape

Print the collocations in Exercise 7 in the empty boxes above. The shape of the word must match the shape of the boxes.



Appendix I

The Pre-tests A and B

The Pre-Test A

This test is meant to gather information about your knowledge and understanding of English vocabulary. The findings will help me plan the vocabulary component of the course. Your test scores will not be part of your mark for this course.

I- Read the word in column **A** and choose the word that you think usually goes with it from column **B**, and provide the **Arabic Translation**. If you think that you don't know the words that can go with each other choose ***I DON'T KNOW.***

A	B	Arabic Translation
1- **do**	a- accident b- homework c- account d- I DON'T KNOW	__________ __________
2- **develop**	a- attacks b- stairs c- strategies d- I DON'T KNOW	__________ __________
3- **open**	a- door b- telephone c- trouble d- I DON'T KNOW	__________ __________
4- **stimulate**	a- debate b- towel c- spade d- I DON'T KNOW	__________ __________
5- **rare**	a- knees b- disease c- month d- I DON'T KNOW	__________ __________
6- **qualified**	a- teacher b- season c- feather d- I DON'T KNOW	__________ __________
7- **conduct**	a- result b- charge c- research d- I DON'T KNOW	__________ __________

A	B	Arabic Translation
8- **achieve**	a- success b- answer c- garage d- I DON'T KNOW	
9- **explore**	a- ambition b- alternatives c- discussion d- I DON'T KNOW	
10- **assume**	a- prejudice b- responsibility c- department d- I DON'T KNOW	
11- **maintain**	a- afternoon b- contact c- button d- I DON'T KNOW	
12- **relieve**	a- stress b- skirt c- chimney d- I DON'T KNOW	
13- **high**	a- butter b- shelf c- article d- I DON'T KNOW	
14- **demonstrate**	a- holiday b- competence c- electricity d- I DON'T KNOW	
15- **slow**	a- car b- bottle c- despair d- I DON'T KNOW	
16- **seek**	a- beard b- revenge c- brain d- I DON'T KNOW	
17- **establish**	a- surface b- bone c- rapport d- I DON'T KNOW	

A	B	Arabic Translation
18- **gain**	a- meeting b- access c- classmate d- I DON'T KNOW	______________________ ______________________
19- **avoid**	a- dress b- conflict c- envelope d- I DON'T KNOW	______________________ ______________________
20- **prohibit**	a- discrimination b- procession c- handkerchief d- I DON'T KNOW	______________________ ______________________
21- **promote**	a- witness b- cooperation c- ornament d- I DON'T KNOW	______________________ ______________________
22- **prevent**	a- circle b- flower c- disease d- I DON'T KNOW	______________________ ______________________
23- **raise**	a- telegraph b- awareness c- voyage d- I DON'T KNOW	______________________ ______________________
24- **improve**	a- throats b- elephants c- outcomes d- I DON'T KNOW	______________________ ______________________
25- **provide**	a- hunger b- regret c- assistance d- I DON'T KNOW	______________________ ______________________
26- **deserve**	a- screw b- ocean c- credit d- I DON'T KNOW	______________________ ______________________
27- **encourage**	a- problem b- dictionary c- participation d- I DON'T KNOW	______________________ ______________________

A	B	Arabic Translation
28- **enjoy**	a- life b- shame c- mile d- I DON’T KNOW	
29- **earn**	a- forest b- distance c- income d- I DON’T KNOW	
30- **pass**	a- legislation b- stomach c- mountain d- I DON’T KNOW	
31- **receive**	a- industry b- compensation c- difference d- I DON’T KNOW	
32- **defy**	a- experiment b- decrease c- logic d- I DON’T KNOW	
33- **facilitate**	a- ornament b- temperature c- implementation d- I DON’T KNOW	
34- **analyse**	a- data b- meal c- hope d- I DON’T KNOW	
35- **reduce**	a- reliance b- plate c- nephew d- I DON’T KNOW	

II- Translate the following sentences into Arabic:

1- My young brother is having difficulties with reading.

2- All students have been given their new laptops.

3- The bus to the city centre is always on time.

4- My dream is to run a successful business.

The Pre-Test B

This test is meant to gather information about your knowledge and understanding of English vocabulary. The findings will help me plan the vocabulary component of the course. Your test scores will not be part of your mark for this course.

I- Read the word in column **A** and choose the word that you think usually goes with it from column **B**, and provide the **Arabic Translation**. If you think that you don't know the words that can go with each other choose ***I DON'T KNOW.***

A	B	Arabic Translation
1- **profound**	e- impact f- telephone g- insect h- I DON'T KNOW	
2- **previous**	i- spoon j- stairs k- research l- I DON'T KNOW	______________ ______________
3- **do**	e- accident f- homework g- account h- I DON'T KNOW	______________ ______________
4- **emotional**	e- stress f- towel g- spade h- I DON'T KNOW	______________ ______________
5- **instant**	e- knees f- guest g- rapport h- I DON'T KNOW	______________ ______________
6- **reach**	a- danger b- advantage c- consensus d- I DON'T KNOW	______________ ______________
7- **daunting**	e- teacher f- season g- task h- I DON'T KNOW	______________ ______________
8- **fully**	a- high b- great c- open	______________ ______________

A	B	Arabic Translation
	d- I DON'T KNOW	
9- **guiding**	e- result f- charge g- principle h- I DON'T KNOW	__________ __________
10- **standard**	e- success f- procedure g- liberty h- I DON'T KNOW	__________ __________
11- **deserve**	a- smoke b- trunk c- credit d- I DON'T KNOW	__________ __________
12- **preferred**	a- method b- skin c- escape d- I DON'T KNOW	__________ __________
13- **assume**	e- prejudice f- responsibility g- department h- I DON'T KNOW	__________ __________
14- **excessive**	e- afternoon f- reliance g- button h- I DON'T KNOW	__________ __________
15- **reliable**	e- data f- skirt g- chimney h- I DON'T KNOW	__________ __________
16- **smooth**	e- load f- transition g- article h- I DON'T KNOW	__________ __________
17- **drink**	a- attraction b- alcohol c- waist d- I DON'T KNOW	__________ __________
18- **short**	a- break b- force c- clay	__________ __________

A	B	Arabic Translation
	d- I DON'T KNOW	
19- **shared**	a- rubber b- responsibility c- confusion d- I DON'T KNOW	____________________ ____________________
20- **large**	a- shock b- deed c- amount d- I DON'T KNOW	____________________ ____________________
21- **voluntary**	a- trouble b- liquid c- participation d- I DON'T KNOW	____________________ ____________________
22- **lively**	e- debate f- bottle g- despair h- I DON'T KNOW	____________________ ____________________
23- **inevitable**	e- beard f- consequence g- brain h- I DON'T KNOW	____________________ ____________________
24- **play**	e- meeting f- guitar g- classmate h- I DON'T KNOW	____________________ ____________________
25- **sweet**	a- taste b- cloth c- needle d- I DON'T KNOW	____________________ ____________________
26- **central**	e- dress f- feature g- envelope h- I DON'T KNOW	____________________ ____________________
27- **particular**	e- stomach f- emphasis g- ornament h- I DON'T KNOW	____________________ ____________________
28- **middle**	a- lane b- soup c- silk	____________________ ____________________

A	B	Arabic Translation
	d- I DON'T KNOW	
29- **desired**	e- throats f- elephants g- outcomes h- I DON'T KNOW	____________ ____________
30- **provide**	e- hunger f- regret g- assistance h- I DON'T KNOW	____________ ____________
31- **calm**	a- voice b- fun c- juice d- I DON'T KNOW	____________ ____________
32- **significant**	e- screw f- gallon g- contribution h- I DON'T KNOW	____________ ____________
33- **enjoy**	e- life f- shame g- mile h- I DON'T KNOW	____________ ____________
34- **earn**	e- forest f- distance g- income h- I DON'T KNOW	____________ ____________
35- **exclusive**	a- access b- pools c- flour d- I DON'T KNOW	____________ ____________

II- Translate the following sentences into Arabic:

1- My young brother is having difficulties with reading.

2- All students have been given their new laptops.

3- The bus to the city centre is always on time.

4- My dream is to run a successful business.

Appendix J

The Verb-Noun Immediate and Delayed Productive Post-Test

Read the sentence and look at the Arabic translation. Complete the sentence with the sequence that is most suitable for this context.

	Sentence	**Arabic Translation**
1-	Many local Emirati organizations including the Red Crescent continue to **pr**_____________ **as**___________ to the Syrian immigrants who badly need help with the difficult weather conditions.	يقدم المساعدة
2-	Studies show that when students **co**_____________ **r**___________ to explore a topic of interest and share the results of their work, they develop their communication skills, including reading, writing, and presenting their findings.	يقوم بالبحث
3-	It is not always easy for teachers to **es**_____________ **ra**___________ with their students because of the big age difference between them and the different interests they may have.	يمتن الصلة
4-	Parents should **as**_____________ **res**___________ for teaching their children practical self-care and health and safety rules. In this way, they prepare them to deal with the outside world.	يتحمل المسؤولية
5-	Some of the best ways to **re**_____________ **st**___________ include exercising, talking to friends, listening to music, or simply getting outside. This can help you forget your worries and feel more powerful.	يحد من التوتر
6-	The UAE laws **pr**_____________ **dis**___________ based on a person's nationality in employment decisions. These laws clearly state that all people have equal rights.	يمنع التمييز
7-	Before joining the Higher Colleges of Technology, all students are asked to take the IELTS exam to **de**_____________ **com**___________ in English because it is the language of instruction.	يثبت الكفاءة
8-	The college football team **de**_____________ **cr**___________ for winning the championship three times. This year win is special because the team ended the season unbeaten.	يستحق الثناء

9-	The aim of the online Blackboard blogs is to make communication easier between the instructor and students and to **st** _____________ **de**___________ among students about issues related to their college life.	يحفز النقاش
10-	The library staff are always ready to answer students' questions and offer advice. Their aim is to help students **g**_____________ **ac**___________ to information using a wide range of materials.	يصل الى
11-	Some people think that the best way to **av**_____________ **co**___________ at work is to never talk about anyone. It is best not say anything behind someone's back.	يتجنب الخلافات
12-	Nowadays, with the popularity of smart phones, students find it easier to **ma**_____________ **co**___________ with their old friends through the use of social media applications like Facebook and Twitter.	يبقى على اتصال
13-	The UAE leaders have promised to further **pr**_____________ **co**___________ with poor Asian countries and support them to improve their economy through giving them special oil prices.	يعزز التعاون
14-	Over the past six years, road accidents killed 5,514 people in the UAE. More than 63% of these accidents are due to speeding. The local police authorities are considering stricter rules to decrease the number of accidents and **ra**_____________ **aw**___________.	يرفع مستوى الوعي
15-	Giving students more time to think before they answer their instructor's questions is one way to **en**_____________ **par**___________ from all learners in classroom activities.	يشجع المشاركة
16-	Successful educators are those who know how to guide their students to **de**_____________ **str**___________ to solve problems on their own and reach their personal learning goals.	يطور استراتيجية
17-	The Higher Colleges of Technology employ student assistants in some college roles for the purpose of allowing students to **re**_____________ **com**___________ to help them meet their college needs.	يحصل على تعويض

18-	With the alarming pollution rate that has put people's health at risk, many countries today continue to **ex**_____________ **alt**___________ to oil like wind and solar power.	يستكشف البدائل
19-	The course modules focus on problem solving and give students necessary skills to collect and **an**_____________ **da**___________ systematically. You will also practise writing effective research reports.	يحلل النتائج
20-	The use of interactive projects has been attractive in that it provides a practical way to substantially **im**_____________ **ou**___________ for students, and to encourage them to build effective communication skills.	يحسسن المخرجات

The Adjective-Noun Immediate and Delayed Productive Post-Test

Read the sentence and look at the Arabic translation. Complete the sentence with the sequence that is most suitable for this context.

	Sentence	**Arabic Translation**
1-	Setting goals from the beginning of the academic year can have a **pr___________ im__________** on what students learn.	تأثير عميق
2-	When students start exploring a topic of interest, an analysis of **pr**_____________ **re**___________ can be very useful in improving their understanding of this topic.	بحث سابق
3-	Using humor during the first classes can help teachers establish **in___________ ra___________** with their students and create a warmer and more relaxed learning environment.	علاقة فورية
4-	Some of the best ways to reduce **em_____________ st___________** and feel more comfortable include exercising, talking to friends, listening to music, or simply getting outside.	ضغط نفسي
5-	Getting all of your homework assignments done becomes increasingly a **da_________ ta_________** if you don't know how to manage your time effectively.	مهمة شاقة
6-	The most important general **gu__________ pr__________** when teachers plan for any learning activity should be the interest of students.	مبدأ توجيهي
7-	As is **st___________ pr__________** in all HCT final exams, students must present their college ID to the invigilators before entering the exam room.	إجراء قياسي
8-	During the four years of studies, the **pr___________ me___________** of communication with your teachers and the students' and academic services in your college is your HCT email.	طريقة محبذة
9-	Most HCT teachers fully support a move away from **ex____________ re_________** on written exams and want to see more focus in their courses on portfolio and learning-by-doing projects.	اعتماد مفرط
10-	If you don't have enough **re_________ da_______** to support your claims when writing essays, then your readers may not be interested in your paper.	بيانات موثوقة

11-	Preparation and advanced planning are the key to making a **sm**__________ **tr**_____________ into a new academic year and successfully beginning your first semester at college.	انتقال سلس
12-	An advantage of involving students in group work is that having **sh**____________ **re**_____________ makes them more engaged and willing to help each other.	مسؤولية مشتركة
13-	All freshmen were sent a letter explaining different community projects for this year and asking for their **vo**____________ **pa**____________.	مشاركة تطوعية
14-	After a **li**____________ **de**____________ with the Student Council members over the new attendance policy, the college director decided to organize another meeting to continue the discussion of this policy.	نقاش حيوي
15-	The new HCT learning-by-doing model puts **pa**____________ **em**____________ on students' ability to work independently and manage their time.	تركيز خاص
16-	During your college studies, failing a course is an **in**____________ **co**____________ of missing classes and not submitting your assignments on time.	نتيجة حتمية
17-	Having support from parents and the wider family is now recognised as a **ce**____________ **fe**____________ of successful education for young children.	خاصية أساسية
18-	Setting learning goals early in the semester and attending classes regularly will help you achieve **de**____________ **ou**____________ in your college studies.	نتائج مرجوة
19-	In all HCT colleges, the Distinguished Student Award is given to students who have made the most **si**____________ **co**____________ to improving college life throughout the academic year.	مساهمة كبيرة
20-	After graduation, all HCT students can still enjoy **ex**____________ **ac**____________ to online library services, including borrowing books, journals, magazines, and popular DVDs.	دخول حصري

Appendix K

The Verb-Noun Immediate and Delayed Receptive Post-Test

Read the sentence and translate the underlined sequence of words into Arabic. If you don't know the translation, circle ***I DON'T KNOW***.

	Sentence	Arabic Translation
1-	**analyze data**	______________________ I DON'T KNOW
2-	**improve outcomes**	______________________ I DON'T KNOW
3-	**explore alternatives**	______________________ I DON'T KNOW
4-	**receive compensation**	______________________ I DON'T KNOW
5-	**develop strategies**	______________________ I DON'T KNOW
6-	**encourage participation**	______________________ I DON'T KNOW
7-	**raise awareness**	______________________ I DON'T KNOW
8-	**promote cooperation**	______________________ I DON'T KNOW
9-	**maintain contact**	______________________ I DON'T KNOW
10-	**avoid conflict**	______________________ I DON'T KNOW
11-	**gain access**	______________________

		I DON’T KNOW
12-	**stimulate debate**	________________________ I DON’T KNOW
13-	**deserve credit**	________________________ I DON’T KNOW
14-	**demonstrate competence**	________________________ I DON’T KNOW
15-	**prohibit discrimination**	________________________ I DON’T KNOW
16-	**relieve stress**	________________________ I DON’T KNOW
17-	**assume responsibility**	________________________ I DON’T KNOW
18-	**establish rapport**	________________________ I DON’T KNOW
19-	**conduct research**	________________________ I DON’T KNOW
20-	**provide assistance**	________________________ I DON’T KNOW

The Adjective-Noun Immediate and Delayed Receptive Post-Test

Read the sentence and translate the underlined sequence of words into Arabic. If you don't know the translation, circle ***I DON'T KNOW***.

	Sentence	Arabic Translation
1-	**profound impact**	______________________ I DON'T KNOW
2-	**previous research**	______________________ I DON'T KNOW
3-	**instant rapport**	______________________ I DON'T KNOW
4-	**emotional stress**	______________________ I DON'T KNOW
5-	**daunting task**	______________________ I DON'T KNOW
6-	**guiding principle**	______________________ I DON'T KNOW
7-	**standard procedure**	______________________ I DON'T KNOW
8-	**preferred method**	______________________ I DON'T KNOW
9-	**excessive reliance**	______________________ I DON'T KNOW
10-	**reliable data**	______________________ I DON'T KNOW
11-	**smooth transition**	______________________ I DON'T KNOW

12-	**shared responsibility**	___________________________ I DON'T KNOW
13-	**voluntary participation**	___________________________ I DON'T KNOW
14-	**lively debate**	___________________________ I DON'T KNOW
15-	**particular emphasis**	___________________________ I DON'T KNOW
16-	**inevitable consequence**	___________________________ I DON'T KNOW
17-	**central feature**	___________________________ I DON'T KNOW
18-	**desired outcomes**	___________________________ I DON'T KNOW
19-	**significant contribution**	___________________________ I DON'T KNOW
20-	**exclusive access**	___________________________ I DON'T KNOW

Appendix L

The Motivational Survey
English Learner Questionnaire

This survey is conducted by your English teacher to better understand your thoughts and beliefs about learning English. This will help him plan for the course effectively by selecting appropriate materials and using the suitable teaching strategies. This is not a test, so there are no “right” and “wrong” answers. The results of the survey will be used only for research purposes, so please give your answers sincerely. Thank you very much for your help!

I would like you to tell me how much you agree or disagree with the following statements by simply circling a number from 1 to 6.

strongly disagree	disagree	slightly disagree	slightly agree	agree	strongly agree
1	**2**	**3**	**4**	**5**	**6**

Example: If you strongly agree with the following statement, write this: **I like skiing very much.**	**1 2 3 4 5 6**
1- If an English course was offered at university or somewhere else in the future, I would like to take it.	**1 2 3 4 5 6**
2- Studying English is important to me in order to bring honour to my family.	**1 2 3 4 5 6**
3- Studying English can be important to me because I think it will someday be useful in getting a good job.	**1 2 3 4 5 6**
4- Compared to my classmates, I think I study English relatively hard.	**1 2 3 4 5 6**
5- Studying English is important to me because English proficiency is necessary for promotion in the future.	**1 2 3 4 5 6**
6- Studying English is important to me, because I would feel ashamed if I got bad grades in English.	**1 2 3 4 5 6**
7- I don’t like to travel to English-speaking countries.	**1 2 3 4 5 6**
8- Studying English can be important for me because I think I’ll need it for further studies on my major.	**1 2 3 4 5 6**
9- I feel nervous and confused when I am speaking in my English class.	**1 2 3 4 5 6**
10- I would like to concentrate on studying English more than any other topic.	**1 2 3 4 5 6**
11- I would like to know more about people from English-speaking countries.	**1 2 3 4 5 6**
12- My family put a lot of pressure on me to study English	**1 2 3 4 5 6**

strongly disagree	disagree	slightly disagree	slightly agree	agree	strongly agree
1	**2**	**3**	**4**	**5**	**6**

13-	Studying English is important to me because, if I don't have knowledge of English, I'll be considered a weak learner	**1 2 3 4 5 6**
14-	I study English in order to keep updated and informed of recent news of the world.	**1 2 3 4 5 6**
15-	My parents encourage me to study English.	**1 2 3 4 5 6**
16-	I would feel uneasy speaking English with a native speaker.	**1 2 3 4 5 6**
17-	I have to study English; otherwise, I think I cannot be successful in my future career.	**1 2 3 4 5 6**
18-	I like meeting people from English-speaking countries.	**1 2 3 4 5 6**
19-	If my teacher would give the class an optional assignment, I would certainly volunteer to do it.	**1 2 3 4 5 6**
20-	I would get tense if a foreigner asked me for directions in English.	**1 2 3 4 5 6**
21-	I have to learn English because without passing the English course I cannot graduate.	**1 2 3 4 5 6**
22-	My parents encourage me to practise my English as much as possible.	**1 2 3 4 5 6**
23-	I like the people who live in English-speaking countries?	**1 2 3 4 5 6**
24-	I am afraid of sounding stupid in English because of the mistakes I make.	**1 2 3 4 5 6**

Appendix M

```
SORT CASES  BY Method.
SPLIT FILE SEPARATE BY Method.
EXAMINE VARIABLES=RT PT DRT DPT
  /PLOT BOXPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
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Explore

Notes

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	Split File	Method

	N of Rows in Working Data File	56
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=RT PT DRT DPT /PLOT BOXPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:00.98
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Method = TB

Case Processing Summary[a]

	Cases		
	Valid	Missing	Total

	N	Percent	N	Percent	N	Percent
RT	29	100.0%	0	0.0%	29	100.0%
PT	29	100.0%	0	0.0%	29	100.0%
Delayed Receptive	29	100.0%	0	0.0%	29	100.0%
Delayed Productive	29	100.0%	0	0.0%	29	100.0%

a. Method = TB

Descriptives[a]

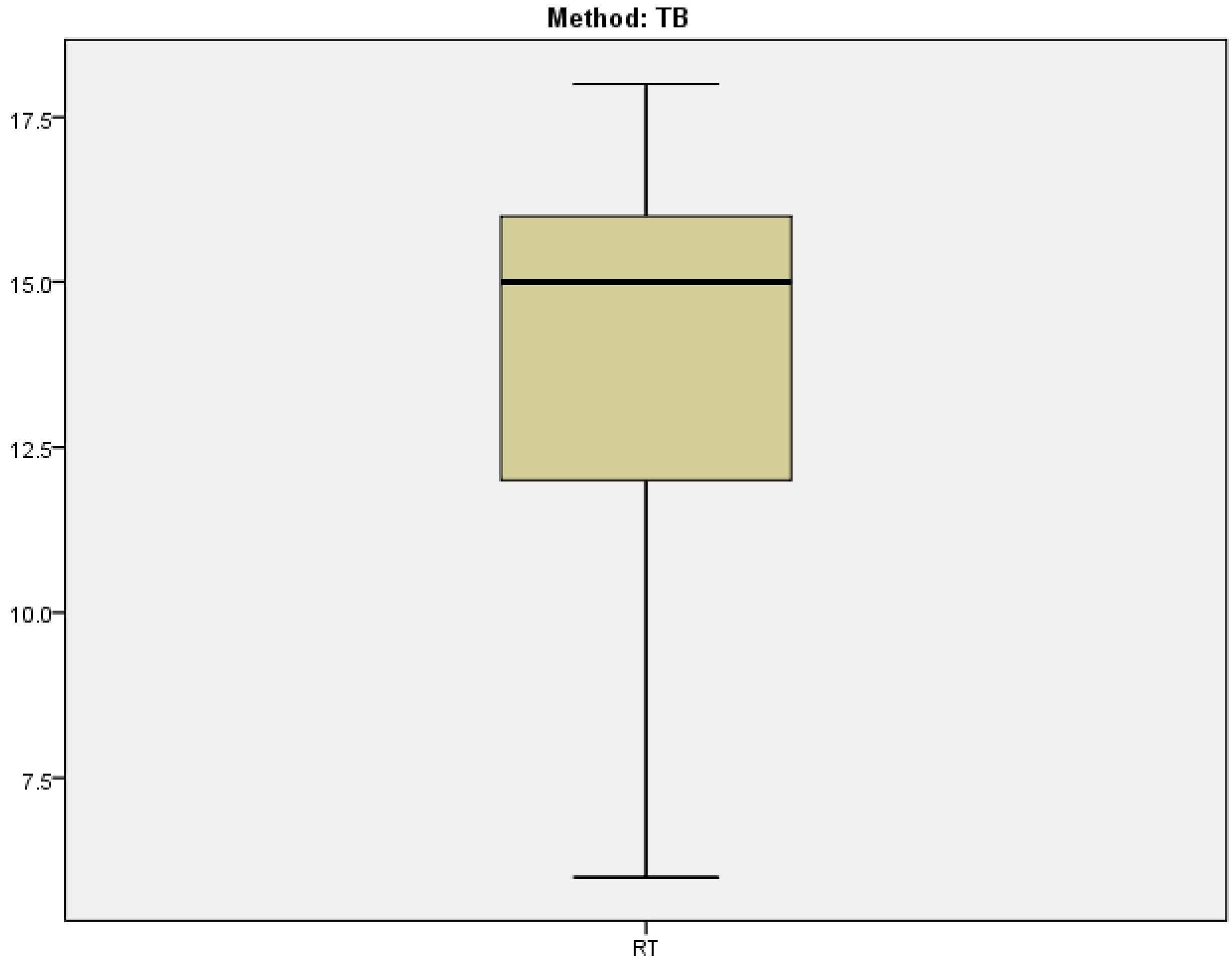
			Statistic	Std. Error
RT	Mean		13.66	.610
	95% Confidence Interval for Mean	Lower Bound	12.40	
		Upper Bound	14.91	
	5% Trimmed Mean		13.82	
	Median		15.00	
	Variance		10.805	
	Std. Deviation		3.287	
	Minimum		6	
	Maximum		18	
	Range		12	
	Interquartile Range		5	
	Skewness		-.831	.434
	Kurtosis		-.148	.845
PT	Mean		9.72	.387
	95% Confidence Interval for Mean	Lower Bound	8.93	
		Upper Bound	10.52	

	5% Trimmed Mean		9.77	
	Median		10.00	
	Variance		4.350	
	Std. Deviation		2.086	
	Minimum		5	
	Maximum		14	
	Range		9	
	Interquartile Range		3	
	Skewness		-.417	.434
	Kurtosis		.036	.845
Delayed Receptive	Mean		8.38	.376
	95% Confidence Interval for Mean	Lower Bound	7.61	
		Upper Bound	9.15	
	5% Trimmed Mean		8.34	
	Median		9.00	
	Variance		4.101	
	Std. Deviation		2.025	
	Minimum		4	
	Maximum		14	
	Range		10	
	Interquartile Range		2	
	Skewness		.355	.434
	Kurtosis		1.226	.845
Delayed Productive	Mean		6.48	.320
	95% Confidence Interval for Mean	Lower Bound	5.83	
		Upper Bound	7.14	
	5% Trimmed Mean		6.44	

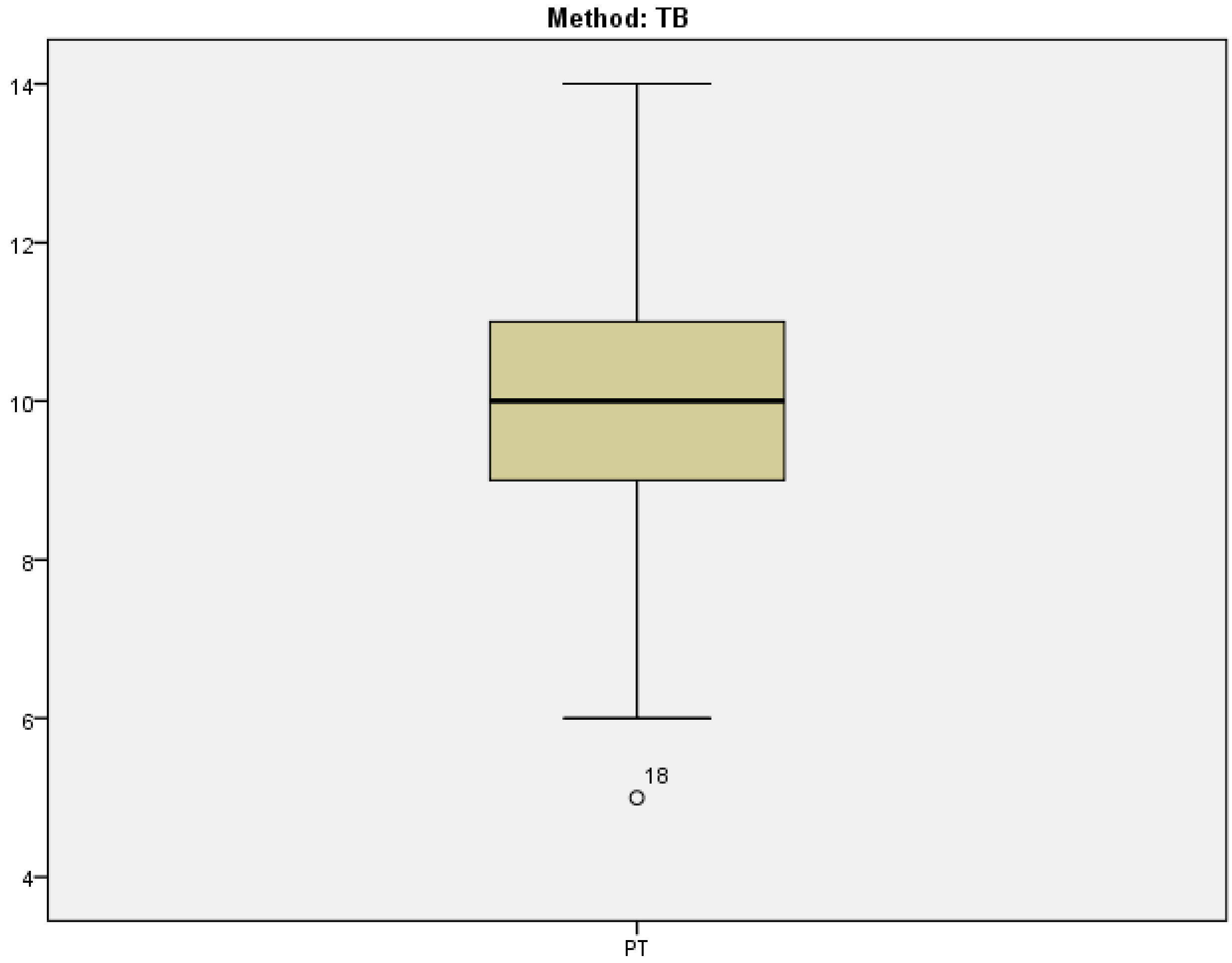
	Median	6.00	
	Variance	2.973	
	Std. Deviation	1.724	
	Minimum	3	
	Maximum	11	
	Range	8	
	Interquartile Range	3	
	Skewness	.435	.434
	Kurtosis	.394	.845

a. Method = TB

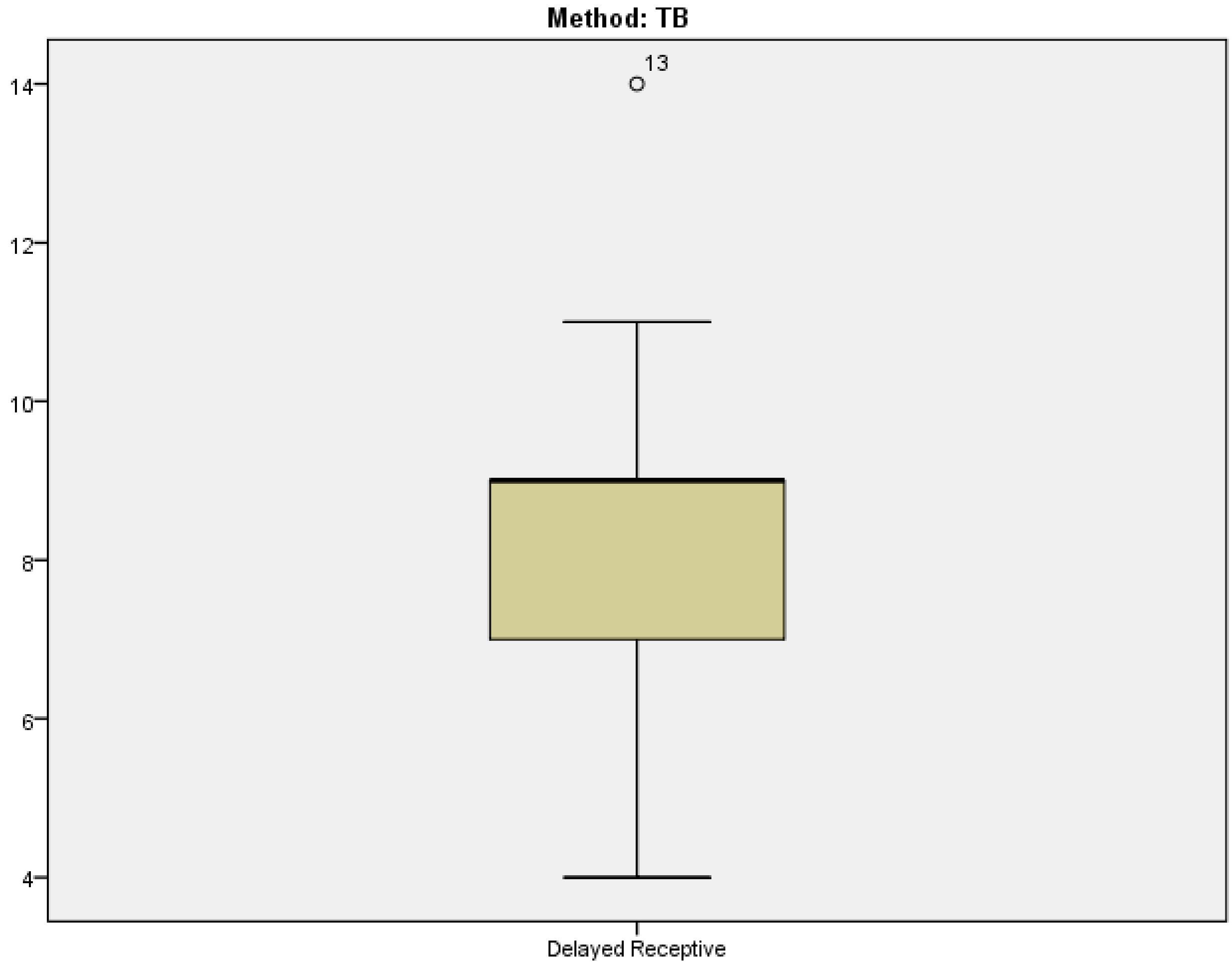
RT



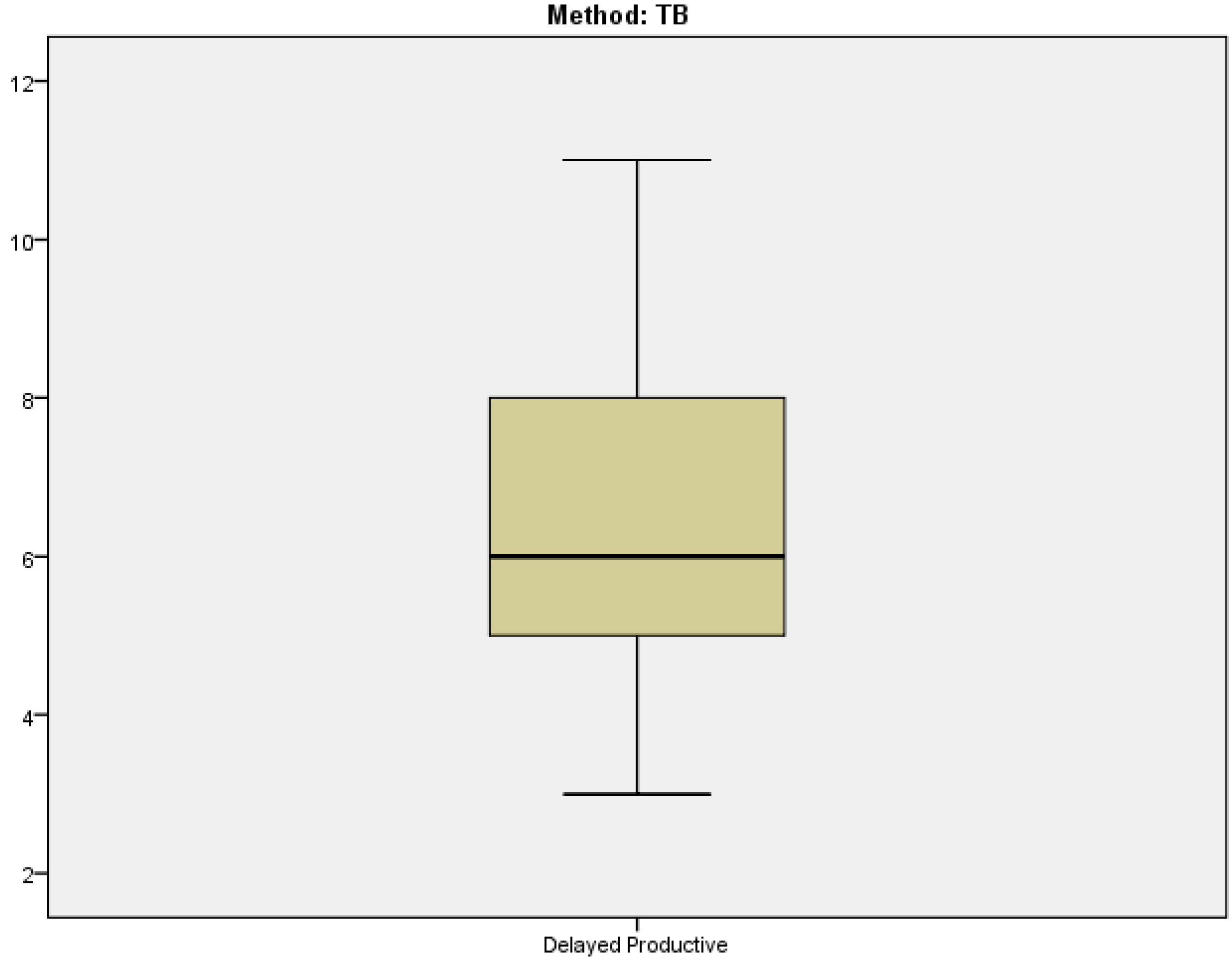
PT



Delayed Receptive



Delayed Productive



Method = MS

Case Processing Summary[a]

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent

RT	27	100.0%	0	0.0%	27	100.0%
PT	27	100.0%	0	0.0%	27	100.0%
Delayed Receptive	27	100.0%	0	0.0%	27	100.0%
Delayed Productive	27	100.0%	0	0.0%	27	100.0%

a. Method = MS

Descriptives[a]

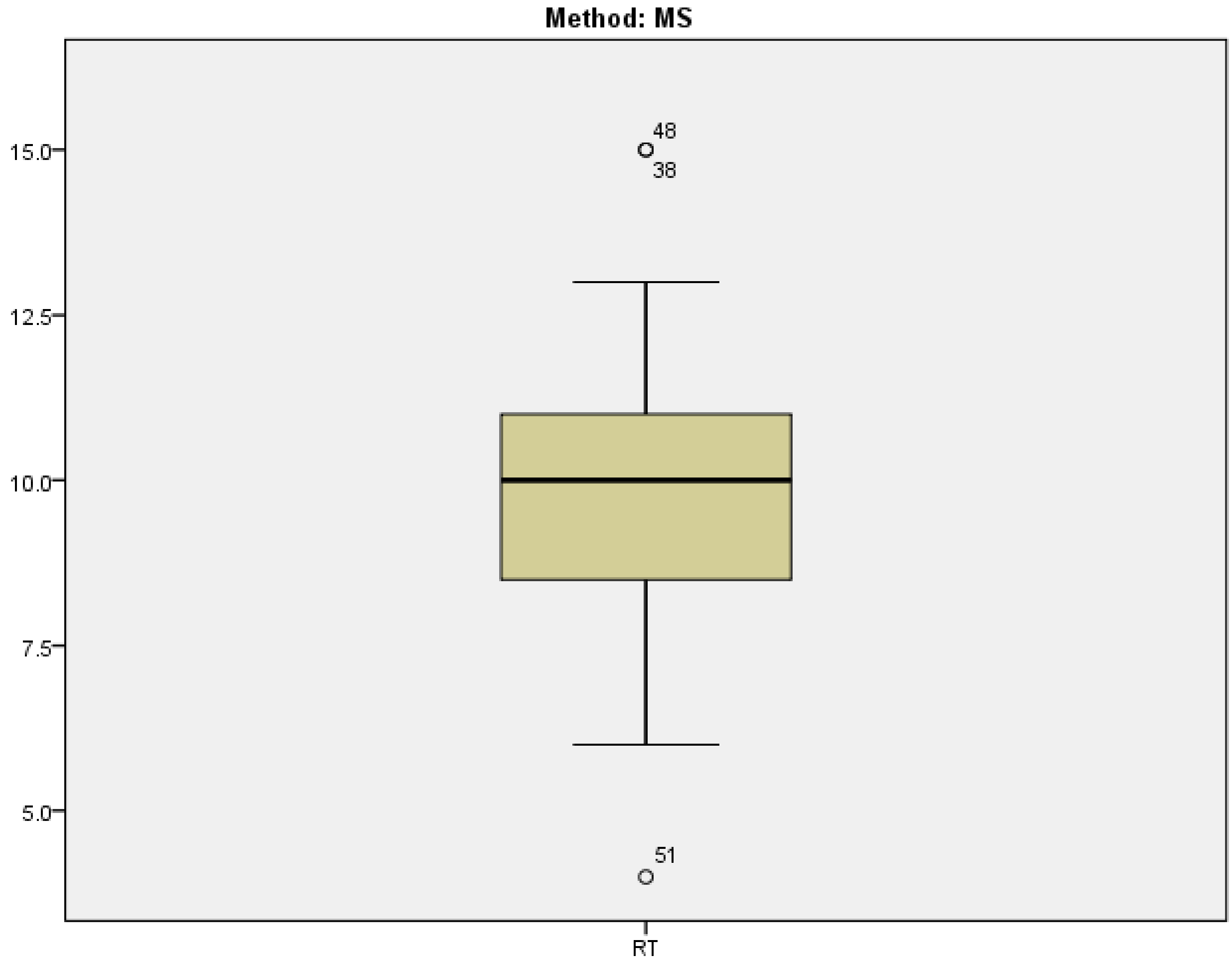
			Statistic	Std. Error
RT	Mean		9.63	.507
	95% Confidence Interval for Mean	Lower Bound	8.59	
		Upper Bound	10.67	
	5% Trimmed Mean		9.62	
	Median		10.00	
	Variance		6.934	
	Std. Deviation		2.633	
	Minimum		4	
	Maximum		15	
	Range		11	
	Interquartile Range		3	
	Skewness		.054	.448
	Kurtosis		.149	.872
PT	Mean		5.63	.312
	95% Confidence Interval for Mean	Lower Bound	4.99	
		Upper Bound	6.27	
	5% Trimmed Mean		5.59	

	Median		5.00	
	Variance		2.627	
	Std. Deviation		1.621	
	Minimum		3	
	Maximum		9	
	Range		6	
	Interquartile Range		3	
	Skewness		.364	.448
	Kurtosis		-.947	.872
Delayed Receptive	Mean		4.37	.298
	95% Confidence Interval for Mean	Lower Bound	3.76	
		Upper Bound	4.98	
	5% Trimmed Mean		4.36	
	Median		4.00	
	Variance		2.396	
	Std. Deviation		1.548	
	Minimum		2	
	Maximum		7	
	Range		5	
	Interquartile Range		3	
	Skewness		.195	.448
	Kurtosis		-.945	.872
Delayed Productive	Mean		2.89	.258
	95% Confidence Interval for Mean	Lower Bound	2.36	
		Upper Bound	3.42	
	5% Trimmed Mean		2.82	
	Median		3.00	

	Variance	1.795	
	Std. Deviation	1.340	
	Minimum	1	
	Maximum	6	
	Range	5	
	Interquartile Range	2	
	Skewness	.839	.448
	Kurtosis	.488	.872

a. Method = MS

RT



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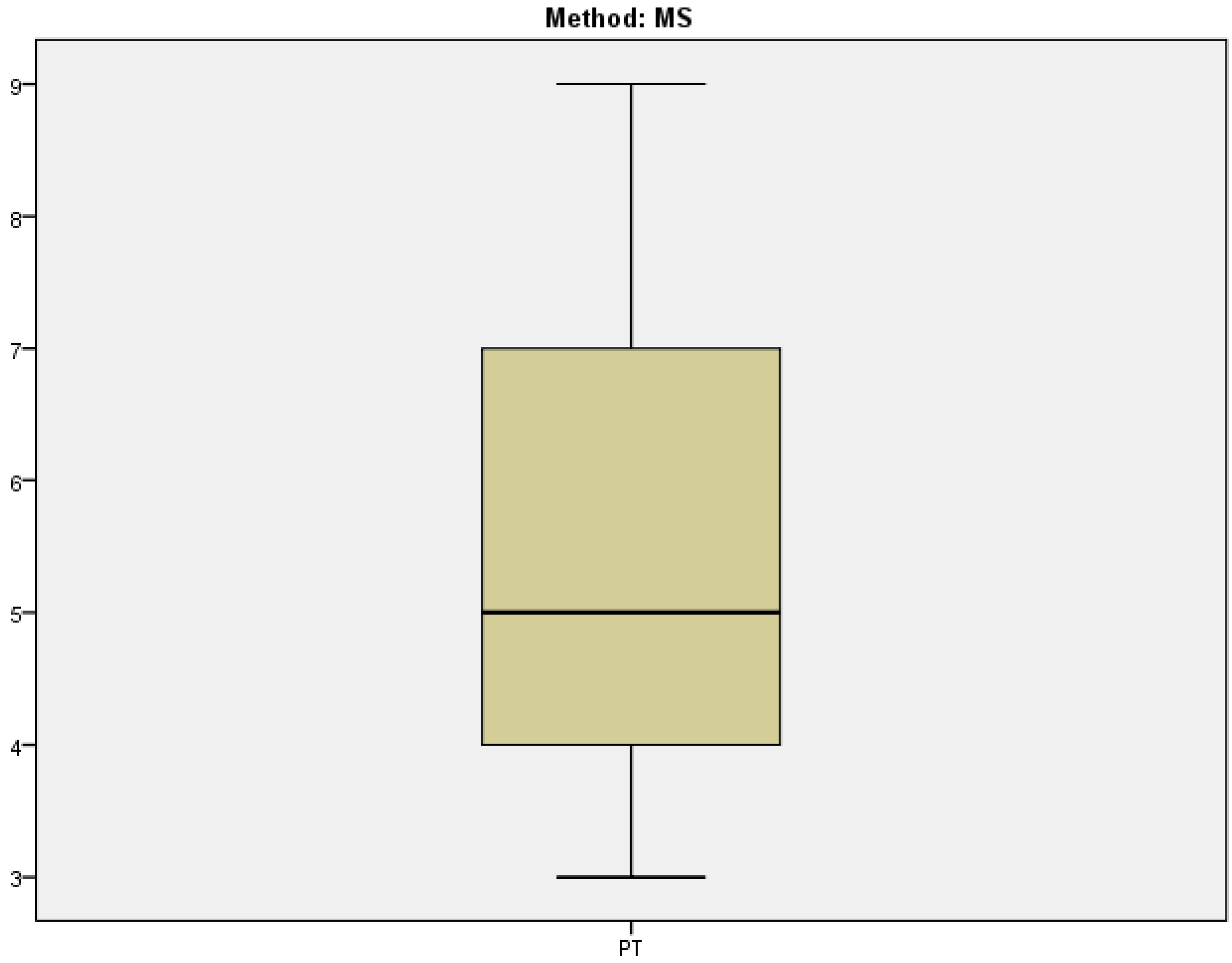
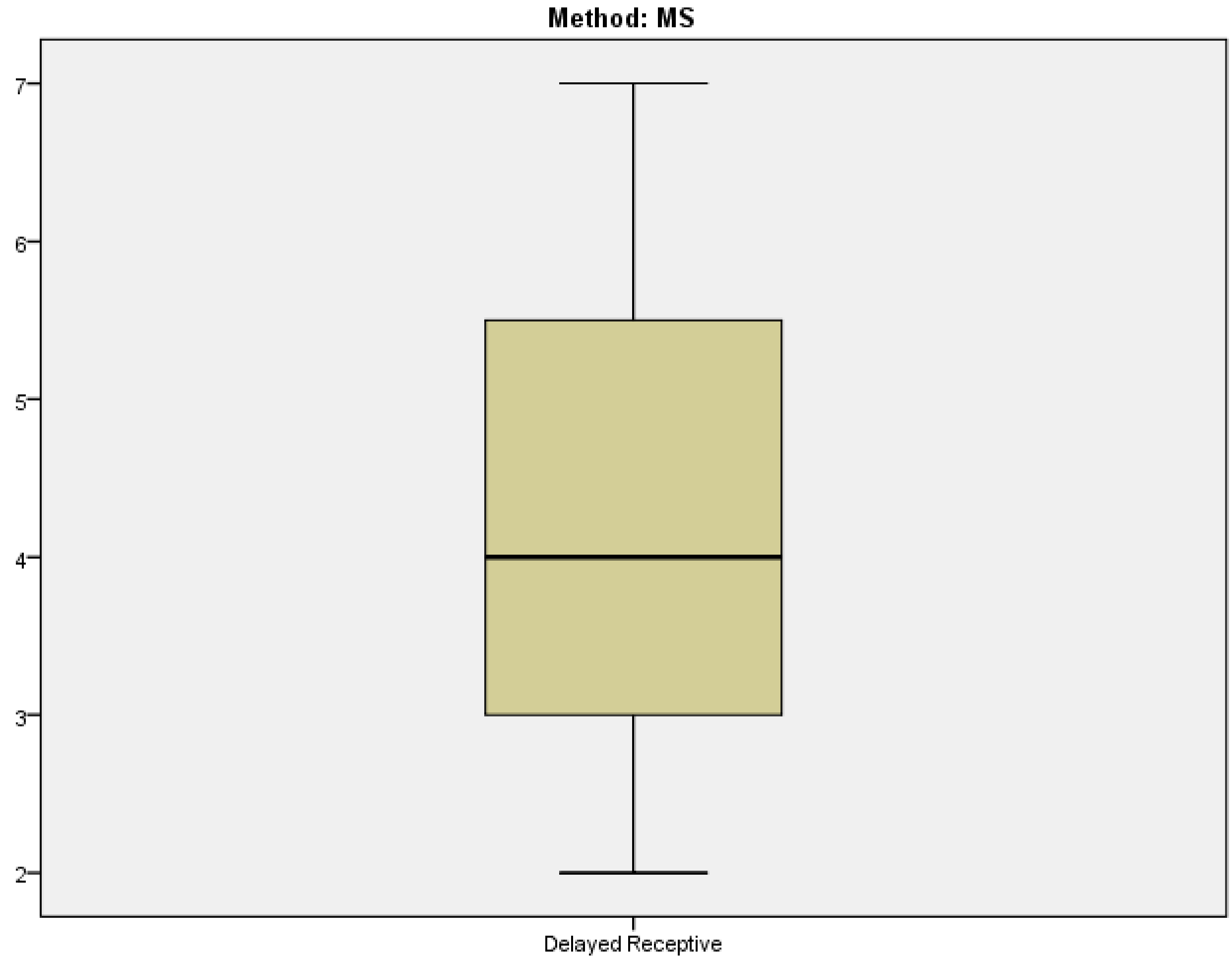
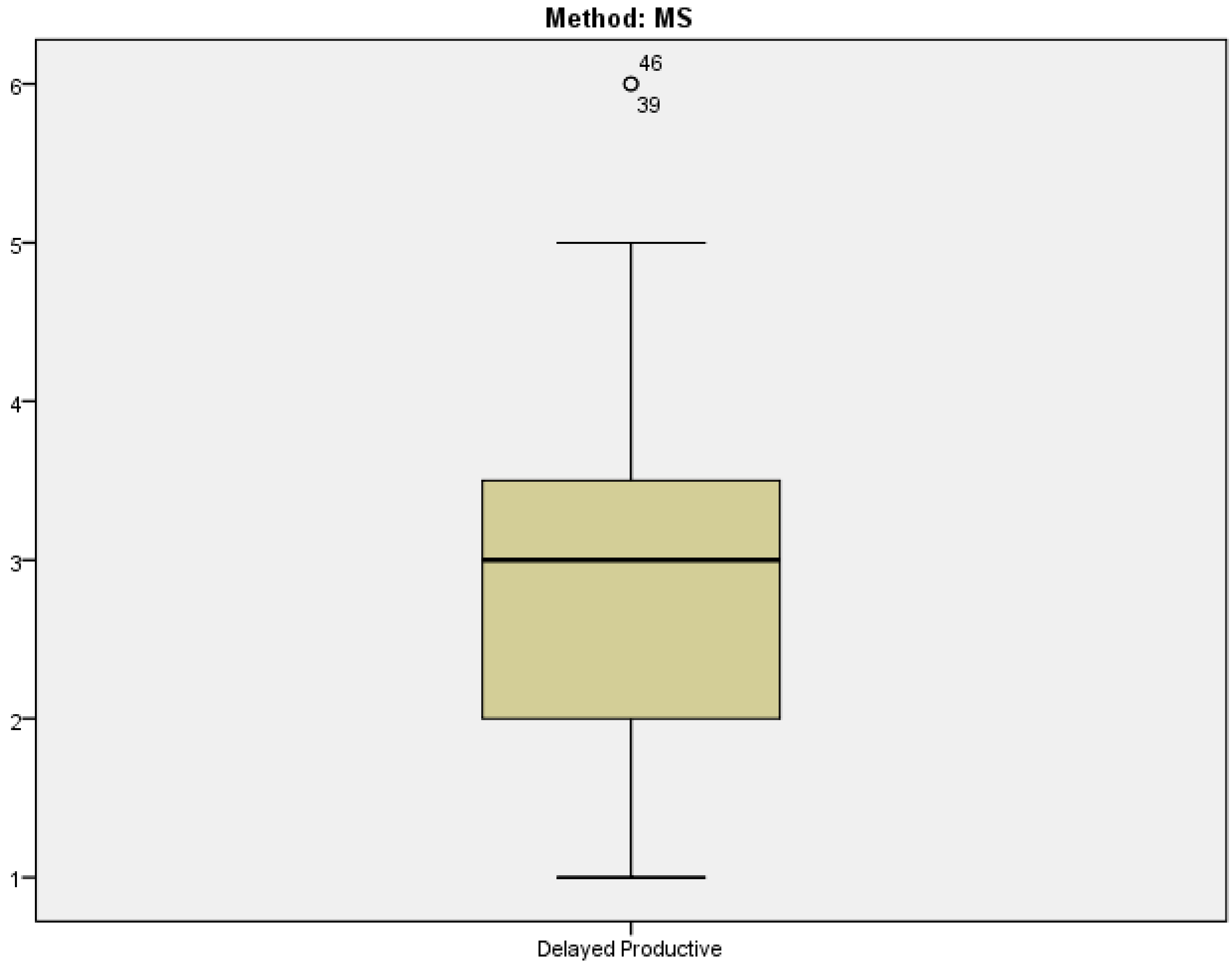


Delayed Receptive



Delayed Productive



SPLIT FILE OFF.

NPAR TESTS

/M-W= RT PT DRT DPT BY Group(1 2)

/STATISTICS=DESCRIPTIVES

/MISSING ANALYSIS.

NPar Tests

Notes

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	Number of Cases Allowed[a]	314572

a. Based on availability of workspace memory.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
RT	56	11.71	3.591	4	18
PT	56	7.75	2.778	3	14
Delayed Receptive	56	6.45	2.703	2	14
Delayed Productive	56	4.75	2.376	1	11
Group	56	1.48	.504	1	2

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
RT	EG1	29	37.33	1082.50
	CG1	27	19.02	513.50
	Total	56		
PT	EG1	29	40.14	1164.00
	CG1	27	16.00	432.00
	Total	56		

Delayed Receptive	EG1	29	40.50	1174.50
	CG1	27	15.61	421.50
	Total	56		
Delayed Productive	EG1	29	40.59	1177.00
	CG1	27	15.52	419.00
	Total	56		

Test Statistics[a]

	RT	PT	Delayed Receptive	Delayed Productive
Mann-Whitney U	135.500	54.000	43.500	41.000
Wilcoxon W	513.500	432.000	421.500	419.000
Z	-4.218	-5.566	-5.748	-5.797
Asymp. Sig. (2-tailed)	.000	.000	.000	.000

a. Grouping Variable: Group

```
*Nonparametric Tests: Independent Samples.
NPTESTS
  /INDEPENDENT TEST (RT PT DRT DPT) GROUP (Method)
  /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
  /CRITERIA ALPHA=0.05  CILEVEL=95.
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Nonparametric Tests

Notes

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Resources	Processor Time	00:00:00.53
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null : null

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of RT is the same across categories of Method.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
2	The distribution of PT is the same across categories of Method.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
3	The distribution of Delayed Receptive is the same across categories of Method.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
4	The distribution of Delayed Productive is the same across categories of Method.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Appendix N

```
GET
DATASET NAME DataSet1 WINDOW=FRONT.
SORT CASES  BY Method.
SPLIT FILE SEPARATE BY Method.
EXAMINE VARIABLES=IELTS VST RT PT DRT DPT
  /PLOT BOXPLOT NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
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Explore

Notes

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	Split File	Methodology
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	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=IELTS VST RT PT DRT DPT /PLOT BOXPLOT NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:07.75
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Methodology = TB

Case Processing Summary[a]

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
IELTS	27	100.0%	0	0.0%	27	100.0%
VST	27	100.0%	0	0.0%	27	100.0%
RT	27	100.0%	0	0.0%	27	100.0%
PT	27	100.0%	0	0.0%	27	100.0%
Delayed Receptive	27	100.0%	0	0.0%	27	100.0%
Delayed Productive	27	100.0%	0	0.0%	27	100.0%

a. Methodology = TB

Descriptives[a]

			Statistic	Std. Error
IELTS	Mean		5.19	.061
	95% Confidence Interval for Mean	Lower Bound	5.06	
		Upper Bound	5.31	
	5% Trimmed Mean		5.15	
	Median		5.00	
	Variance		.099	
	Std. Deviation		.315	
	Minimum		5	

	Maximum		6	
	Range		1	
	Interquartile Range		1	
	Skewness		1.531	.448
	Kurtosis		1.381	.872
VST	Mean		23.15	1.008
	95% Confidence Interval for Mean	Lower Bound	21.08	
		Upper Bound	25.22	
	5% Trimmed Mean		23.21	
	Median		23.00	
	Variance		27.439	
	Std. Deviation		5.238	
	Minimum		12	
	Maximum		33	
	Range		21	
	Interquartile Range		8	
	Skewness		-.151	.448
	Kurtosis		-.438	.872
RT	Mean		13.81	.509
	95% Confidence Interval for Mean	Lower Bound	12.77	
		Upper Bound	14.86	
	5% Trimmed Mean		14.06	
	Median		15.00	
	Variance		7.003	
	Std. Deviation		2.646	
	Minimum		6	
	Maximum		17	

	Range		11	
	Interquartile Range		4	
	Skewness		-1.479	.448
	Kurtosis		1.949	.872
PT	Mean		10.04	.438
	95% Confidence Interval for Mean	Lower Bound	9.14	
		Upper Bound	10.94	
	5% Trimmed Mean		10.11	
	Median		11.00	
	Variance		5.191	
	Std. Deviation		2.278	
	Minimum		5	
	Maximum		14	
	Range		9	
	Interquartile Range		3	
	Skewness		-.745	.448
	Kurtosis		.133	.872
Delayed Receptive	Mean		9.04	.467
	95% Confidence Interval for Mean	Lower Bound	8.08	
		Upper Bound	10.00	
	5% Trimmed Mean		9.04	
	Median		9.00	
	Variance		5.883	
	Std. Deviation		2.426	
	Minimum		4	
	Maximum		14	
	Range		10	

	Interquartile Range		3	
	Skewness		-.169	.448
	Kurtosis		-.148	.872
Delayed Productive	Mean		6.11	.435
	95% Confidence Interval for Mean	Lower Bound	5.22	
		Upper Bound	7.00	
	5% Trimmed Mean		6.03	
	Median		6.00	
	Variance		5.103	
	Std. Deviation		2.259	
	Minimum		3	
	Maximum		11	
	Range		8	
	Interquartile Range		4	
	Skewness		.284	.448
	Kurtosis		-.670	.872

a. Methodology = TB

Tests of Normality[a]

	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
IELTS	.426	27	.000	.626	27	.000
VST	.114	27	.200*	.978	27	.812
RT	.265	27	.000	.824	27	.000
PT	.219	27	.002	.919	27	.038

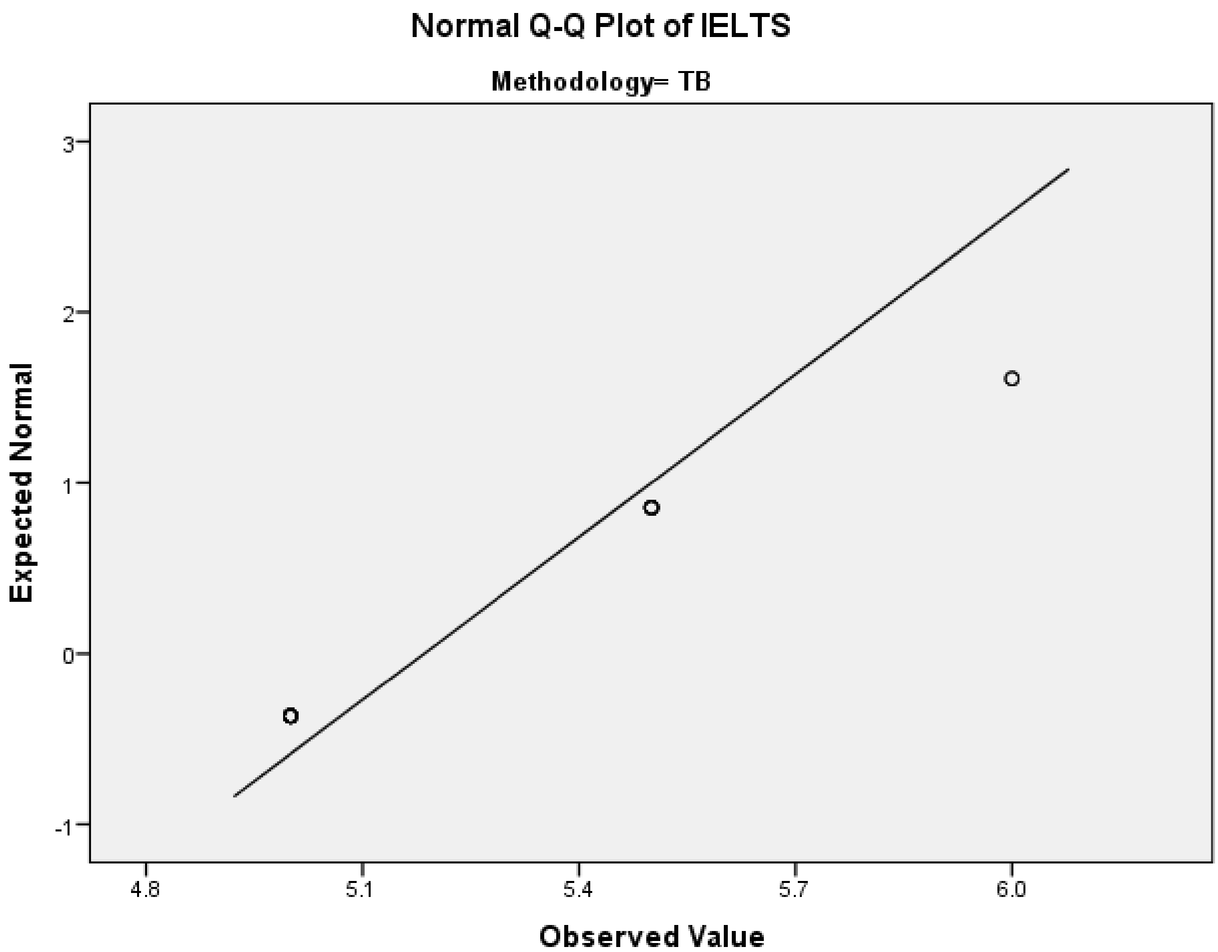
Delayed Receptive	.112	27	.200*	.976	27	.755
Delayed Productive	.158	27	.081	.943	27	.144

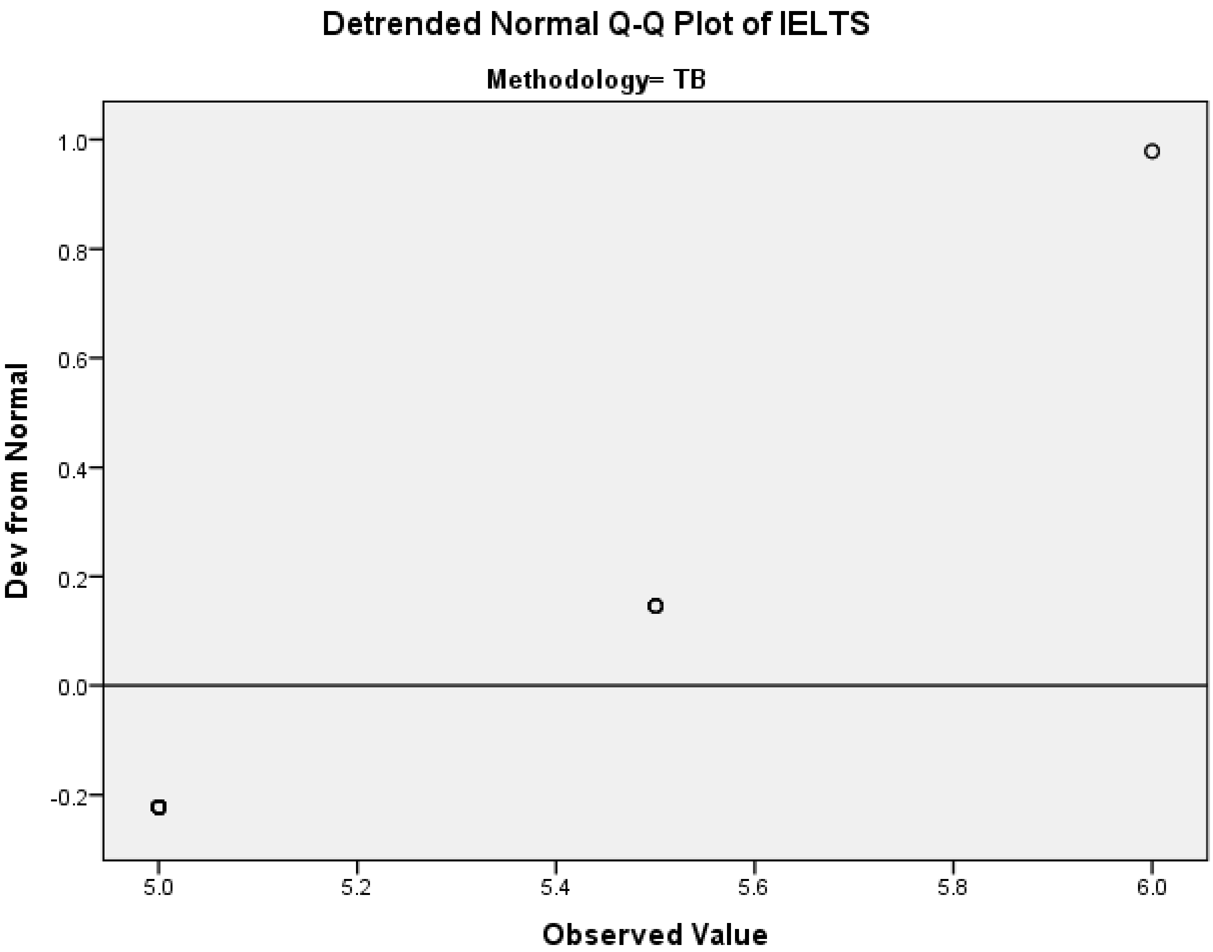
*. This is a lower bound of the true significance.

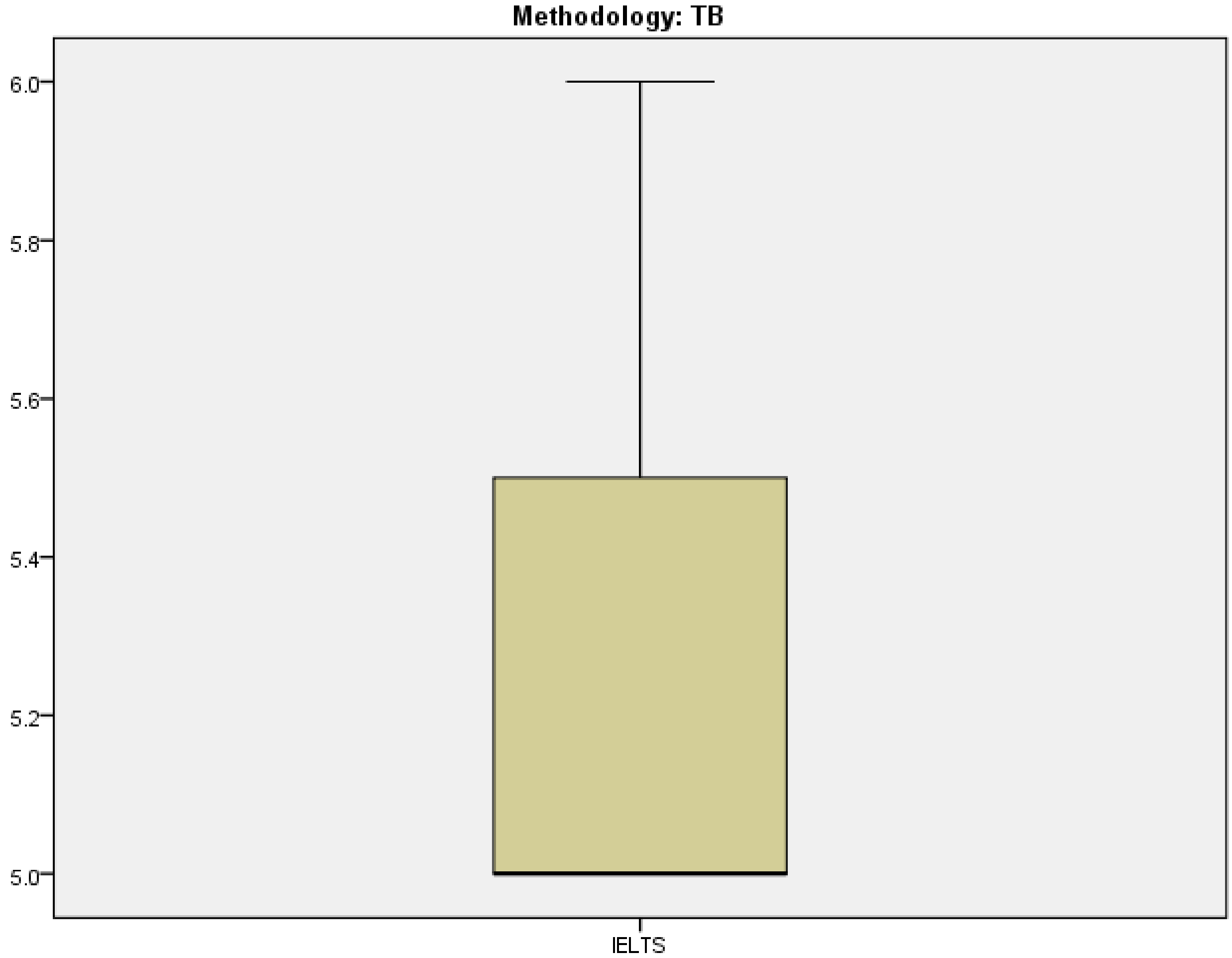
a. Methodology = TB

b. Lilliefors Significance Correction

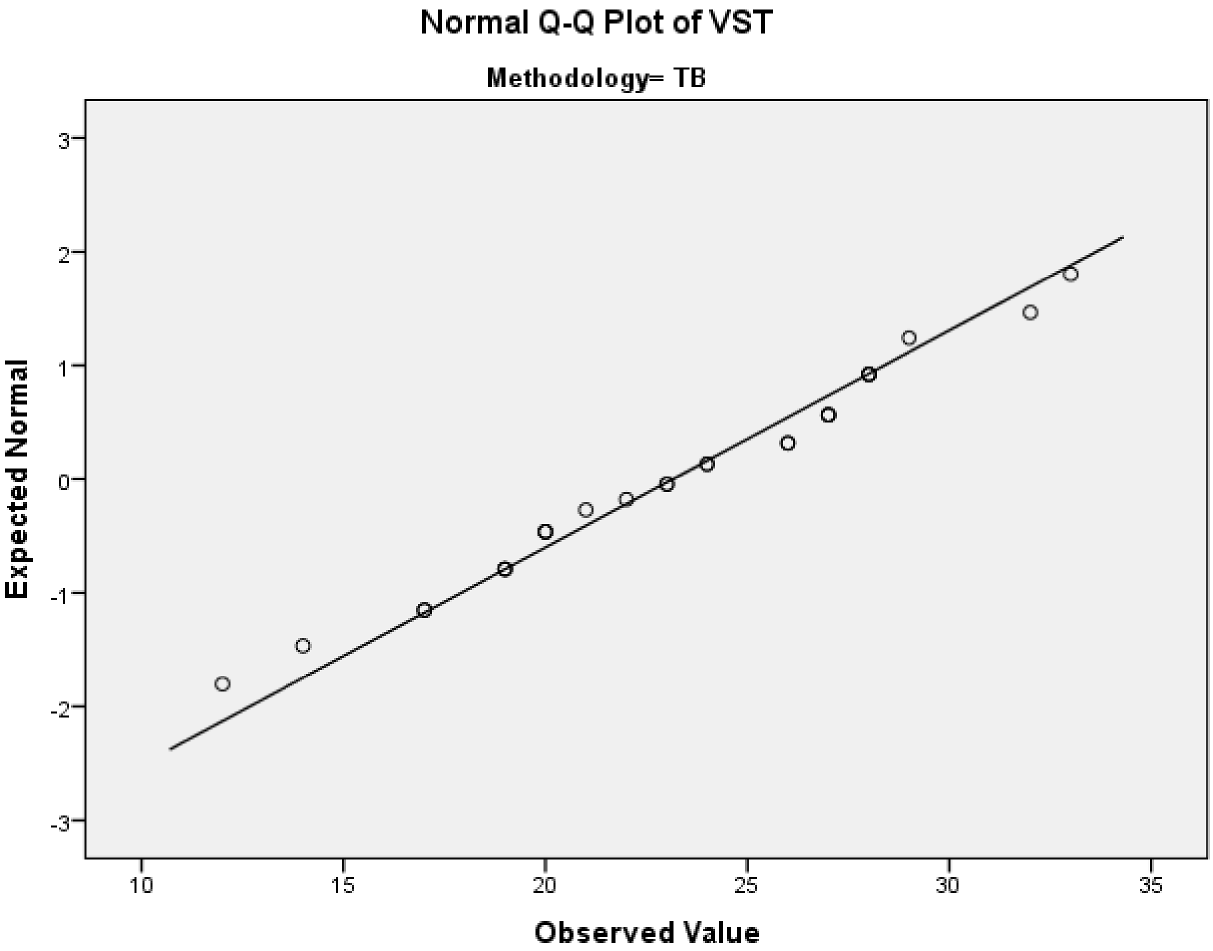
IELTS

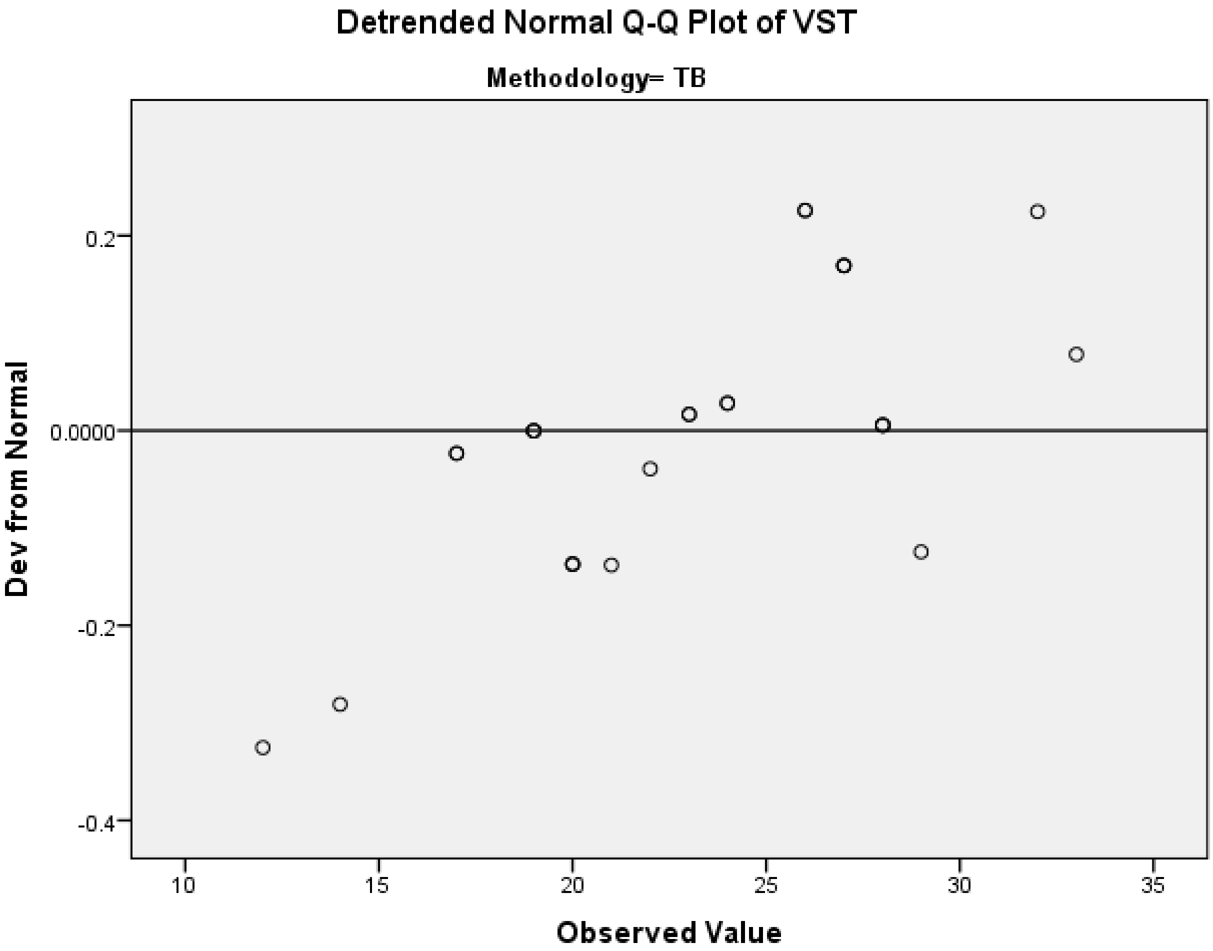


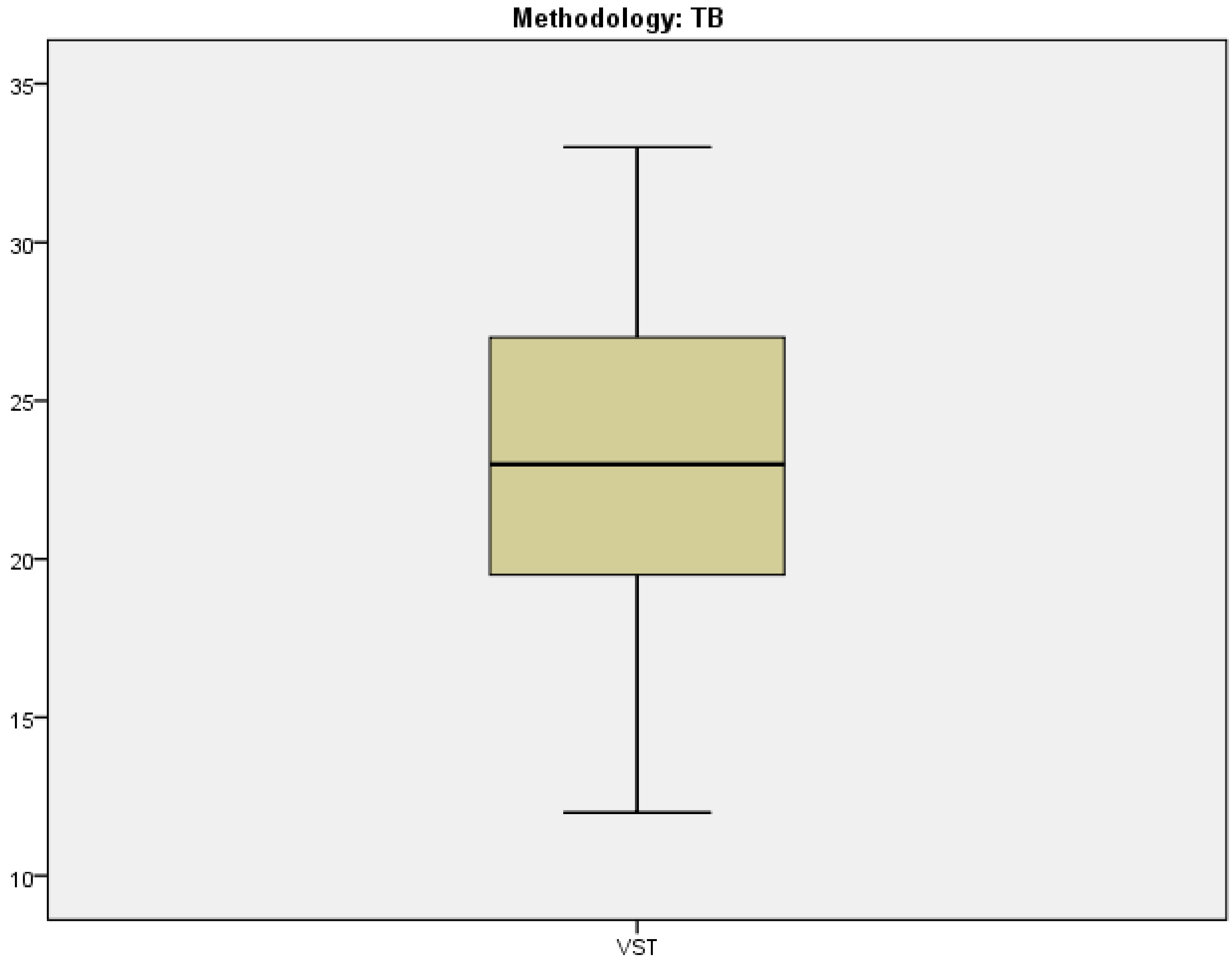

Detrended Normal Q-Q Plot of IELTS
Methodology= TB
Dev from Normal
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
5.0
5.2
5.4
5.6
5.8
6.0
Observed Value



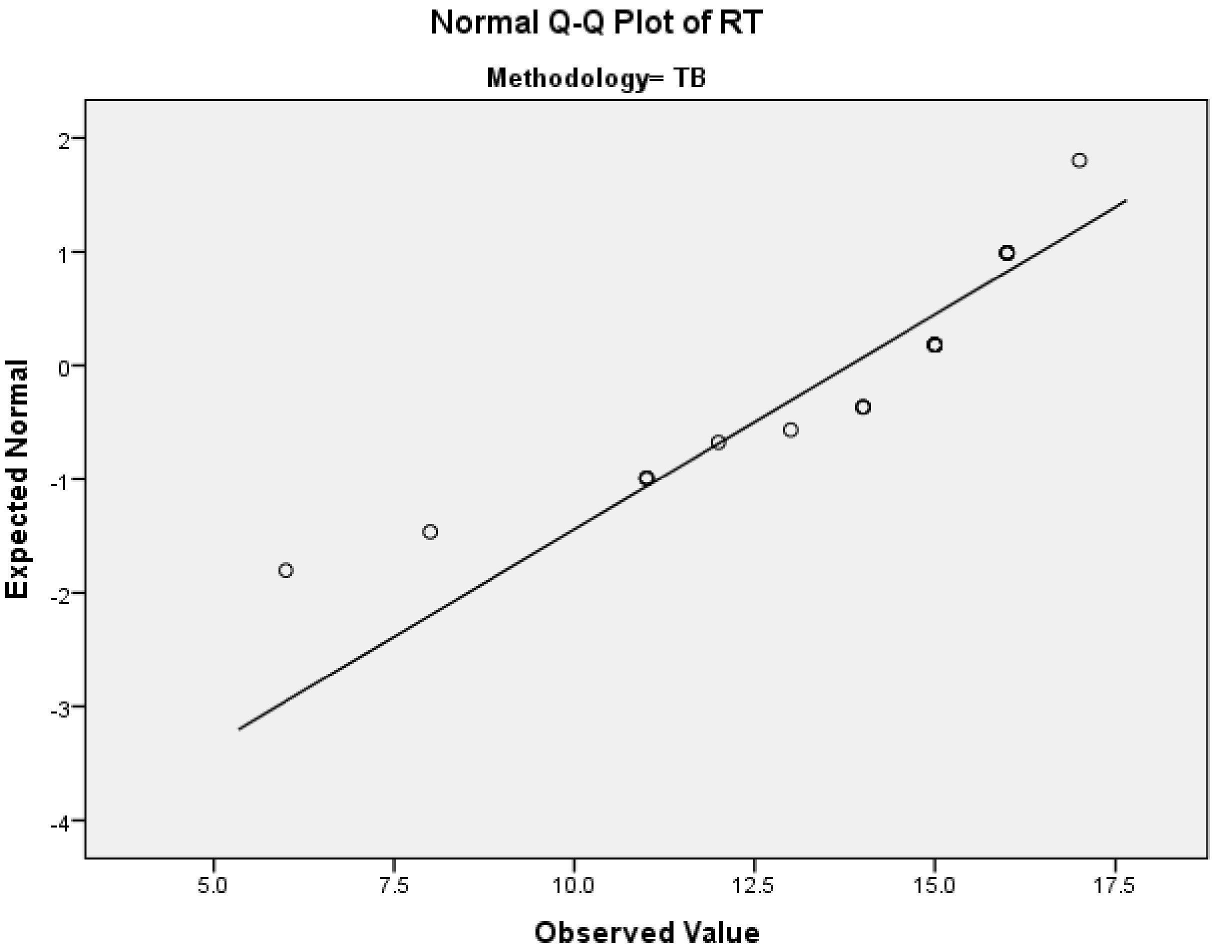
VST


Normal Q-Q Plot of VST
Methodology= TB
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
10
15
20
25
30
35

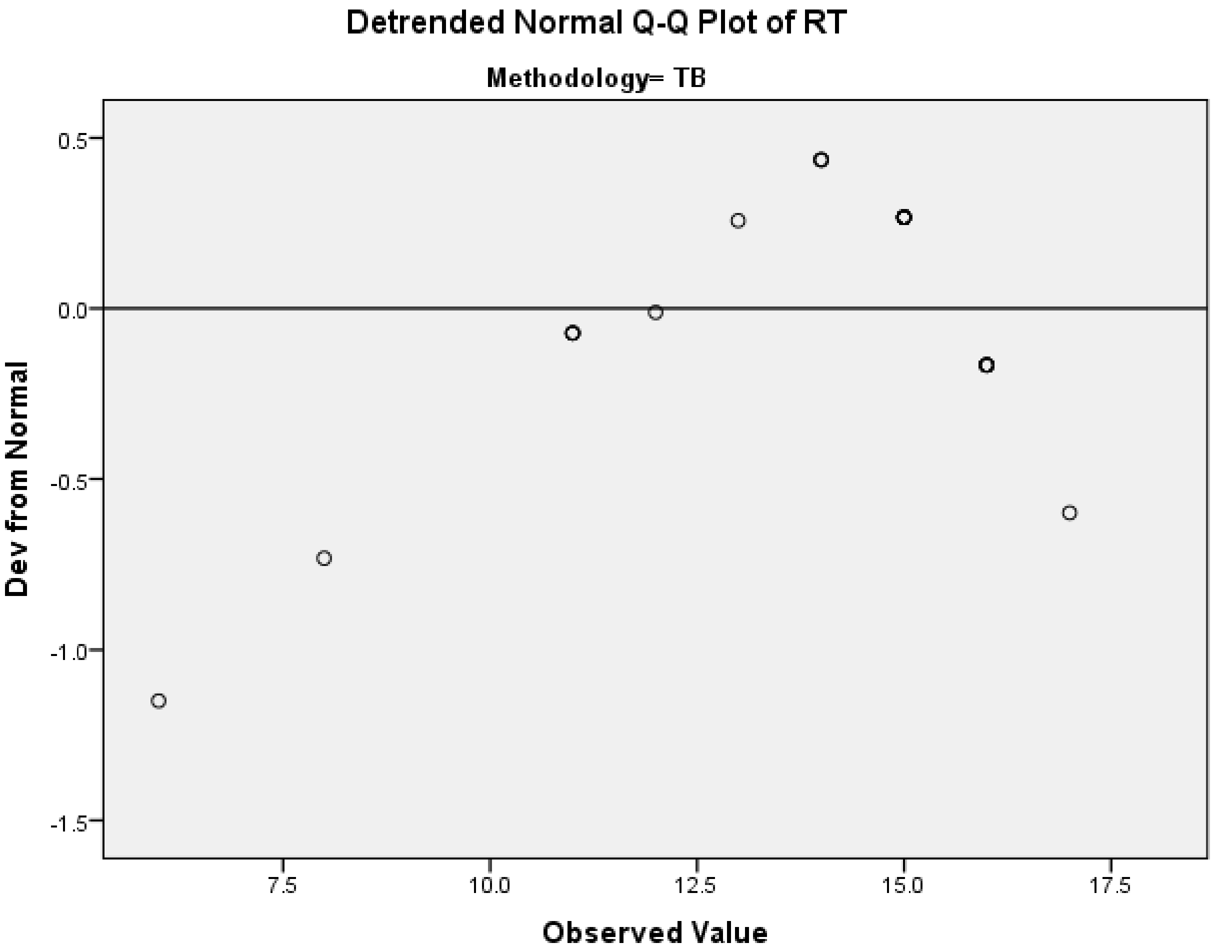

Detrended Normal Q-Q Plot of VST
Methodology= TB
Dev from Normal
0.2
0.0000
-0.2
-0.4
10
15
20
25
30
35
Observed Value

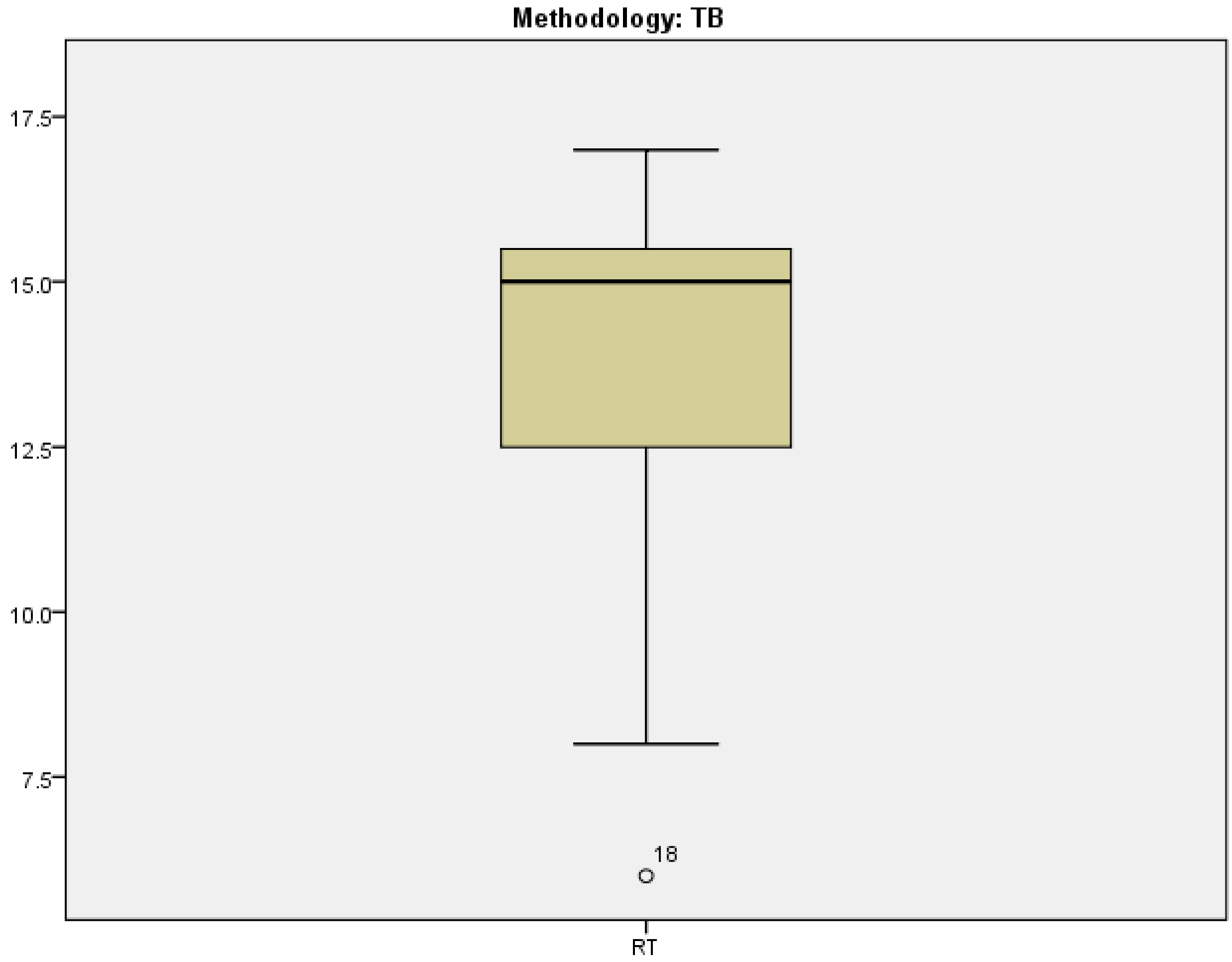


RT

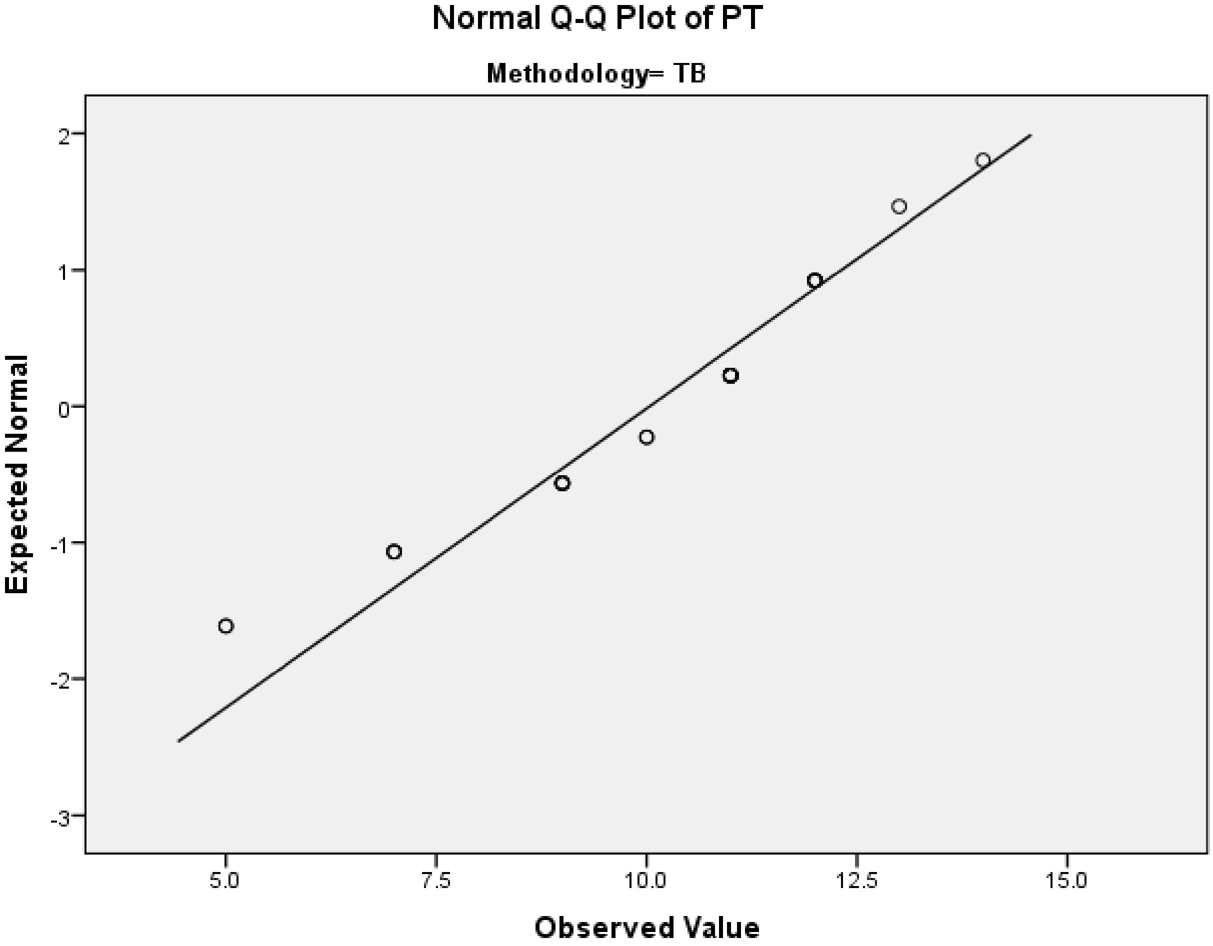


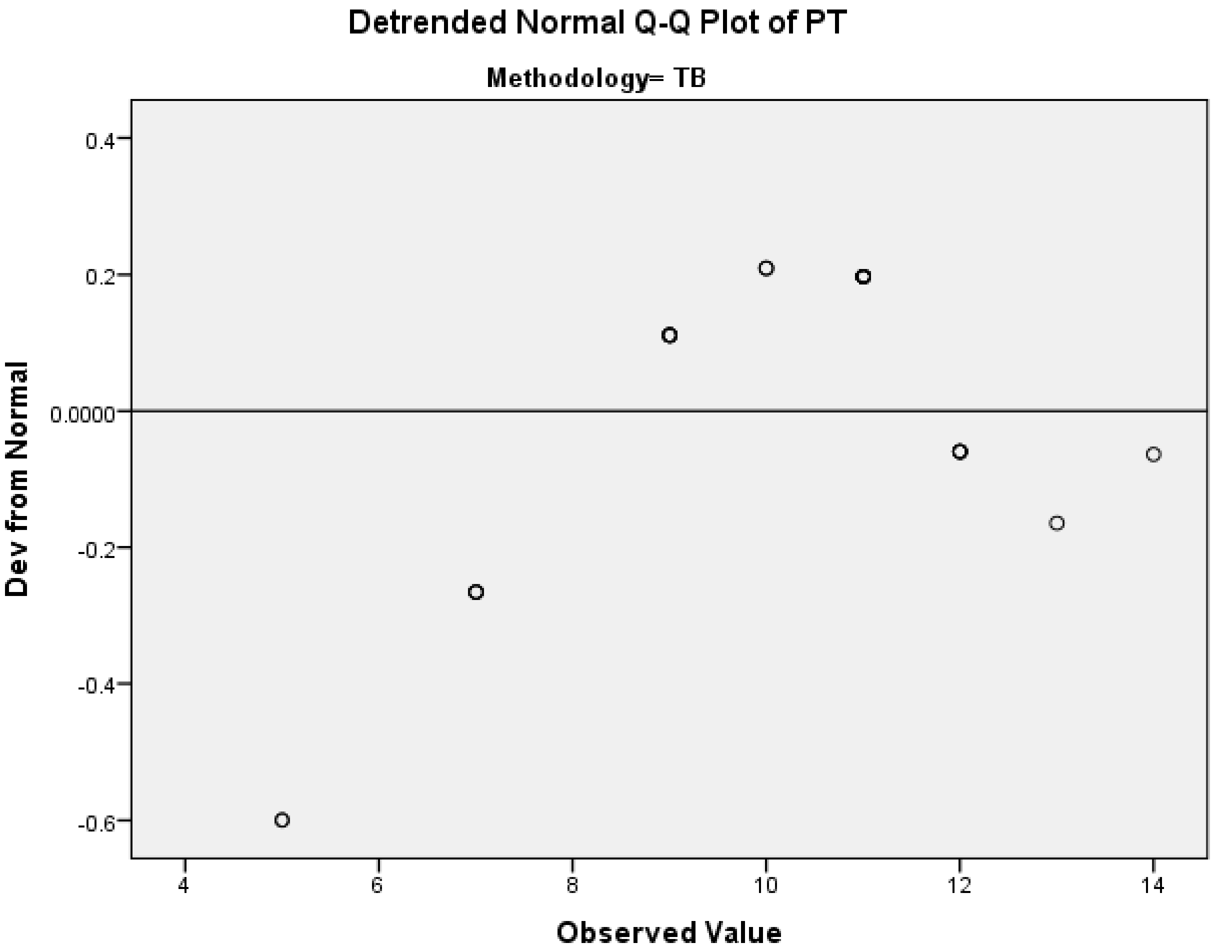
Normal Q-Q Plot of RT
Methodology= TB
Expected Normal
Observed Value
2
1
0
-1
-2
-3
-4
5.0
7.5
10.0
12.5
15.0
17.5

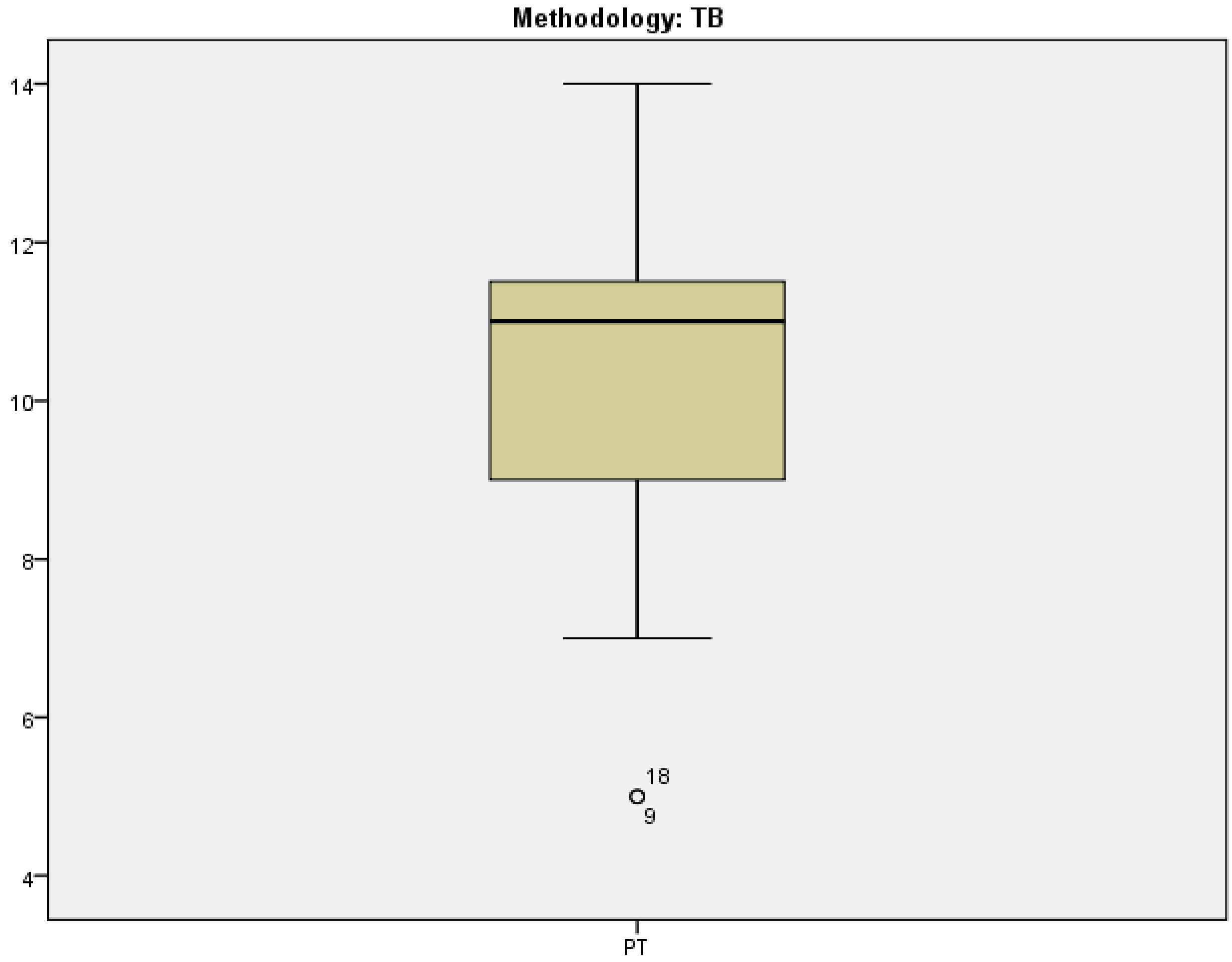

Detrended Normal Q-Q Plot of RT
Methodology= TB
0.5
0.0
-0.5
-1.0
-1.5
Dev from Normal
7.5
10.0
12.5
15.0
17.5
Observed Value



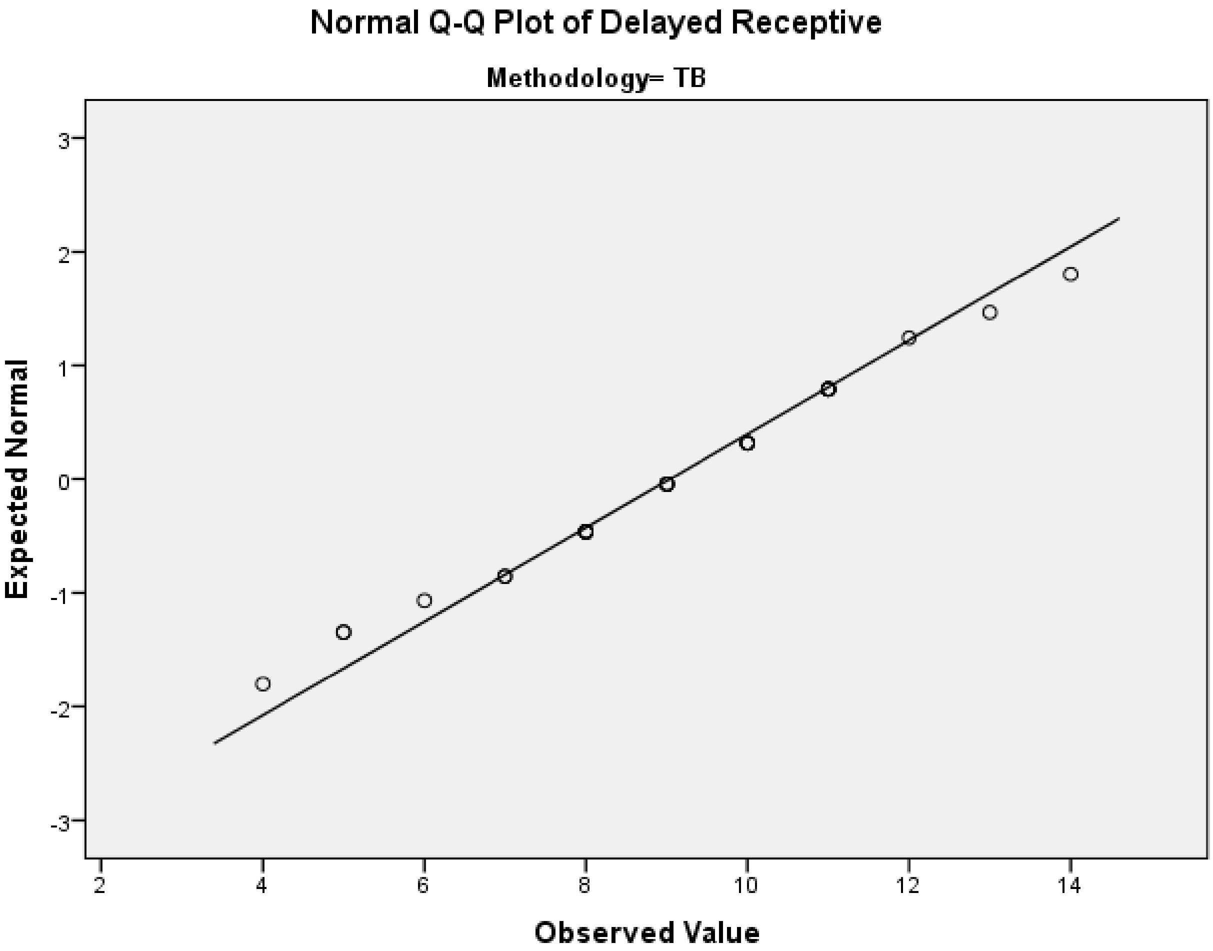
PT


Normal Q-Q Plot of PT
Methodology= TB
Expected Normal
2
1
0
-1
-2
-3
5.0
7.5
10.0
12.5
15.0
Observed Value

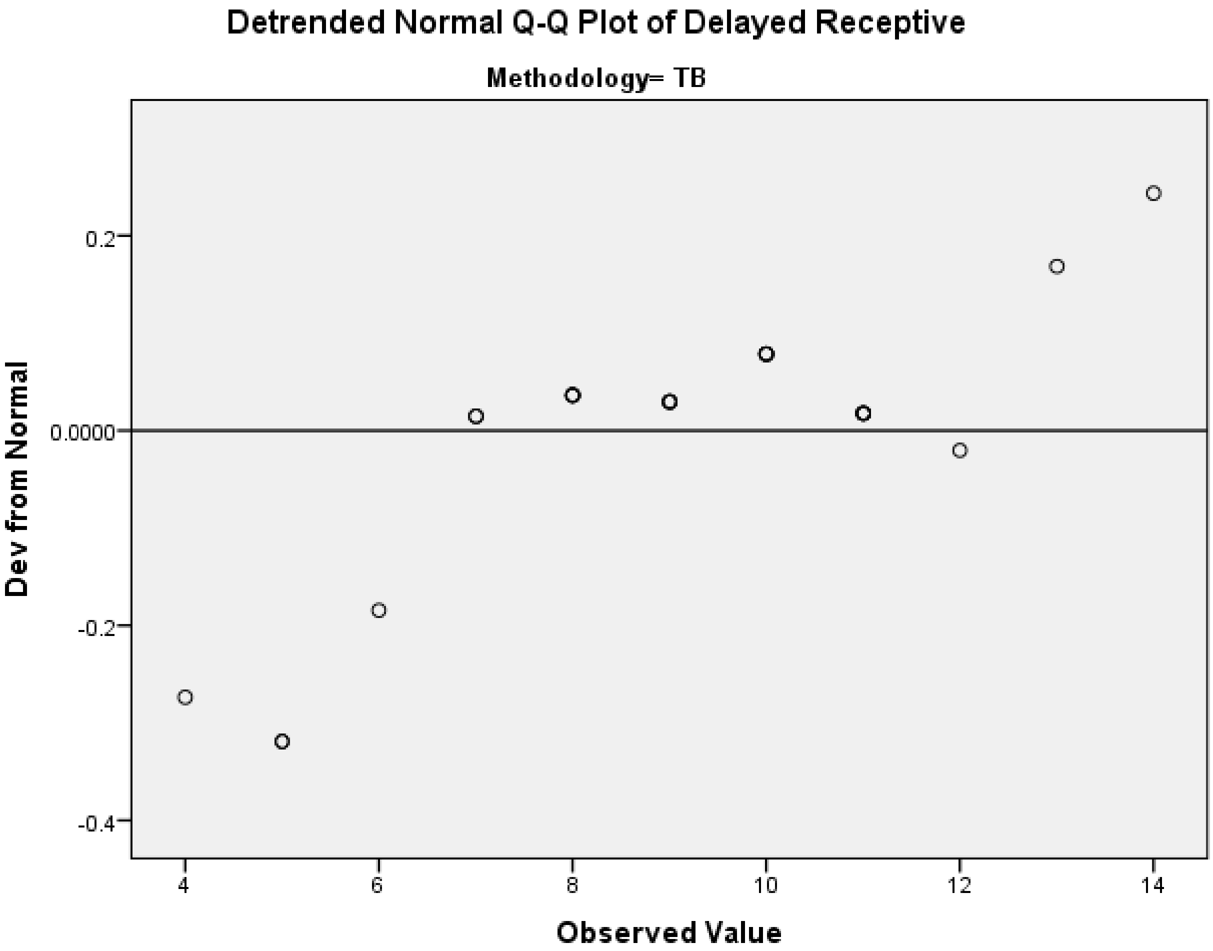

Detrended Normal Q-Q Plot of PT
Methodology= TB
Dev from Normal
0.4
0.2
0.0000
-0.2
-0.4
-0.6
4
6
8
10
12
14
Observed Value

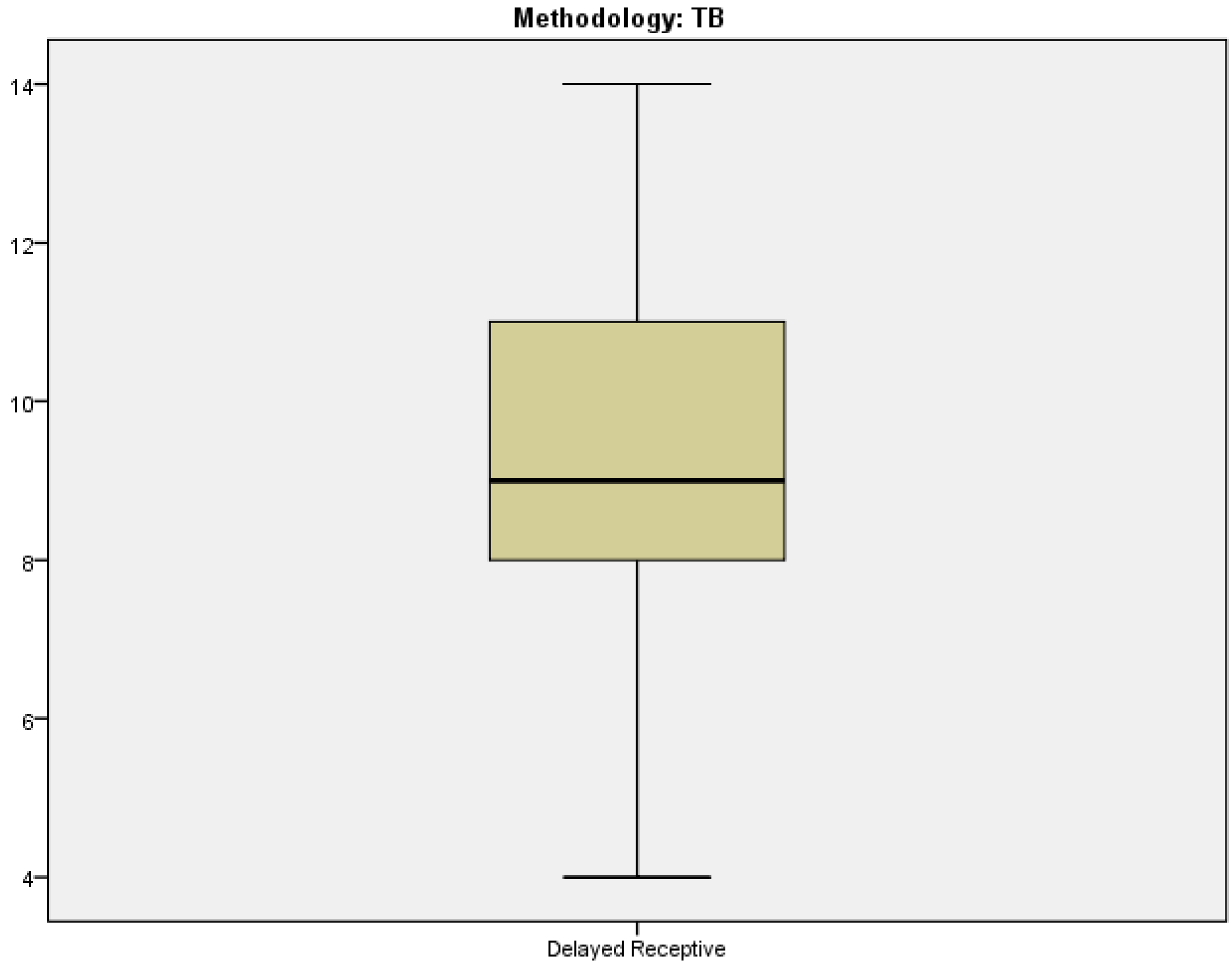


Delayed Receptive

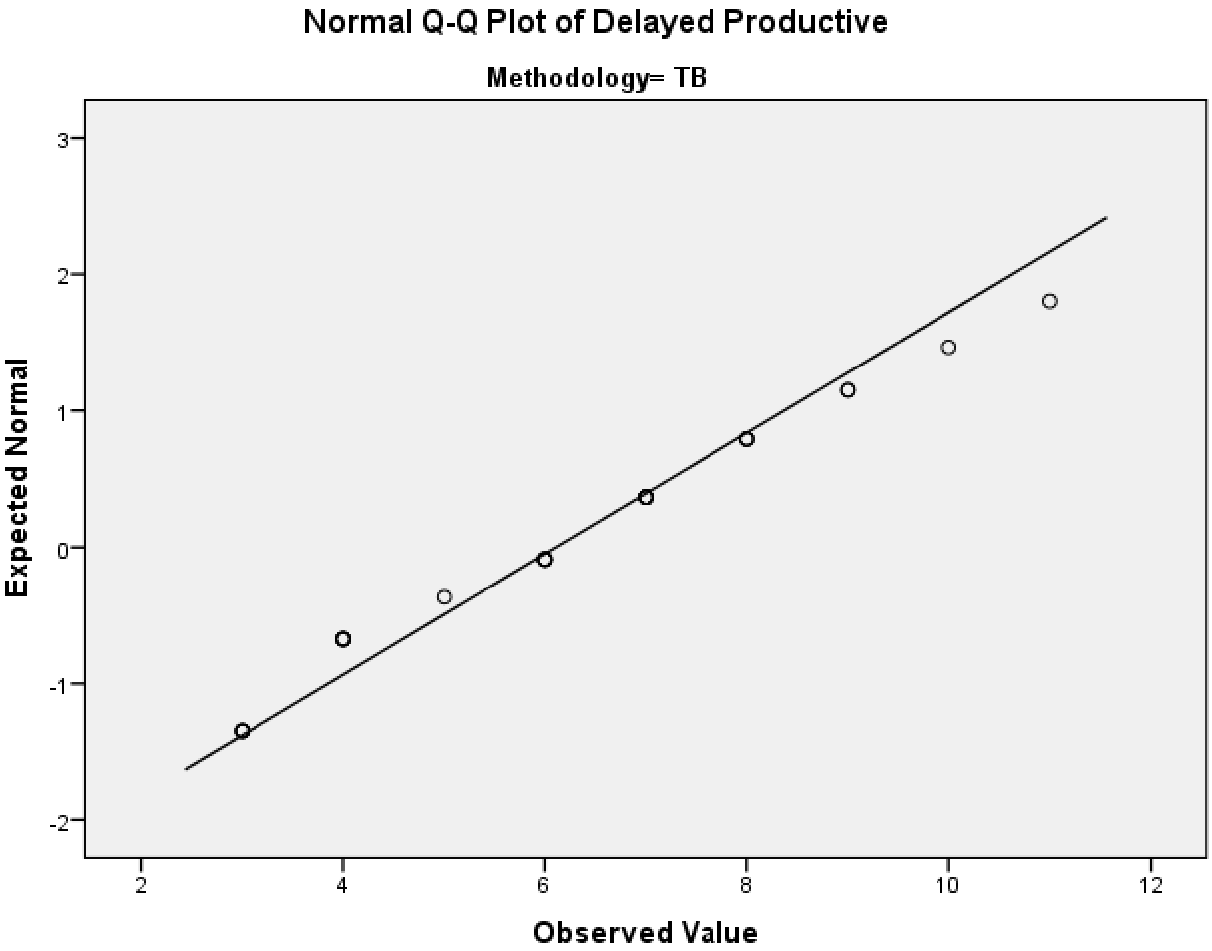


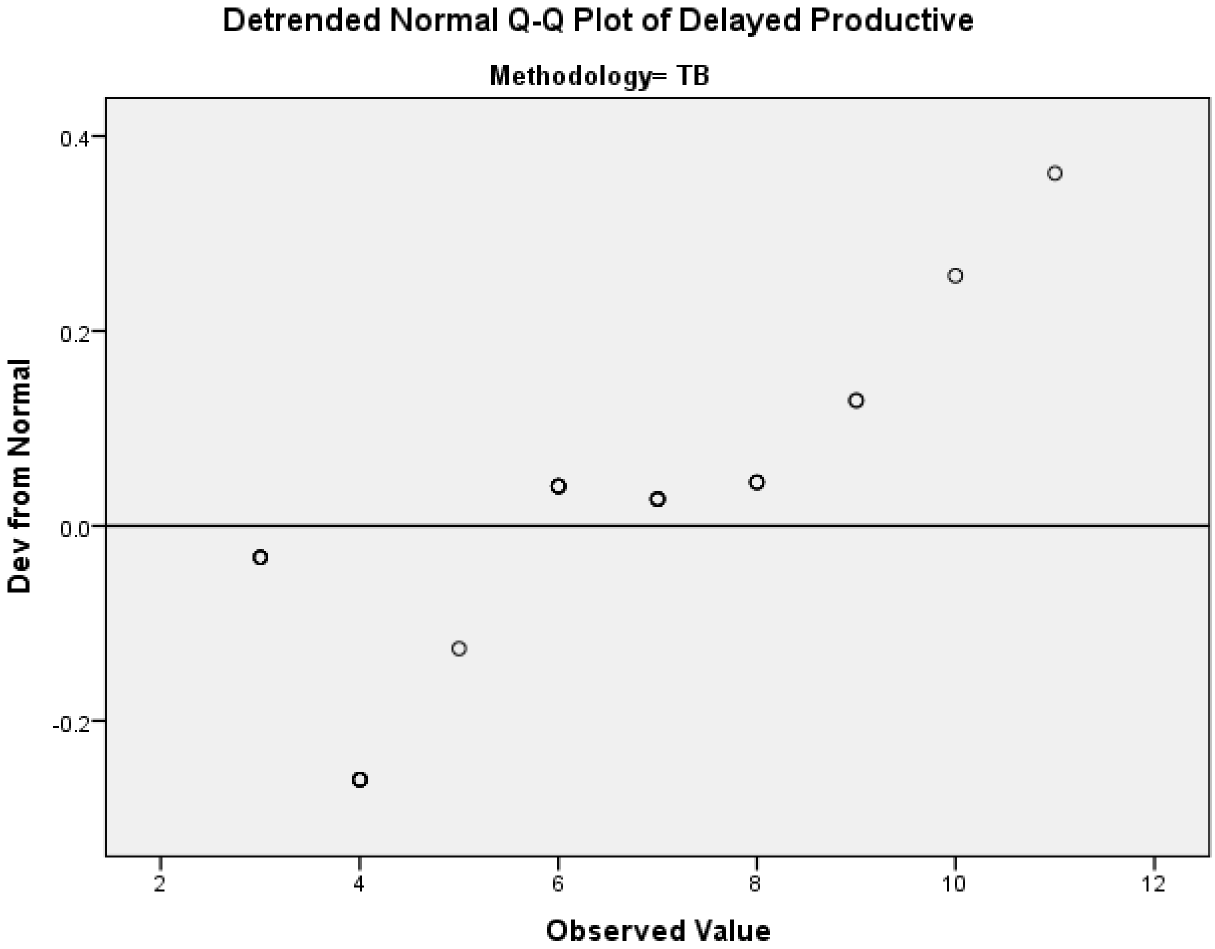
Normal Q-Q Plot of Delayed Receptive
Methodology= TB
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
2
4
6
8
10
12
14

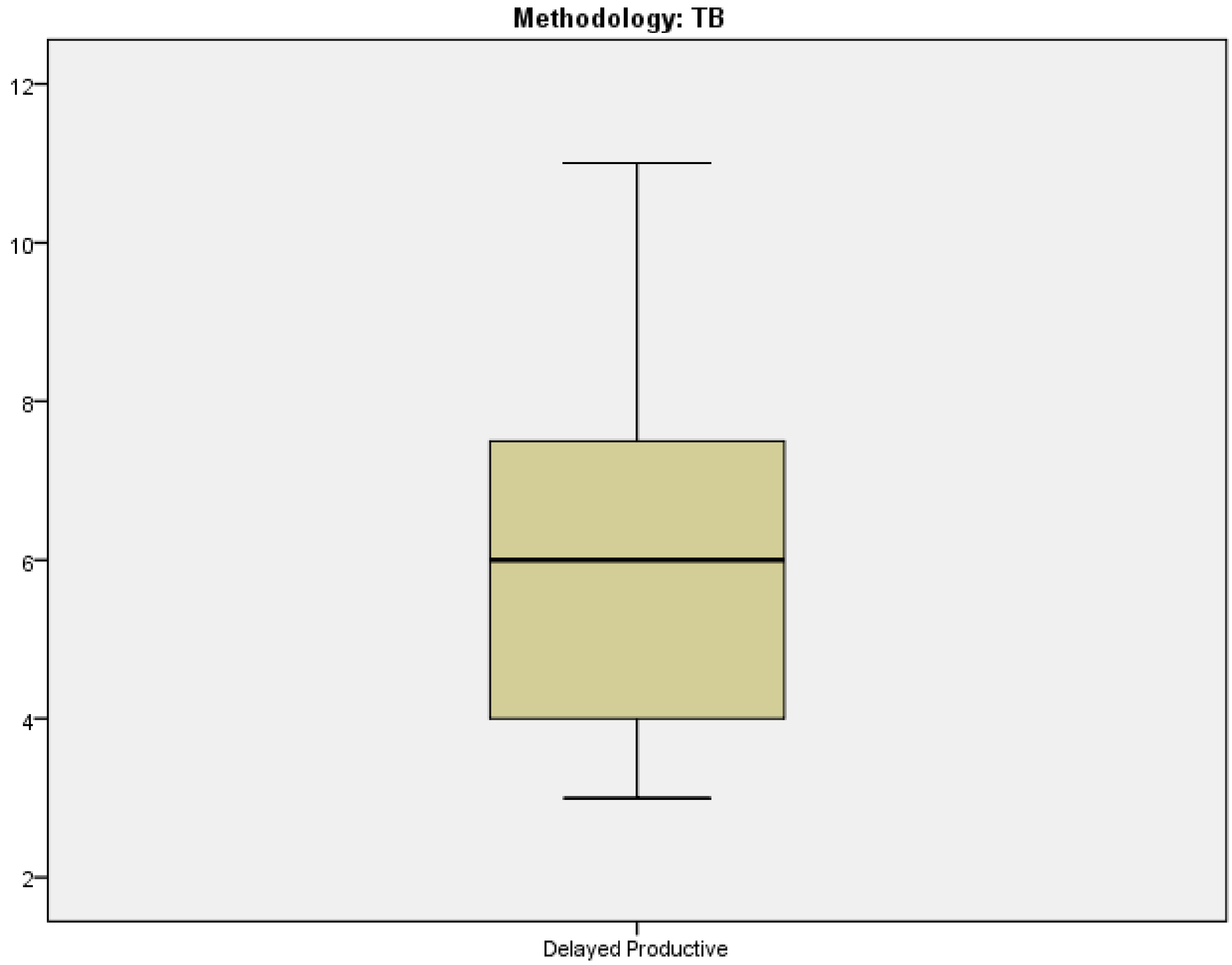

Detrended Normal Q-Q Plot of Delayed Receptive
Methodology= TB
Dev from Normal
0.2
0.0000
-0.2
-0.4
4
6
8
10
12
14
Observed Value



Delayed Productive


Normal Q-Q Plot of Delayed Productive
Methodology= TB
Expected Normal
Observed Value
3
2
1
0
-1
-2
2
4
6
8
10
12


Detrended Normal Q-Q Plot of Delayed Productive
Methodology= TB
0.4
0.2
0.0
-0.2
Dev from Normal
2
4
6
8
10
12
Observed Value



Methodology = MS

Case Processing Summary[a]

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent

IELTS	26	100.0%	0	0.0%	26	100.0%
VST	26	100.0%	0	0.0%	26	100.0%
RT	26	100.0%	0	0.0%	26	100.0%
PT	26	100.0%	0	0.0%	26	100.0%
Delayed Receptive	26	100.0%	0	0.0%	26	100.0%
Delayed Productive	26	100.0%	0	0.0%	26	100.0%

a. Methodology = MS

Descriptives[a]

			Statistic	Std. Error
IELTS	Mean		5.25	.075
	95% Confidence Interval for Mean	Lower Bound	5.10	
		Upper Bound	5.40	
	5% Trimmed Mean		5.22	
	Median		5.00	
	Variance		.145	
	Std. Deviation		.381	
	Minimum		5	
	Maximum		6	
	Range		1	
	Interquartile Range		1	
	Skewness		1.177	.456
	Kurtosis		-.127	.887
VST	Mean		23.96	1.137
		Lower Bound	21.62	

	95% Confidence Interval for Mean	Upper Bound	26.30	
	5% Trimmed Mean		23.79	
	Median		24.00	
	Variance		33.638	
	Std. Deviation		5.800	
	Minimum		15	
	Maximum		36	
	Range		21	
	Interquartile Range		9	
	Skewness		.368	.456
	Kurtosis		-.595	.887
RT	Mean		11.15	.602
	95% Confidence Interval for Mean	Lower Bound	9.91	
		Upper Bound	12.39	
	5% Trimmed Mean		11.12	
	Median		11.00	
	Variance		9.415	
	Std. Deviation		3.068	
	Minimum		5	
	Maximum		18	
	Range		13	
	Interquartile Range		4	
	Skewness		.293	.456
	Kurtosis		.314	.887
PT	Mean		7.46	.491
	95% Confidence Interval for Mean	Lower Bound	6.45	
		Upper Bound	8.47	

	5% Trimmed Mean		7.36	
	Median		8.00	
	Variance		6.258	
	Std. Deviation		2.502	
	Minimum		4	
	Maximum		13	
	Range		9	
	Interquartile Range		4	
	Skewness		.340	.456
	Kurtosis		-.422	.887
Delayed Receptive	Mean		5.65	.477
	95% Confidence Interval for Mean	Lower Bound	4.67	
		Upper Bound	6.64	
	5% Trimmed Mean		5.53	
	Median		5.00	
	Variance		5.915	
	Std. Deviation		2.432	
	Minimum		1	
	Maximum		13	
	Range		12	
	Interquartile Range		2	
	Skewness		1.071	.456
	Kurtosis		2.600	.887
Delayed Productive	Mean		3.54	.494
	95% Confidence Interval for Mean	Lower Bound	2.52	
		Upper Bound	4.56	
	5% Trimmed Mean		3.38	

	Median	3.00	
	Variance	6.338	
	Std. Deviation	2.518	
	Minimum	0	
	Maximum	10	
	Range	10	
	Interquartile Range	2	
	Skewness	1.173	.456
	Kurtosis	1.741	.887

a. Methodology = MS

Tests of Normality[a]

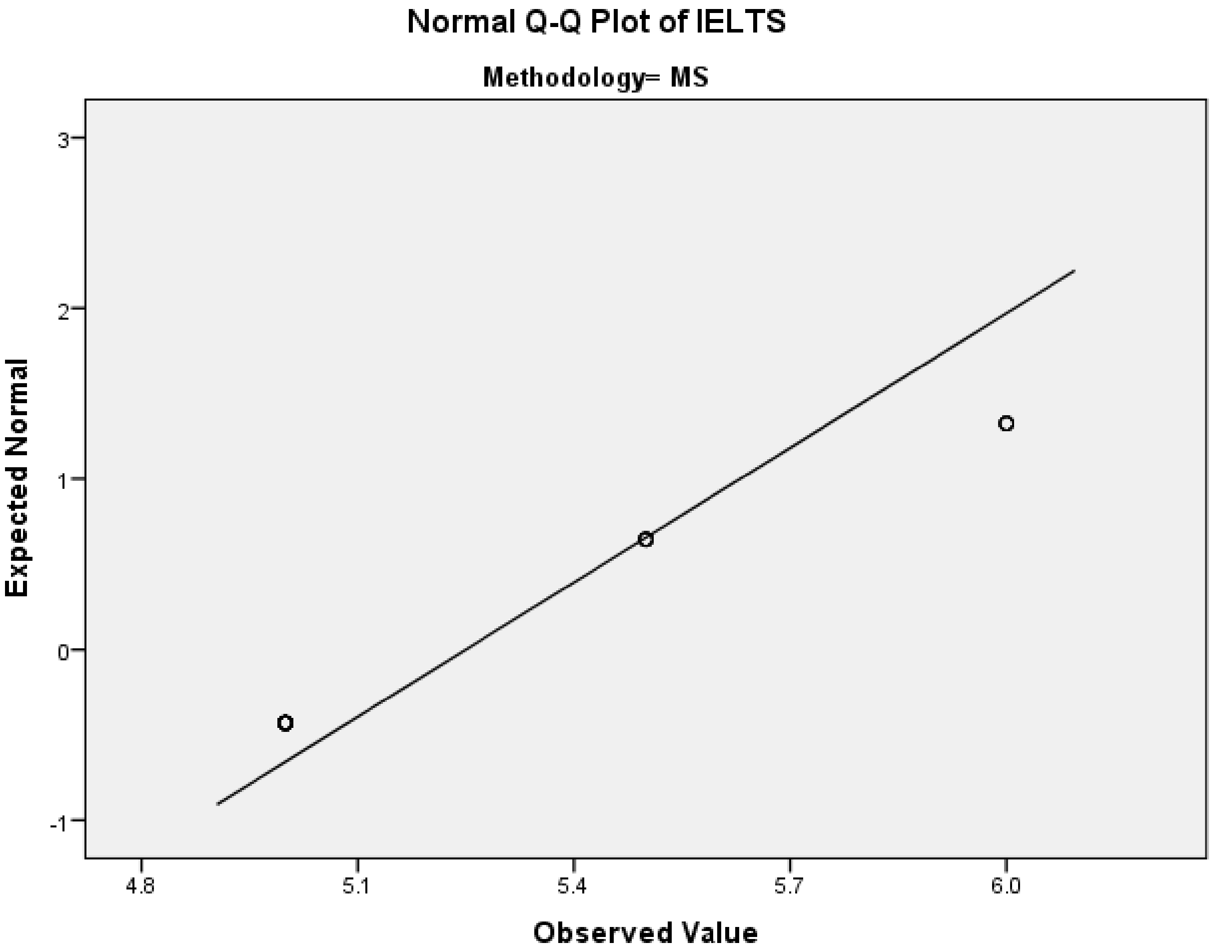
	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
IELTS	.398	26	.000	.662	26	.000
VST	.083	26	.200*	.965	26	.499
RT	.122	26	.200*	.967	26	.550
PT	.124	26	.200*	.945	26	.181
Delayed Receptive	.213	26	.004	.906	26	.021
Delayed Productive	.235	26	.001	.884	26	.007

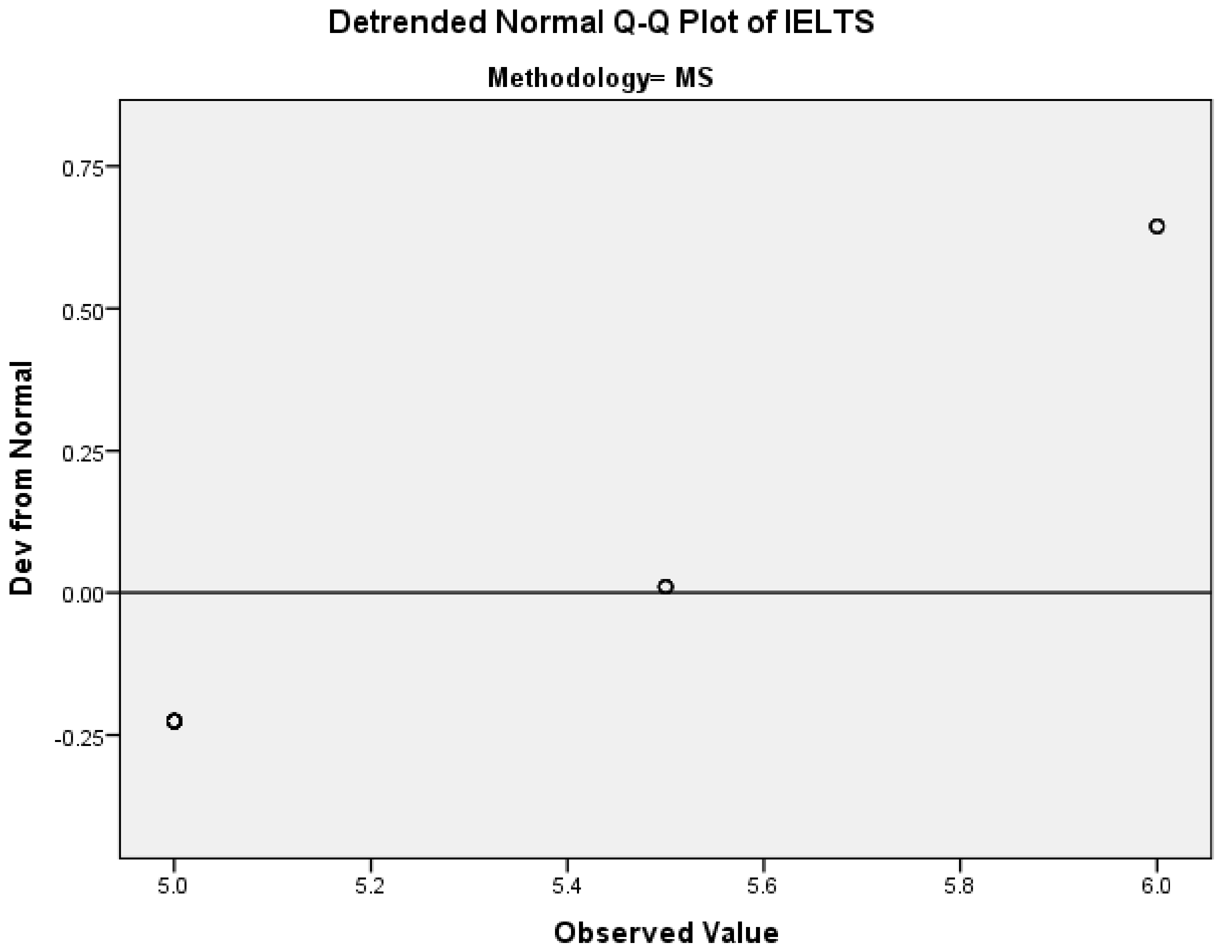
*. This is a lower bound of the true significance.

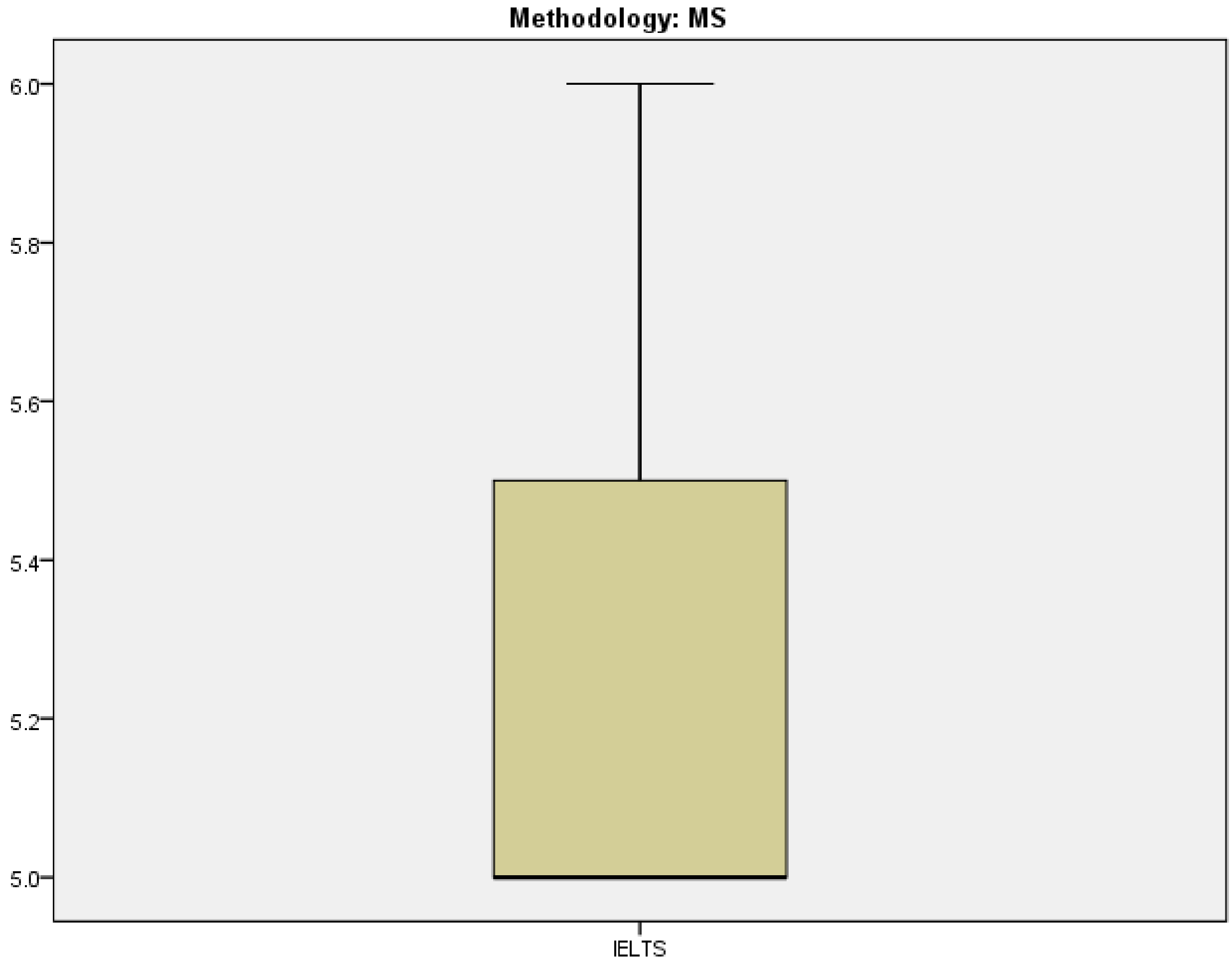
a. Methodology = MS

b. Lilliefors Significance Correction

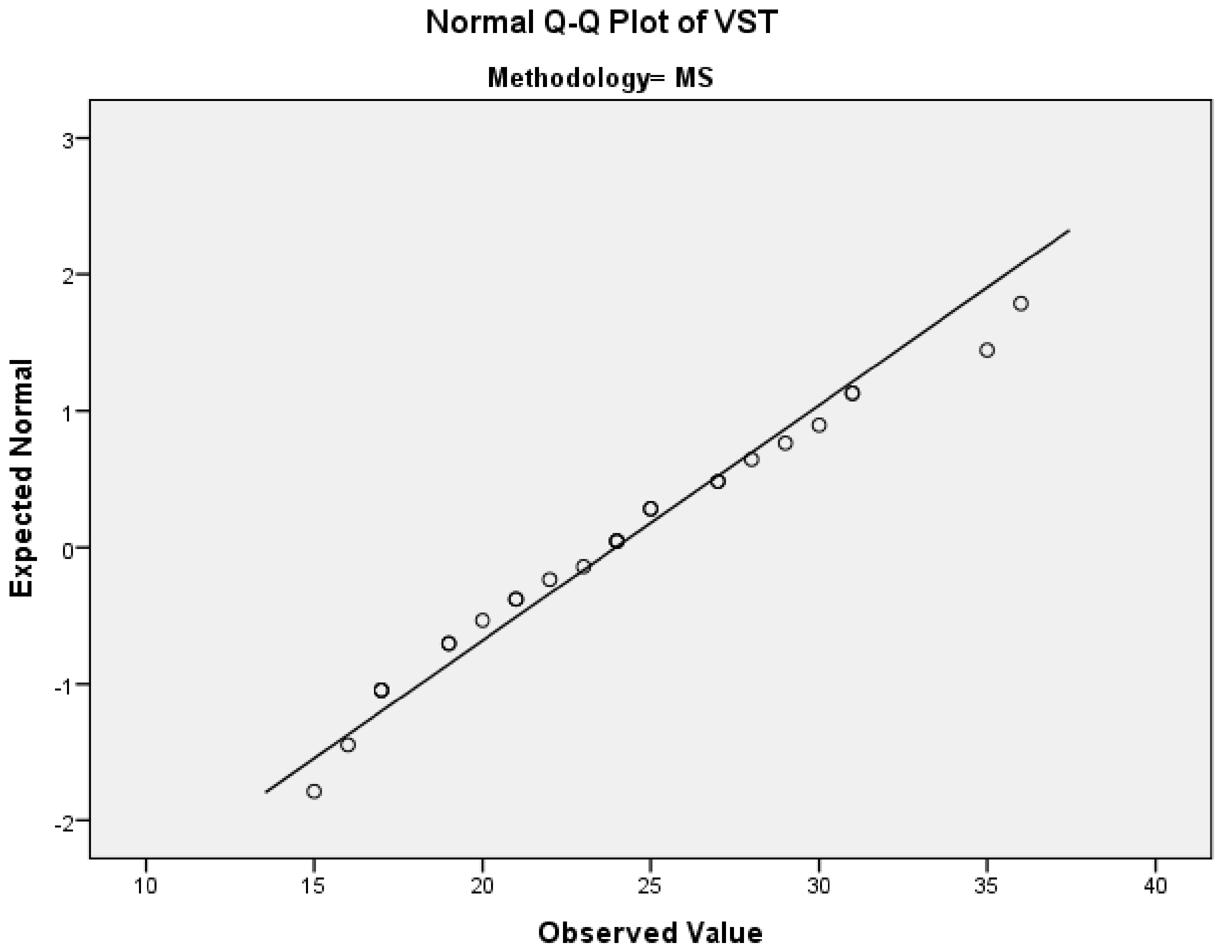
IELTS

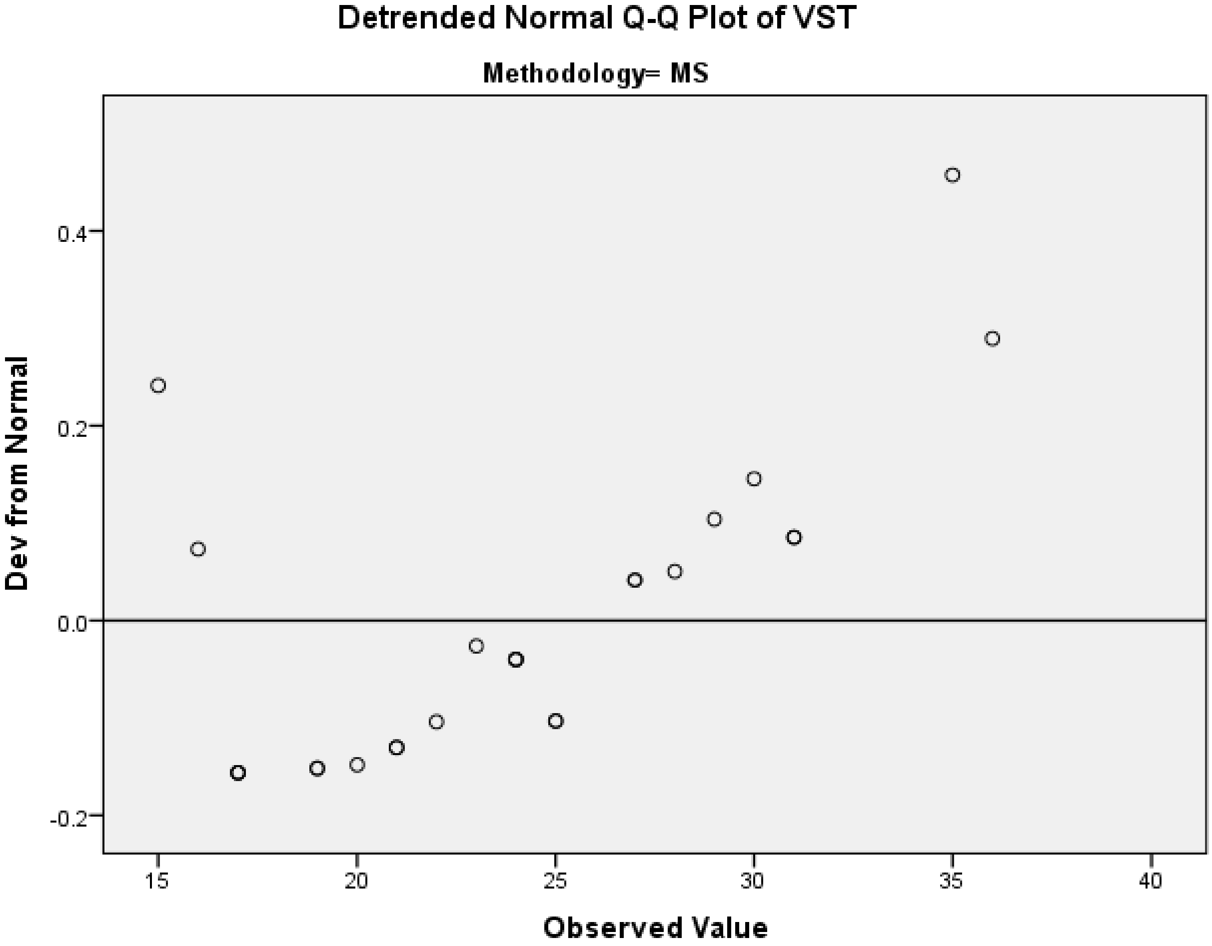

Normal Q-Q Plot of IELTS
Methodology= MS
Expected Normal
3
2
1
0
-1
4.8
5.1
5.4
5.7
6.0
Observed Value

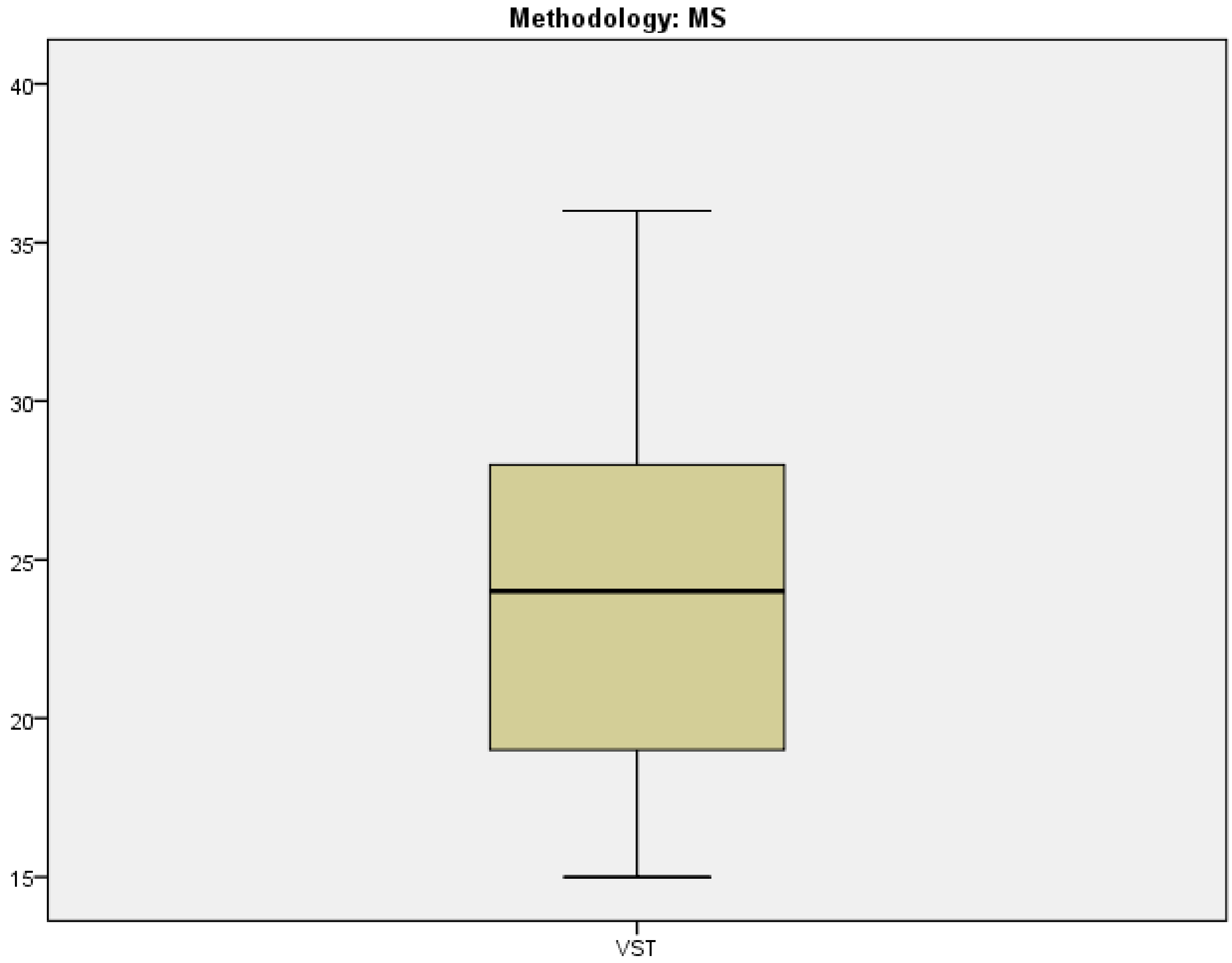

Detrended Normal Q-Q Plot of IELTS
Methodology= MS
Dev from Normal
0.75
0.50
0.25
0.00
-0.25
5.0
5.2
5.4
5.6
5.8
6.0
Observed Value



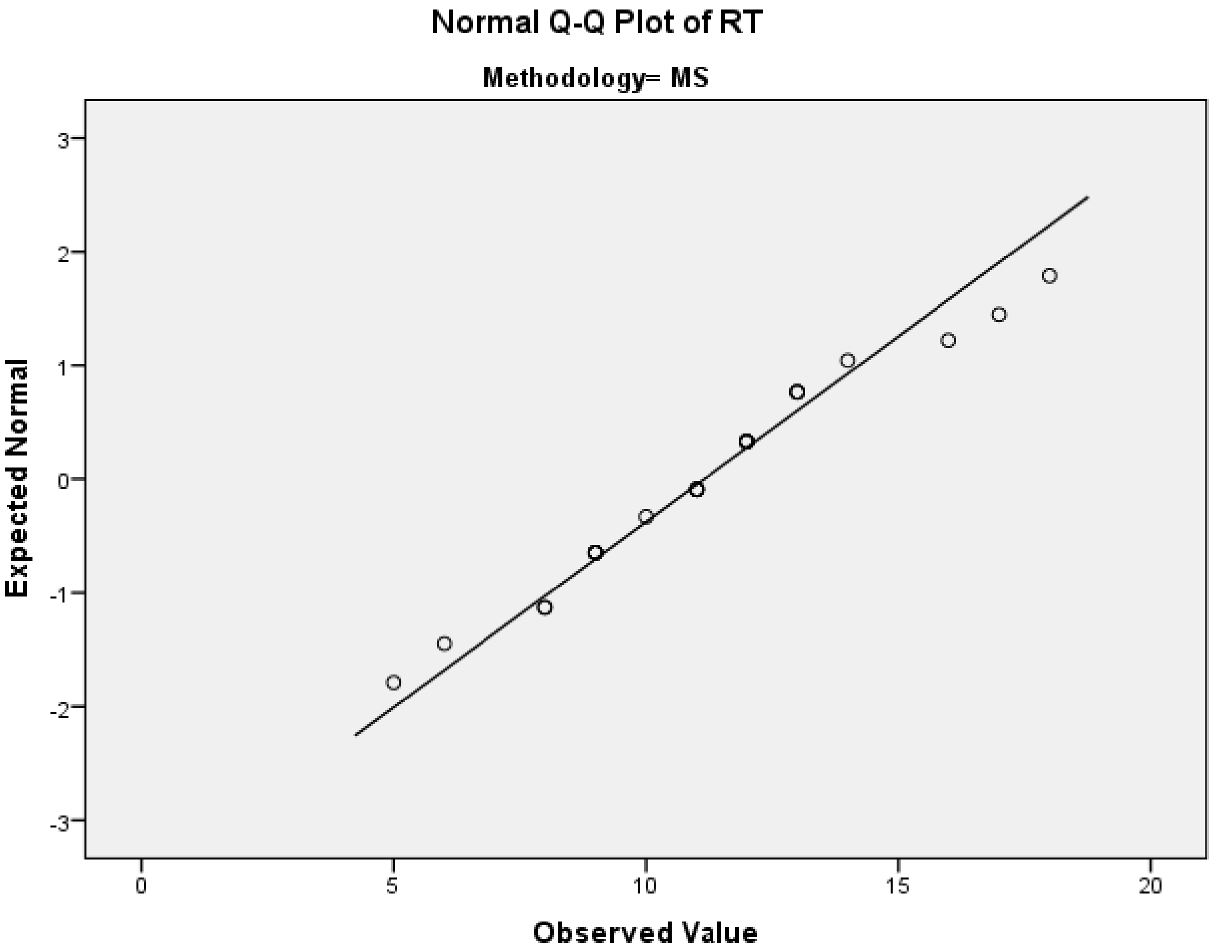
VST

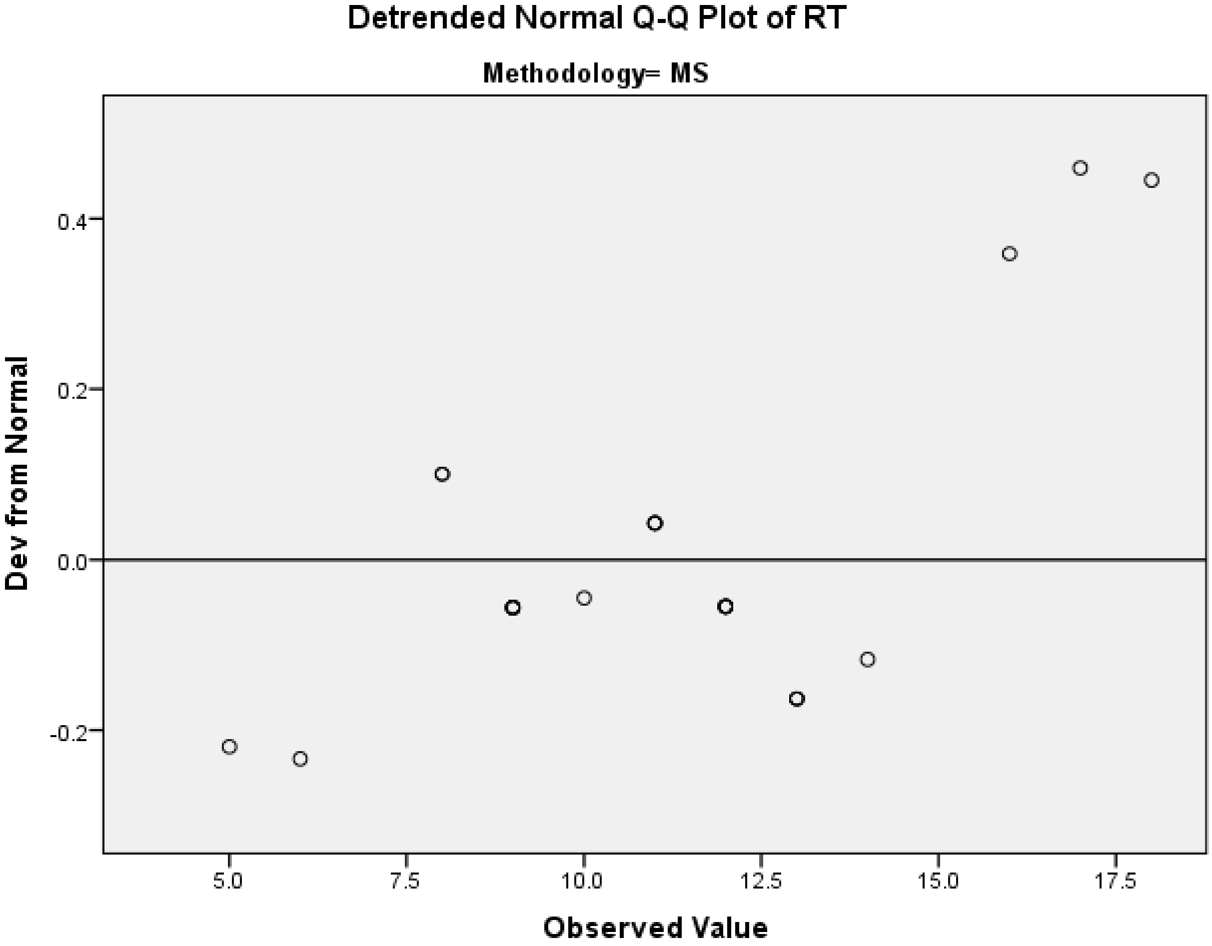

Normal Q-Q Plot of VST
Methodology= MS
Expected Normal
Observed Value
3
2
1
0
-1
-2
10
15
20
25
30
35
40

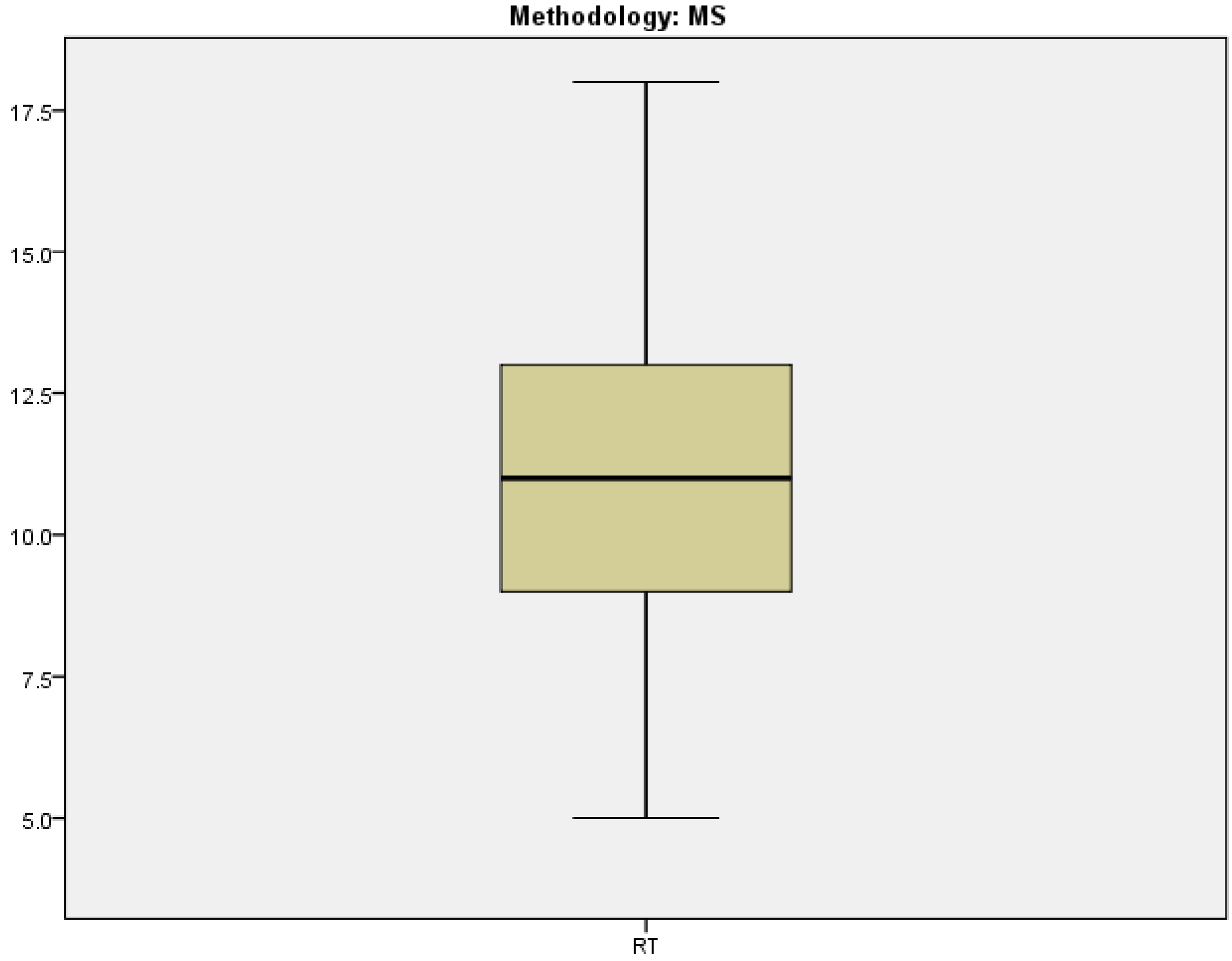

Detrended Normal Q-Q Plot of VST
Methodology= MS
Dev from Normal
0.4
0.2
0.0
-0.2
15
20
25
30
35
40
Observed Value



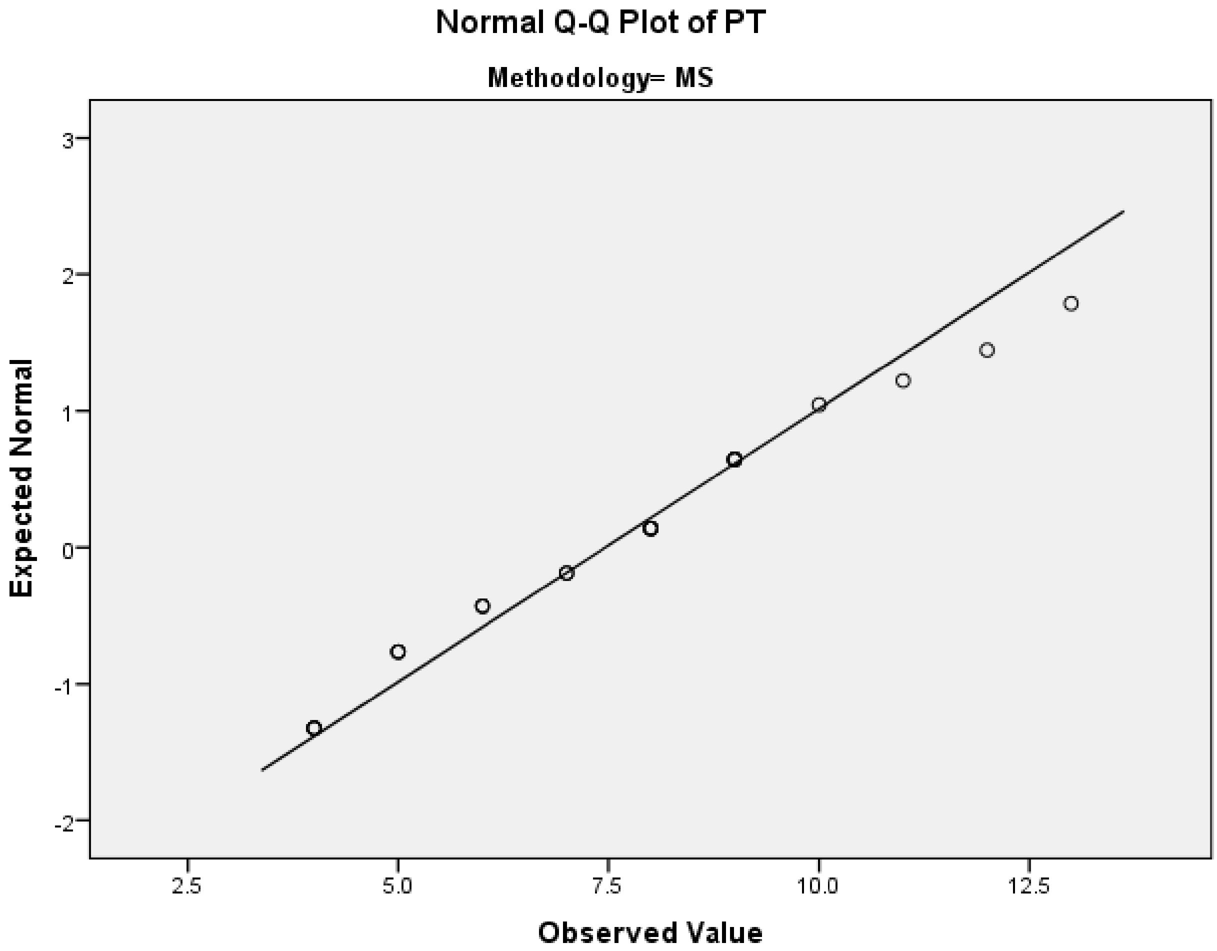
RT

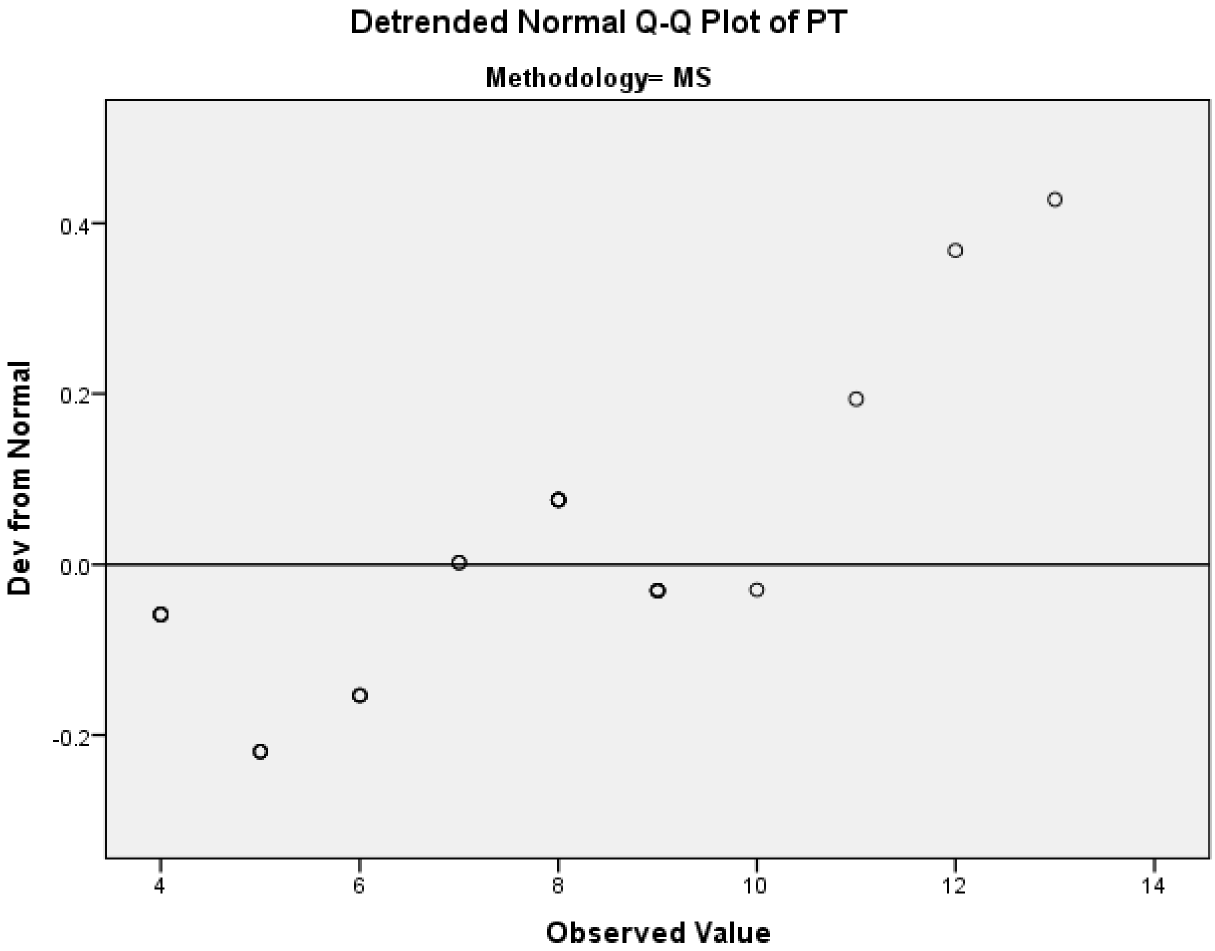

Normal Q-Q Plot of RT
Methodology= MS
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
0
5
10
15
20

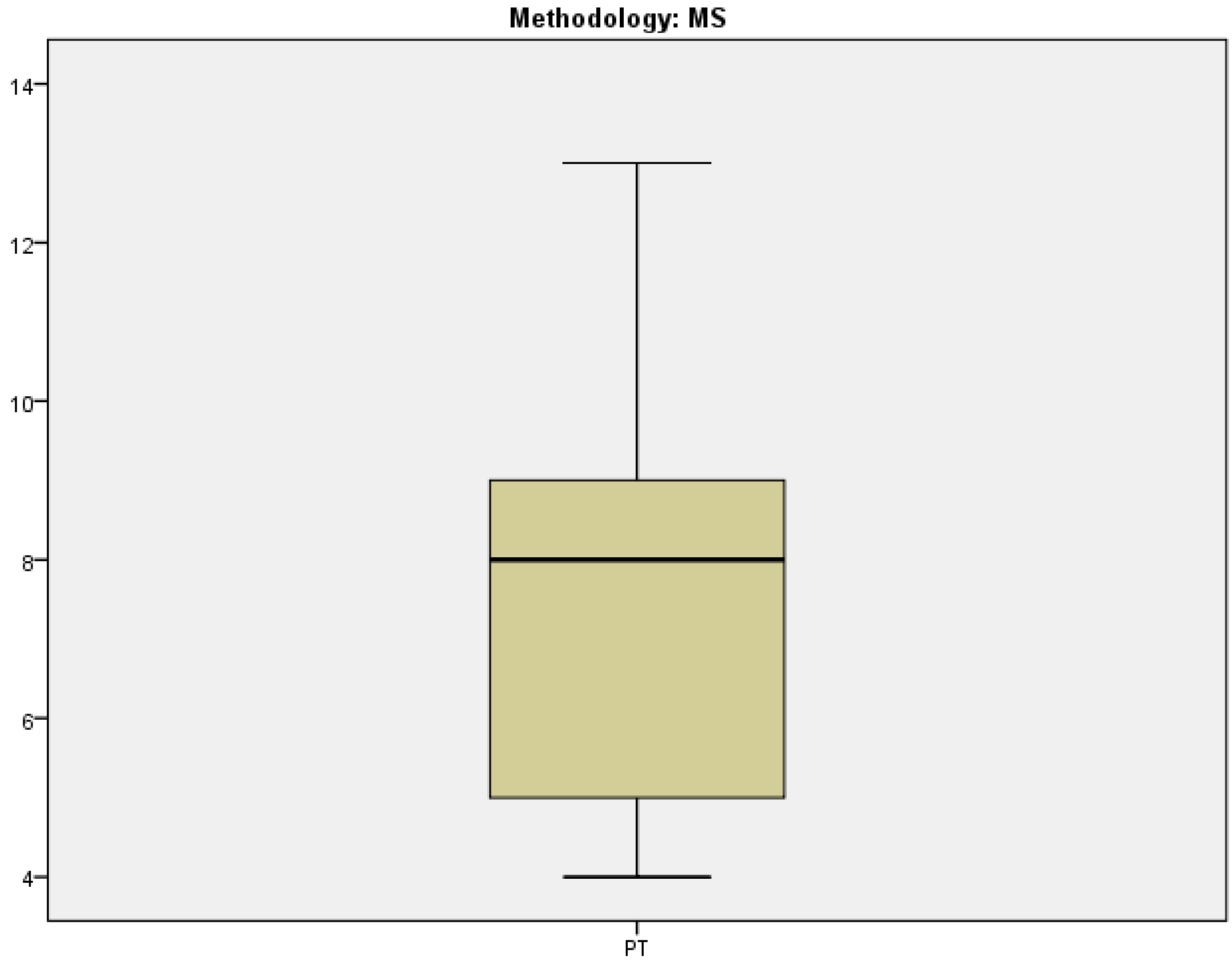

Detrended Normal Q-Q Plot of RT
Methodology= MS
Dev from Normal
0.4
0.2
0.0
-0.2
5.0
7.5
10.0
12.5
15.0
17.5
Observed Value



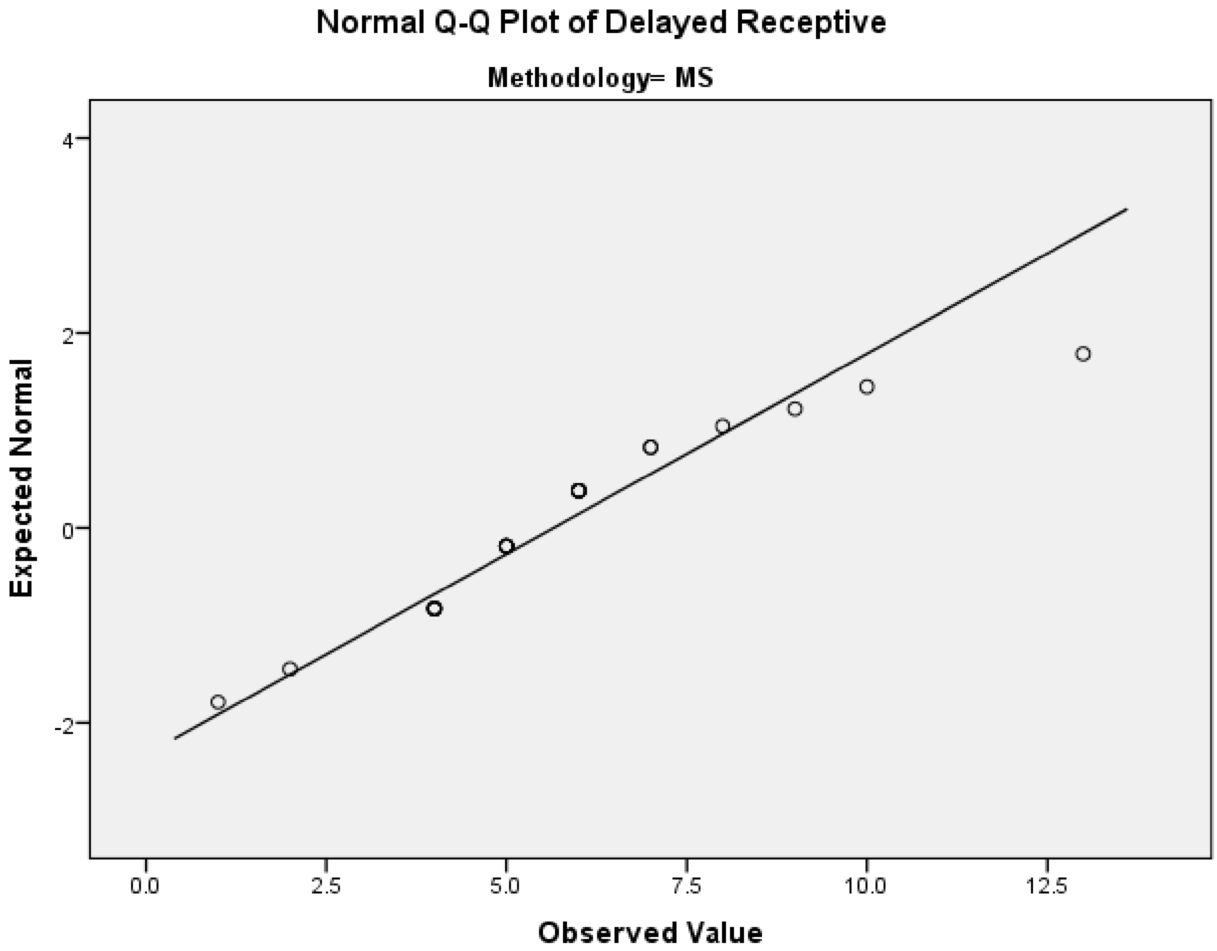
PT

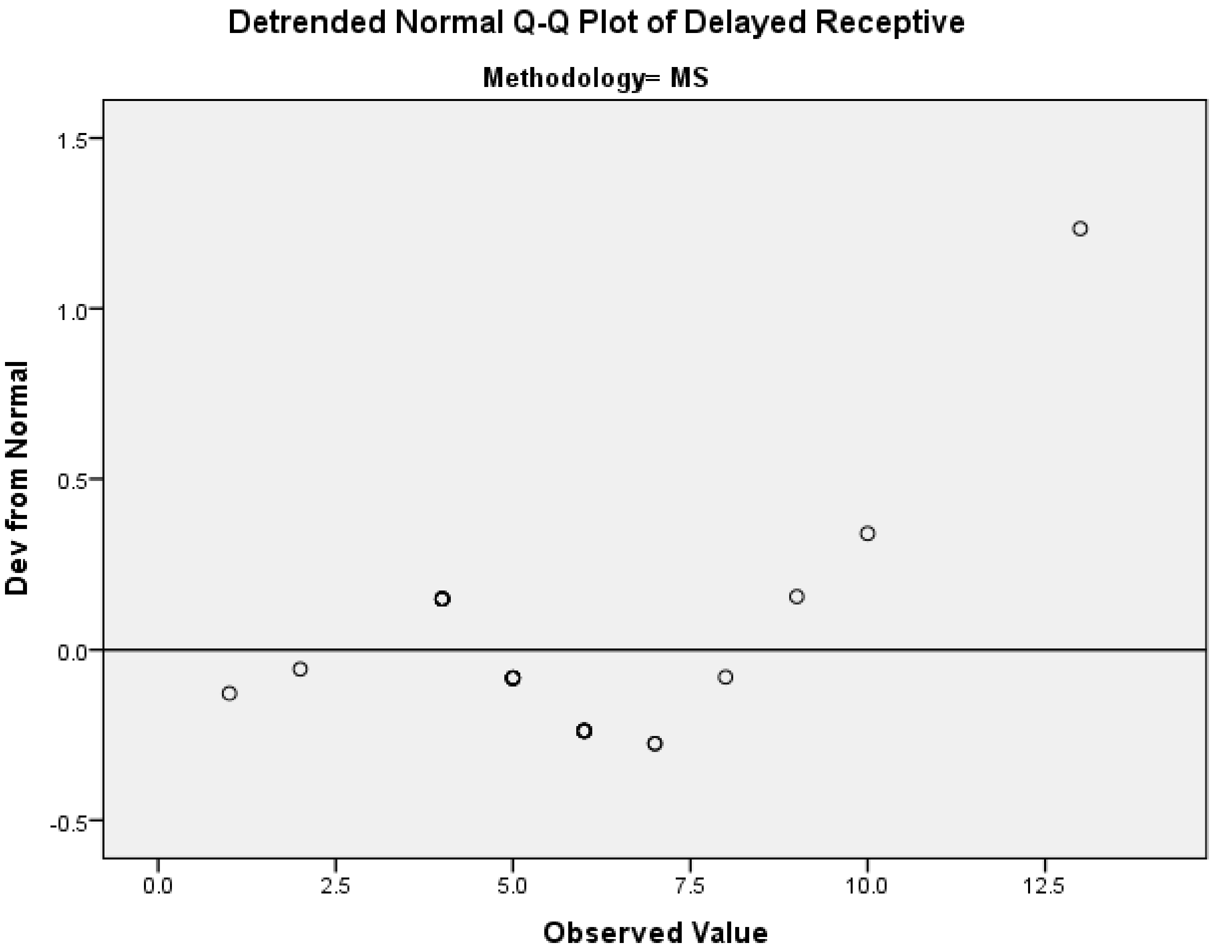

Normal Q-Q Plot of PT
Methodology= MS
Expected Normal
Observed Value
3
2
1
0
-1
-2
2.5
5.0
7.5
10.0
12.5


Detrended Normal Q-Q Plot of PT
Methodology= MS
Dev from Normal
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
Observed Value

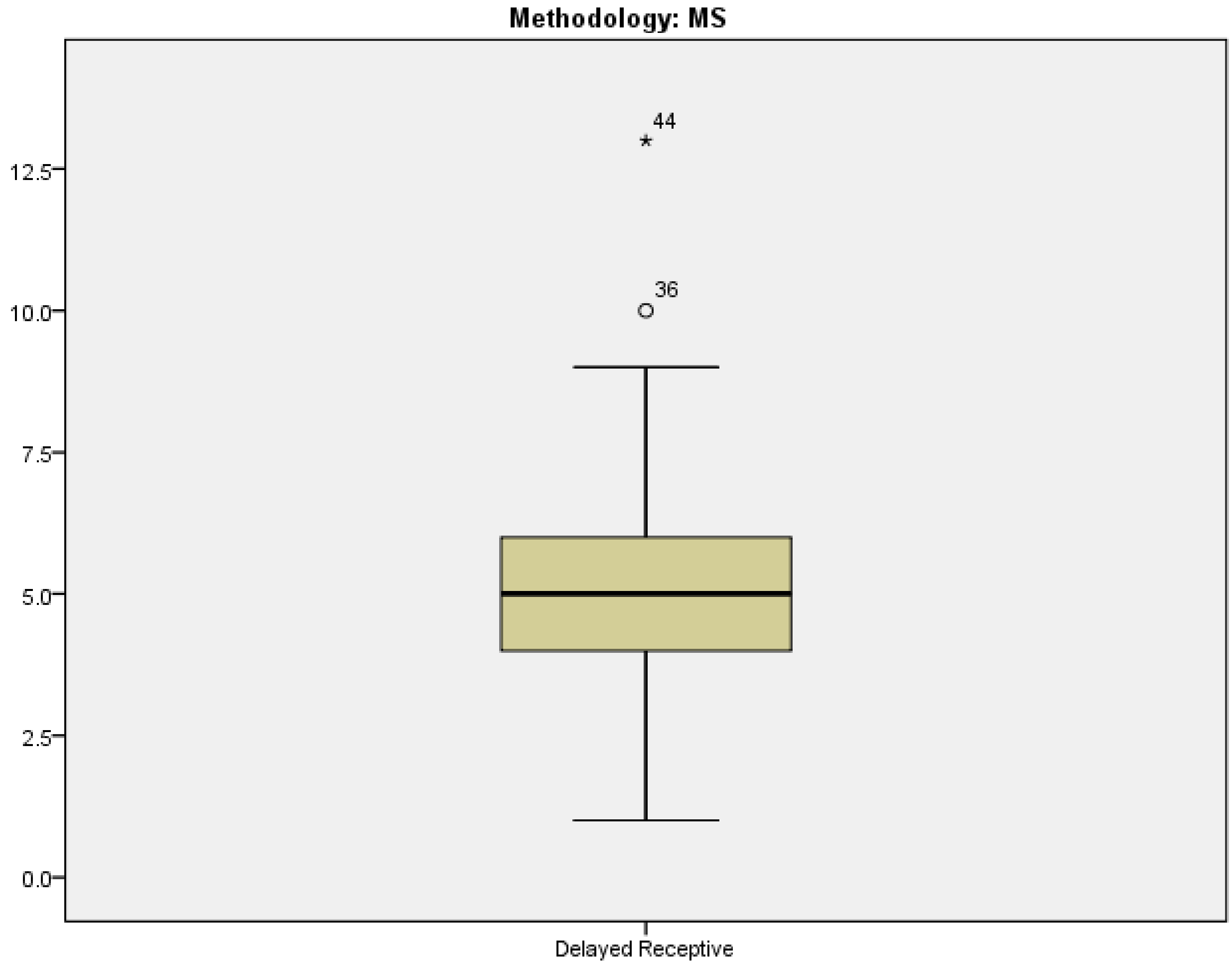


Delayed Receptive

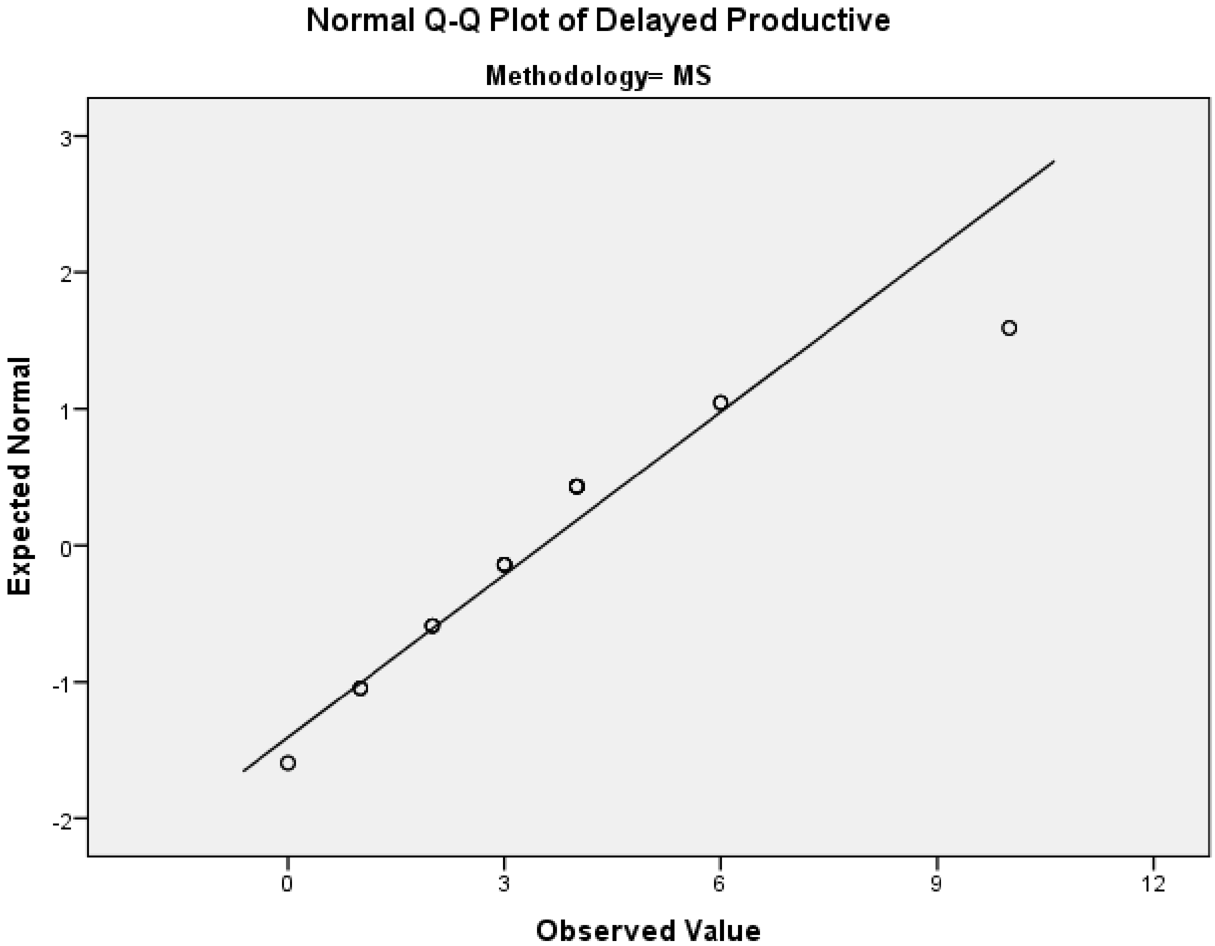

Normal Q-Q Plot of Delayed Receptive
Methodology= MS
Expected Normal
Observed Value
4
2
0
-2
0.0
2.5
5.0
7.5
10.0
12.5



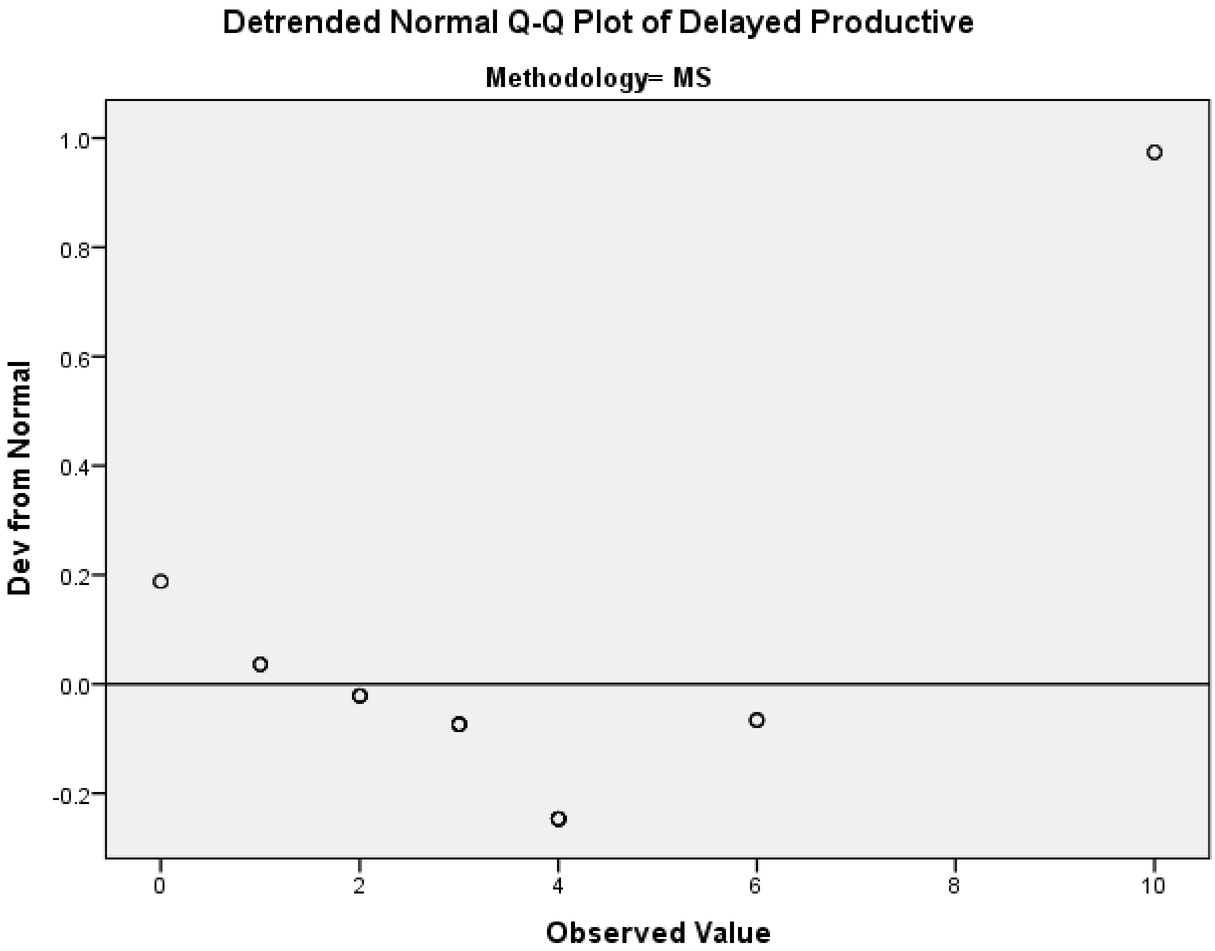
Detrended Normal Q-Q Plot of Delayed Receptive
Methodology= MS
Dev from Normal
Observed Value
1.5
1.0
0.5
0.0
-0.5
0.0
2.5
5.0
7.5
10.0
12.5

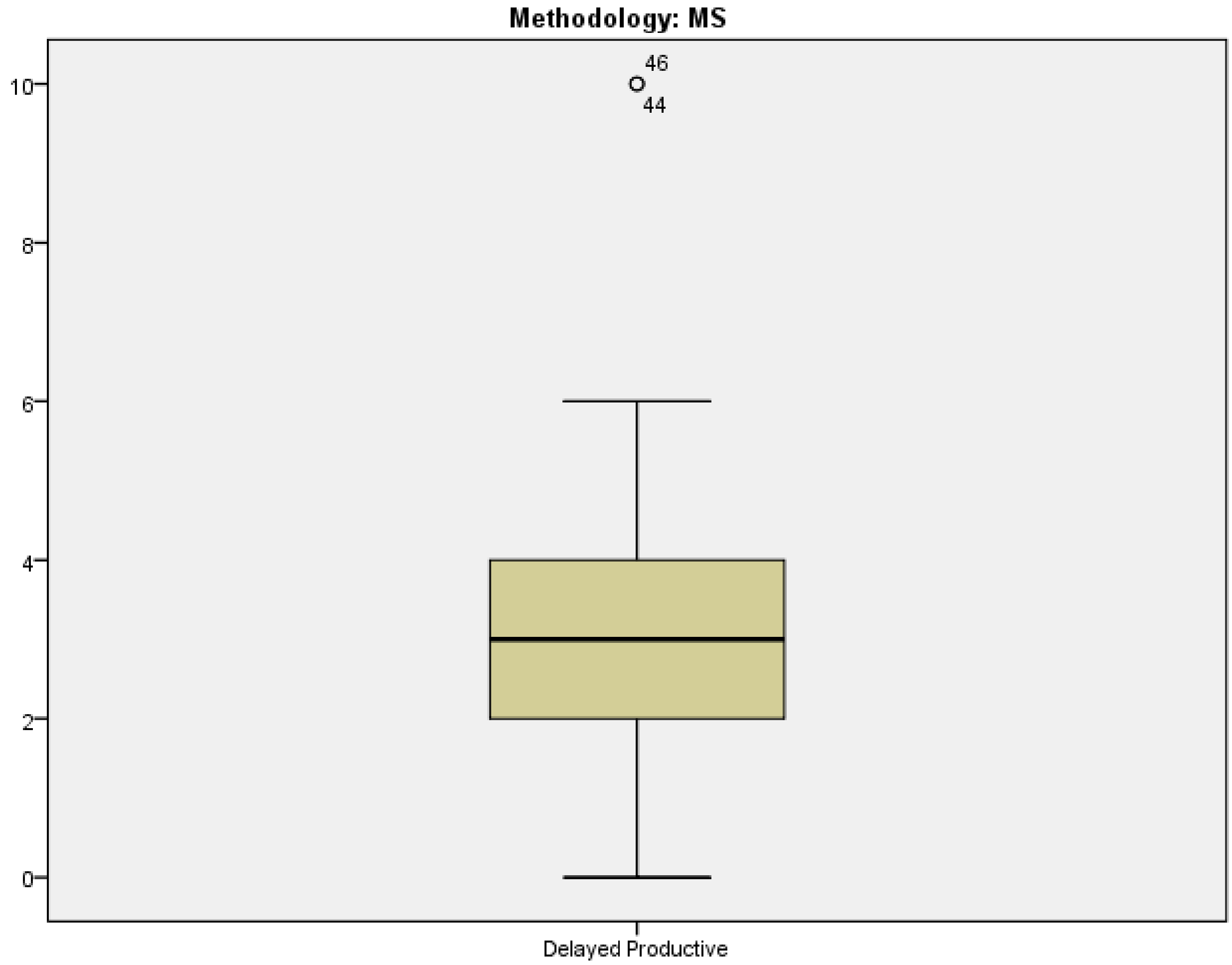


Delayed Productive



Normal Q-Q Plot of Delayed Productive
Methodology= MS
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
3
6
9
12


Detrended Normal Q-Q Plot of Delayed Productive
Methodology= MS
Dev from Normal
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
0
2
4
6
8
10
Observed Value



SPLIT FILE OFF.

ONEWAY IELTS VST RT PT DRT DPT BY Group

/STATISTICS HOMOGENEITY

/MISSING ANALYSIS.

Oneway

Notes

Output Created		09-JUL-2017 11:27:23
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
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	Split File	<none>
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Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY IELTS VST RT PT DRT DPT BY Group /STATISTICS HOMOGENEITY /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
IELTS	1.872	1	51	.177
VST	.173	1	51	.679
RT	.323	1	51	.572
PT	.380	1	51	.540
Delayed Receptive	.187	1	51	.667
Delayed Productive	.002	1	51	.968

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
IELTS	Between Groups	.056	1	.056	.458	.502
	Within Groups	6.199	51	.122		
	Total	6.255	52			
VST	Between Groups	8.763	1	8.763	.288	.594
	Within Groups	1554.369	51	30.478		
	Total	1563.132	52			
RT	Between Groups	93.787	1	93.787	11.458	.001
	Within Groups	417.459	51	8.185		
	Total	511.245	52			
PT	Between Groups	87.859	1	87.859	15.375	.000
	Within Groups	291.425	51	5.714		
	Total	379.283	52			
Delayed Receptive	Between Groups	151.605	1	151.605	25.700	.000
	Within Groups	300.848	51	5.899		
	Total	452.453	52			

Delayed Productive	Between Groups	87.664	1	87.664	15.357	.000
	Within Groups	291.128	51	5.708		
	Total	378.792	52			

NPAR TESTS

/M-W= IELTS BY Group(1 2)

/MISSING ANALYSIS.

NPar Tests

Notes

Output Created		09-JUL-2017 17:19:45
Comments		
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	Split File	<none>
	N of Rows in Working Data File	53

Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= IELTS BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed[a]	449389

a. Based on availability of workspace memory.

[DataSet1] C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav

Mann-Whitney Test

Ranks

Group	N	Mean Rank	Sum of Ranks

IELTS	EG1	27	26.09	704.50
	CG1	26	27.94	726.50
	Total	53		

Test Statistics[a]

	IELTS
Mann-Whitney U	326.500
Wilcoxon W	704.500
Z	-.530
Asymp. Sig. (2-tailed)	.596

a. Grouping Variable: Group

```
NPAR TESTS
  /M-W= IELTS BY Group(1 2)
  /K-S= IELTS BY Group(1 2)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		09-JUL-2017 17:23:49
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	53
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= IELTS BY Group(1 2) /K-S= IELTS BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed[a]	449389

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
IELTS	EG1	27	26.09	704.50
	CG1	26	27.94	726.50
	Total	53		

Test Statistics[a]

	IELTS
Mann-Whitney U	326.500
Wilcoxon W	704.500
Z	-.530
Asymp. Sig. (2-tailed)	.596

a. Grouping Variable: Group

Two-Sample Kolmogorov-Smirnov Test

Frequencies

	Group	N
IELTS	EG1	27
	CG1	26
	Total	53

Test Statistics[a]

		IELTS
Most Extreme Differences	Absolute	.080
	Positive	.080
	Negative	.000
Kolmogorov-Smirnov Z		.290
Asymp. Sig. (2-tailed)		1.000

a. Grouping Variable: Group

```
T-TEST GROUPS=Method('1' '2')
  /MISSING=ANALYSIS
  /VARIABLES=VST
  /CRITERIA=CI(.95).
```

T-Test

Notes

Output Created		09-JUL-2017 17:28:19
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	53
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=Method('1' '2') /MISSING=ANALYSIS /VARIABLES=VST /CRITERIA=CI(.95).
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02

Group Statistics

	Methodology	N	Mean	Std. Deviation	Std. Error Mean
VST	TB	27	23.15	5.238	1.008
	MS	26	23.96	5.800	1.137

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
VST	Equal variances assumed	.173	.679	-.536	51	.594	-.813
	Equal variances not assumed			-.535	50.023	.595	-.813

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
VST	Equal variances assumed	1.517	-3.859	2.232
	Equal variances not assumed	1.520	-3.866	2.239

```
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=Group RT
MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
```

```
  SOURCE: s=userSource(id("graphdataset"))
  DATA: Group=col(source(s), name("Group"), unit.category())
  DATA: RT=col(source(s), name("RT"))
  DATA: id=col(source(s), name("$CASENUM"), unit.category())
  GUIDE: axis(dim(1), label("Group"))
  GUIDE: axis(dim(2), label("RT"))
  SCALE: cat(dim(1), include("1", "2"))
  SCALE: linear(dim(2), include(0))
  ELEMENT: schema(position(bin.quantile.letter(Group*RT)), label(id))
END GPL.
```

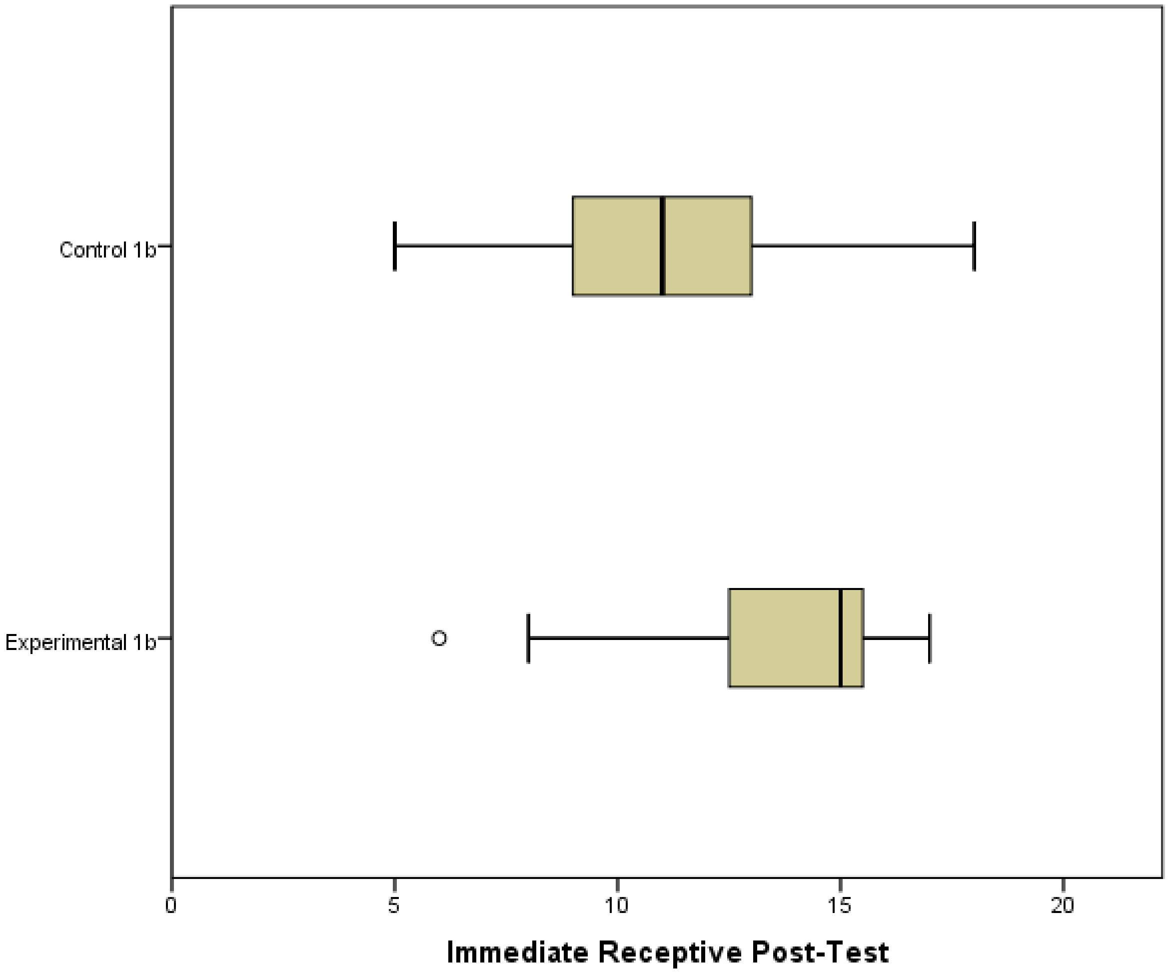
GGraph

Notes

Output Created		11-JUL-2017 00:37:09
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>

	N of Rows in Working Data File	53
Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Group RT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Group=col(source(s), name("Group"), unit.category()) DATA: RT=col(source(s), name("RT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Group")) GUIDE: axis(dim(2), label("RT")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Group*RT)), label(id)) END GPL.

Resources	Processor Time	00:00:00.20
	Elapsed Time	00:00:00.17




```
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=Group PT
MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: Group=col(source(s), name("Group"), unit.category())
```

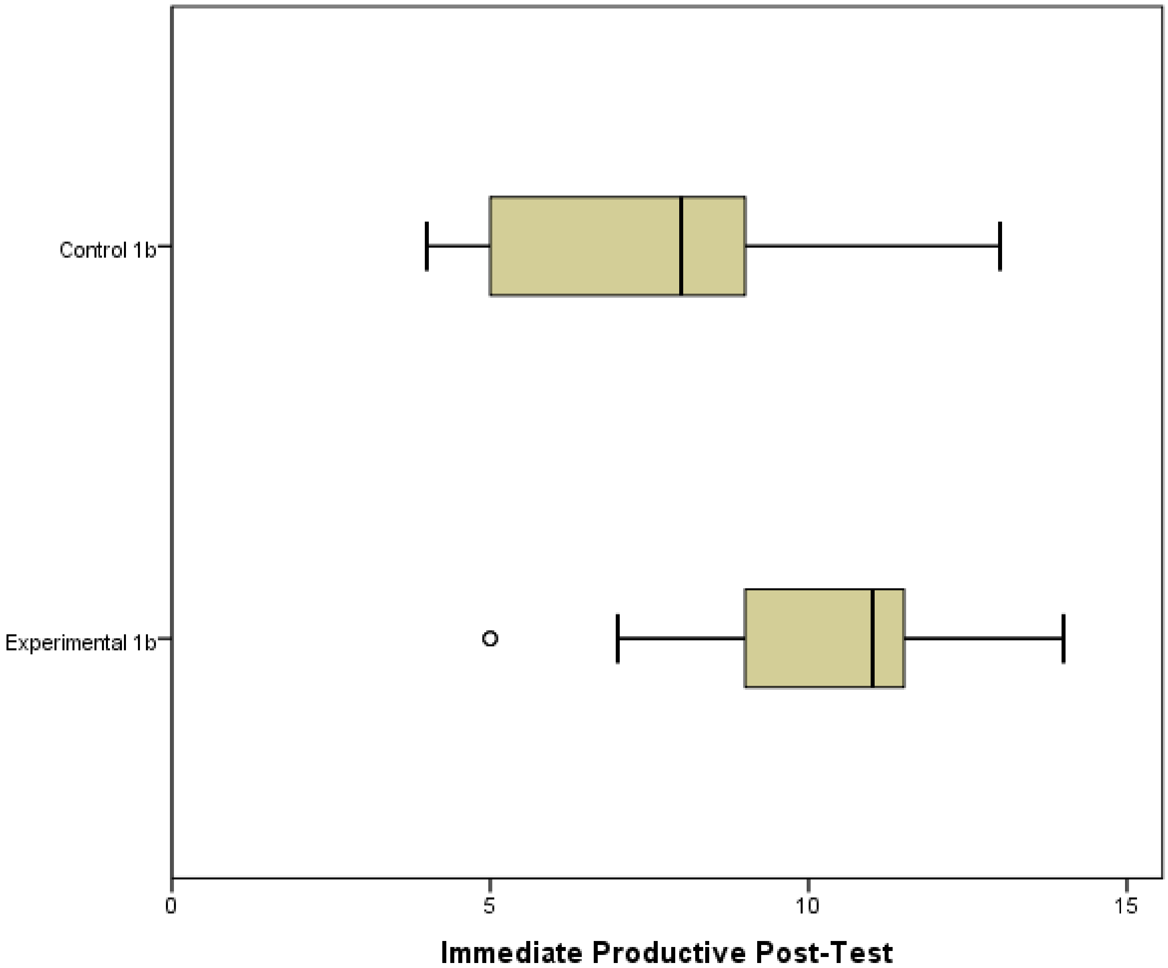
```
  DATA: PT=col(source(s), name("PT"))
  DATA: id=col(source(s), name("$CASENUM"), unit.category())
  GUIDE: axis(dim(1), label("Group"))
  GUIDE: axis(dim(2), label("PT"))
  SCALE: cat(dim(1), include("1", "2"))
  SCALE: linear(dim(2), include(0))
  ELEMENT: schema(position(bin.quantile.letter(Group*PT)), label(id))
END GPL.
```

GGraph

Notes

Output Created		11-JUL-2017 06:45:41
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	53

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Group PT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Group=col(source(s), name("Group"), unit.category()) DATA: PT=col(source(s), name("PT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Group")) GUIDE: axis(dim(2), label("PT")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Group*PT)), label(id)) END GPL.
Resources	Processor Time	00:00:03.00
	Elapsed Time	00:00:00.97



* Chart Builder.

GGRAPH

  /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DRT MISSING=LISTWISE REPORTMISSING=NO

  /GRAPHSPEC SOURCE=INLINE.

BEGIN GPL

  SOURCE: s=userSource(id("graphdataset"))

```
  DATA: Method=col(source(s), name("Method"), unit.category())
  DATA: DRT=col(source(s), name("DRT"))
  DATA: id=col(source(s), name("$CASENUM"), unit.category())
  GUIDE: axis(dim(1), label("Methodology"))
  GUIDE: axis(dim(2), label("Delayed Receptive"))
  SCALE: cat(dim(1), include("1", "2"))
  SCALE: linear(dim(2), include(0))
  ELEMENT: schema(position(bin.quantile.letter(Method*DRT)), label(id))
END GPL.
```

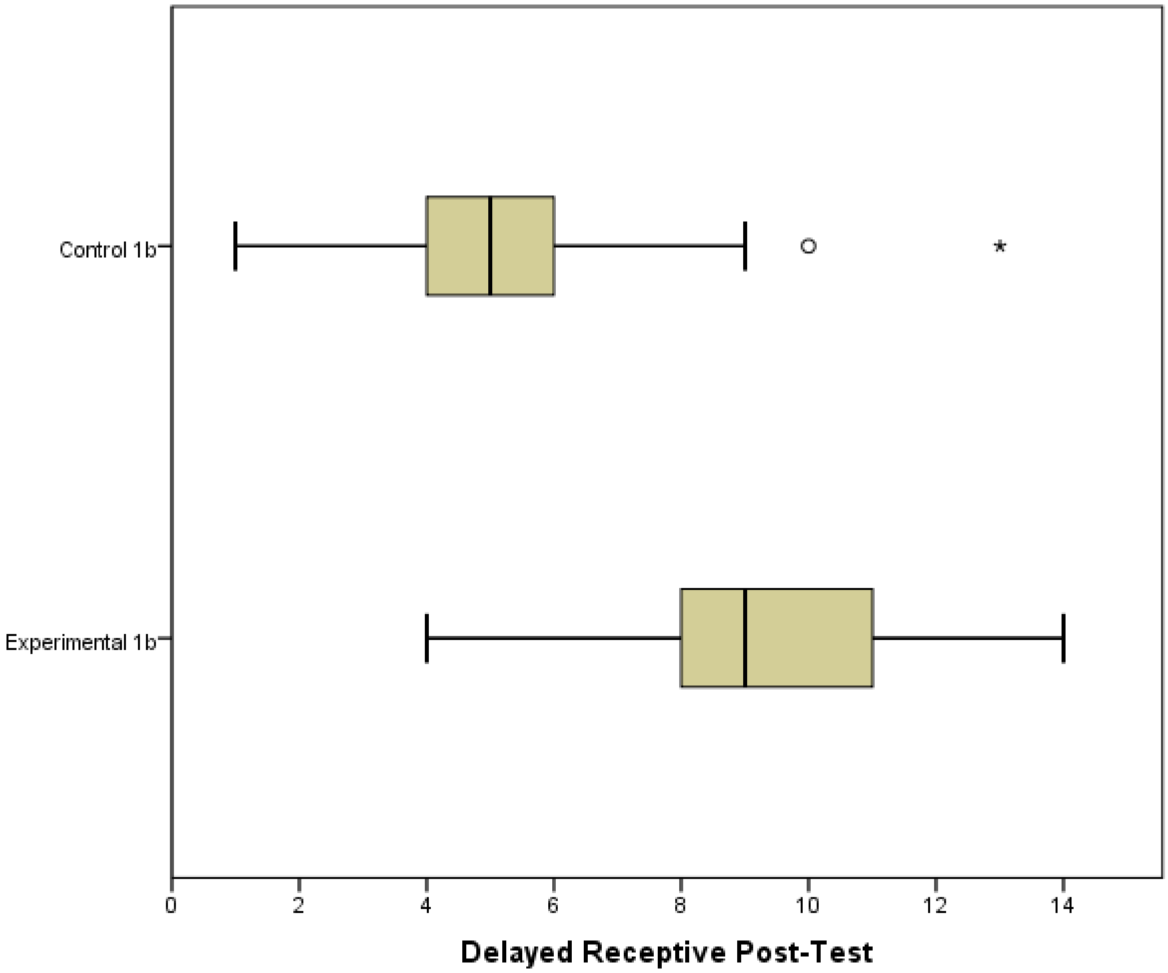
GGraph

Notes

Output Created		11-JUL-2017 08:53:42
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	53

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DRT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: DRT=col(source(s), name("DRT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("Delayed Receptive")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*DRT)), label(id)) END GPL.
Resources	Processor Time	00:00:03.05

Elapsed Time	00:00:01.13



NPAR TESTS

/M-W= DRT DPT BY Group(1 2)

/MISSING ANALYSIS.

NPar Tests

Notes

Output Created		11-JUL-2017 09:49:42
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	53
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= DRT DPT BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.02

	Number of Cases Allowed[a]	393216

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
Delayed Receptive	EG1	27	35.93	970.00
	CG1	26	17.73	461.00
	Total	53		
Delayed Productive	EG1	27	34.67	936.00
	CG1	26	19.04	495.00
	Total	53		

Test Statistics[a]

	Delayed Receptive	Delayed Productive
Mann-Whitney U	110.000	144.000
Wilcoxon W	461.000	495.000
Z	-4.314	-3.723

Asymp. Sig. (2-tailed)	.000	.000

a. Grouping Variable: Group

```
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DPT
MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: Method=col(source(s), name("Method"), unit.category())
  DATA: DPT=col(source(s), name("DPT"))
  DATA: id=col(source(s), name("$CASENUM"), unit.category())
  GUIDE: axis(dim(1), label("Methodology"))
  GUIDE: axis(dim(2), label("Delayed Productive"))
  SCALE: cat(dim(1), include("1", "2"))
  SCALE: linear(dim(2), include(0))
  ELEMENT: schema(position(bin.quantile.letter(Method*DPT)), label(id))
END GPL.
```

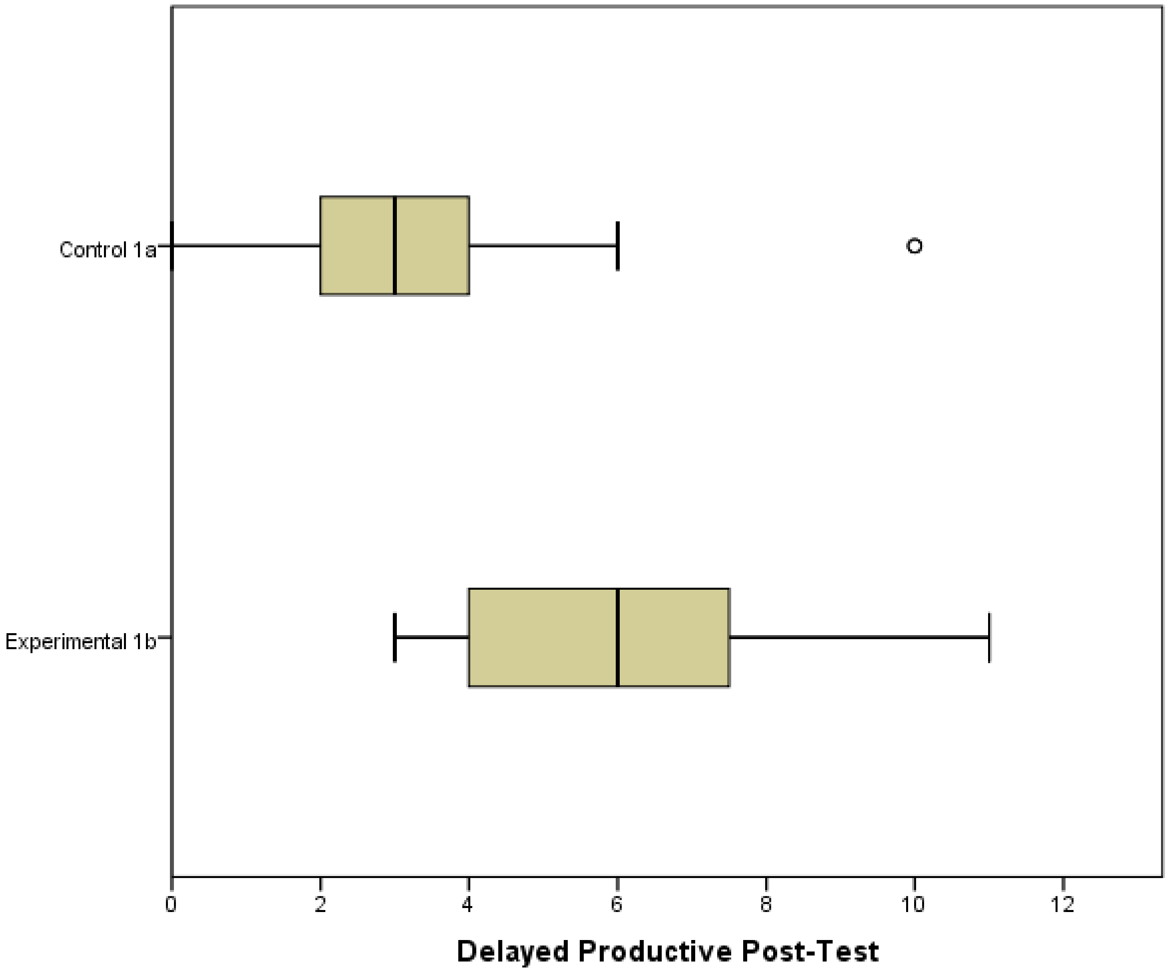
GGraph

Notes

Output Created		11-JUL-2017 10:11:48
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	53

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DPT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: DPT=col(source(s), name("DPT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("Delayed Productive")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*DPT)), label(id)) END GPL.
Resources	Processor Time	00:00:00.86

Elapsed Time	00:00:00.29



NPAR TESTS

/M-W= RT PT BY Group(1 2)

/MISSING ANALYSIS.

NPar Tests

Notes

Output Created		11-JUL-2017 11:01:33
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	53
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= RT PT BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.01
	Number of Cases Allowed[a]	393216

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
RT	EG1	27	33.61	907.50
	CG1	26	20.13	523.50
	Total	53		
PT	EG1	27	34.31	926.50
	CG1	26	19.40	504.50
	Total	53		

Test Statistics[a]

	RT	PT
Mann-Whitney U	172.500	153.500
Wilcoxon W	523.500	504.500
Z	-3.198	-3.543
Asymp. Sig. (2-tailed)	.001	.000

a. Grouping Variable: Group

Appendix O

```
SORT CASES  BY Method.
SPLIT FILE LAYERED BY Method.
EXAMINE VARIABLES=IELTS VST RT PT DRT DPT
  /ID=Method
  /PLOT BOXPLOT NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

Notes

Output Created		15-JUL-2017 20:28:58
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>

	Weight	<none>
	Split File	Methodology
	N of Rows in Working Data File	55
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=IELTS VST RT PT DRT DPT /ID=Method /PLOT BOXPLOT NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:04.91
	Elapsed Time	00:00:04.02

Case Processing Summary

		Cases					
		Valid		Missing		Total	
Methodology		N	Percent	N	Percent	N	Percent
TB	IELTS	28	100.0%	0	0.0%	28	100.0%

	VST	28	100.0%	0	0.0%	28	100.0%
	RT	28	100.0%	0	0.0%	28	100.0%
	PT	28	100.0%	0	0.0%	28	100.0%
	Delayed Receptive	28	100.0%	0	0.0%	28	100.0%
	Delayed Productive	28	100.0%	0	0.0%	28	100.0%
MS	IELTS	27	100.0%	0	0.0%	27	100.0%
	VST	27	100.0%	0	0.0%	27	100.0%
	RT	27	100.0%	0	0.0%	27	100.0%
	PT	27	100.0%	0	0.0%	27	100.0%
	Delayed Receptive	27	100.0%	0	0.0%	27	100.0%
	Delayed Productive	27	100.0%	0	0.0%	27	100.0%

Descriptives

Methodology				Statistic	Std. Error
TB	IELTS	Mean		5.321	.0528
		95% Confidence Interval for Mean	Lower Bound	5.213	
			Upper Bound	5.430	
		5% Trimmed Mean		5.310	
		Median		5.500	
		Variance		.078	
		Std. Deviation		.2794	
		Minimum		5.0	
		Maximum		6.0	
		Range		1.0	
		Interquartile Range		.5	

	Skewness		.070	.441
	Kurtosis		-.738	.858
VST	Mean		23.43	.939
	95% Confidence Interval for Mean	Lower Bound	21.50	
		Upper Bound	25.36	
	5% Trimmed Mean		23.57	
	Median		23.50	
	Variance		24.698	
	Std. Deviation		4.970	
	Minimum		12	
	Maximum		32	
	Range		20	
	Interquartile Range		8	
	Skewness		-.408	.441
	Kurtosis		-.283	.858
RT	Mean		14.61	.571
	95% Confidence Interval for Mean	Lower Bound	13.44	
		Upper Bound	15.78	
	5% Trimmed Mean		14.83	
	Median		15.00	
	Variance		9.136	
	Std. Deviation		3.023	
	Minimum		6	
	Maximum		19	
	Range		13	
	Interquartile Range		3	

	Skewness		-1.353	.441
	Kurtosis		1.838	.858
PT	Mean		11.14	.394
	95% Confidence Interval for Mean	Lower Bound	10.33	
		Upper Bound	11.95	
	5% Trimmed Mean		11.21	
	Median		11.00	
	Variance		4.349	
	Std. Deviation		2.085	
	Minimum		5	
	Maximum		15	
	Range		10	
	Interquartile Range		2	
	Skewness		-.468	.441
	Kurtosis		1.793	.858
Delayed Receptive	Mean		9.57	.481
	95% Confidence Interval for Mean	Lower Bound	8.58	
		Upper Bound	10.56	
	5% Trimmed Mean		9.48	
	Median		9.00	
	Variance		6.476	
	Std. Deviation		2.545	
	Minimum		4	
	Maximum		16	
	Range		12	
	Interquartile Range		3	

		Skewness		.854	.441
		Kurtosis		1.802	.858
	Delayed Productive	Mean		7.04	.358
		95% Confidence Interval for Mean	Lower Bound	6.30	
			Upper Bound	7.77	
		5% Trimmed Mean		6.94	
		Median		7.00	
		Variance		3.591	
		Std. Deviation		1.895	
		Minimum		4	
		Maximum		12	
		Range		8	
		Interquartile Range		2	
		Skewness		.683	.441
		Kurtosis		.752	.858
MS	IELTS	Mean		5.222	.0556
		95% Confidence Interval for Mean	Lower Bound	5.108	
			Upper Bound	5.336	
		5% Trimmed Mean		5.199	
		Median		5.000	
		Variance		.083	
		Std. Deviation		.2887	
		Minimum		5.0	
		Maximum		6.0	
		Range		1.0	
		Interquartile Range		.5	

	Skewness		.879	.448
	Kurtosis		-.138	.872
VST	Mean		23.63	.893
	95% Confidence Interval for Mean	Lower Bound	21.79	
		Upper Bound	25.47	
	5% Trimmed Mean		23.42	
	Median		23.00	
	Variance		21.550	
	Std. Deviation		4.642	
	Minimum		17	
	Maximum		35	
	Range		18	
	Interquartile Range		7	
	Skewness		.504	.448
	Kurtosis		-.031	.872
RT	Mean		11.07	.547
	95% Confidence Interval for Mean	Lower Bound	9.95	
		Upper Bound	12.20	
	5% Trimmed Mean		10.99	
	Median		11.00	
	Variance		8.071	
	Std. Deviation		2.841	
	Minimum		7	
	Maximum		17	
	Range		10	
	Interquartile Range		4	

	Skewness		.245	.448
	Kurtosis		-.599	.872
PT	Mean		7.26	.445
	95% Confidence Interval for Mean	Lower Bound	6.34	
		Upper Bound	8.17	
	5% Trimmed Mean		7.18	
	Median		7.00	
	Variance		5.353	
	Std. Deviation		2.314	
	Minimum		4	
	Maximum		12	
	Range		8	
	Interquartile Range		3	
	Skewness		.625	.448
	Kurtosis		-.235	.872
Delayed Receptive	Mean		5.96	.628
	95% Confidence Interval for Mean	Lower Bound	4.67	
		Upper Bound	7.25	
	5% Trimmed Mean		5.79	
	Median		6.00	
	Variance		10.652	
	Std. Deviation		3.264	
	Minimum		1	
	Maximum		14	
	Range		13	
	Interquartile Range		4	

		Skewness		.810	.448
		Kurtosis		.480	.872
	Delayed Productive	Mean		3.67	.346
		95% Confidence Interval for Mean	Lower Bound	2.96	
			Upper Bound	4.38	
		5% Trimmed Mean		3.59	
		Median		3.00	
		Variance		3.231	
		Std. Deviation		1.797	
		Minimum		1	
		Maximum		8	
		Range		7	
		Interquartile Range		3	
		Skewness		.544	.448
		Kurtosis		.019	.872

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Methodology		Statistic	df	Sig.	Statistic	df	Sig.
TB	IELTS	.346	28	.000	.720	28	.000
	VST	.126	28	.200*	.971	28	.595
	RT	.242	28	.000	.873	28	.003
	PT	.162	28	.058	.932	28	.071
	Delayed Receptive	.267	28	.000	.886	28	.006
	Delayed Productive	.150	28	.105	.944	28	.137

MS	IELTS	.372	27	.000	.693	27	.000
	VST	.098	27	.200*	.958	27	.333
	RT	.119	27	.200*	.951	27	.229
	PT	.174	27	.035	.928	27	.063
	Delayed Receptive	.125	27	.200*	.943	27	.146
	Delayed Productive	.163	27	.063	.949	27	.201

*. This is a lower bound of the true significance.

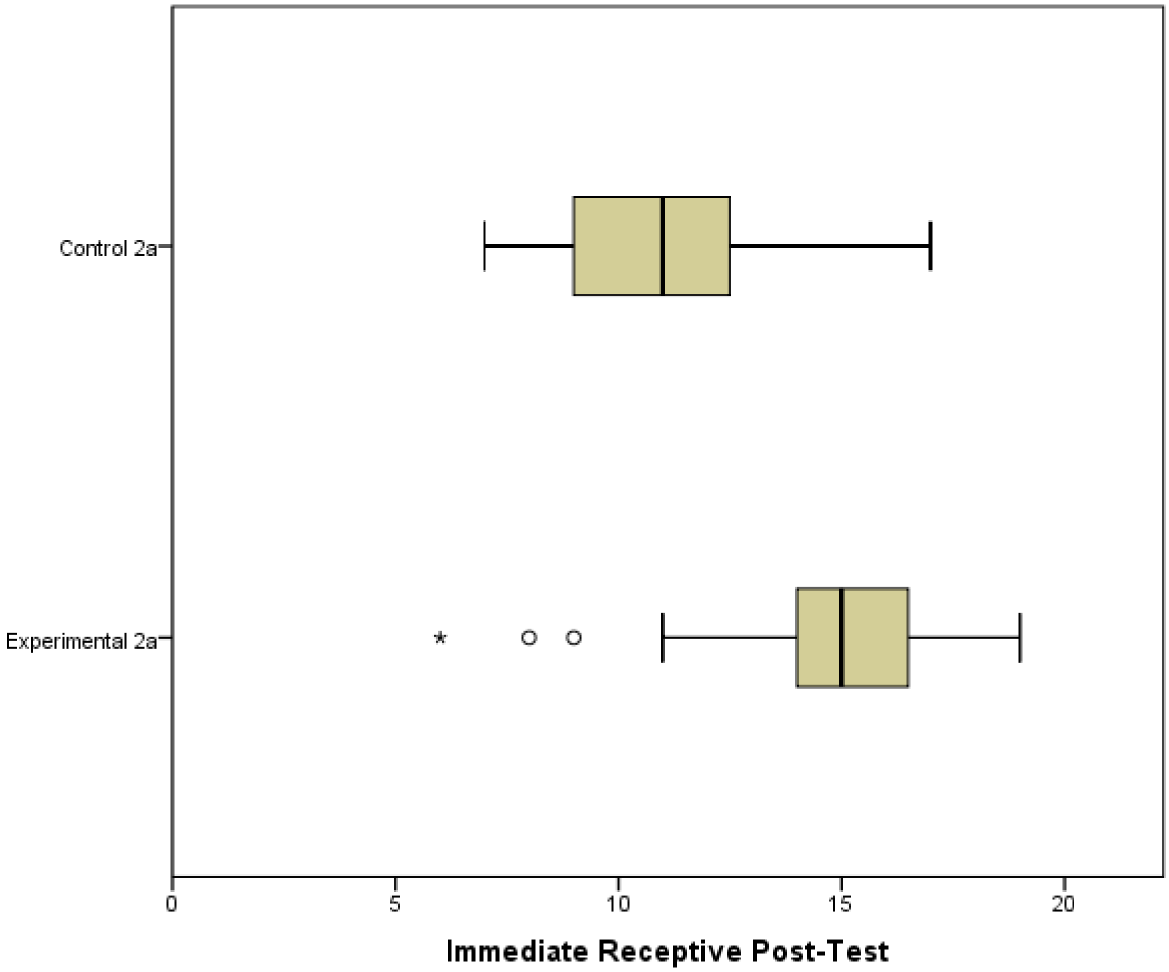
a. Lilliefors Significance Correction

GGraph

Notes

Output Created		15-JUL-2017 20:34:31
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method RT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: RT=col(source(s), name("RT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("RT")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*RT)), label(id)) END GPL.
Resources	Processor Time	00:00:00.19
	Elapsed Time	00:00:00.15



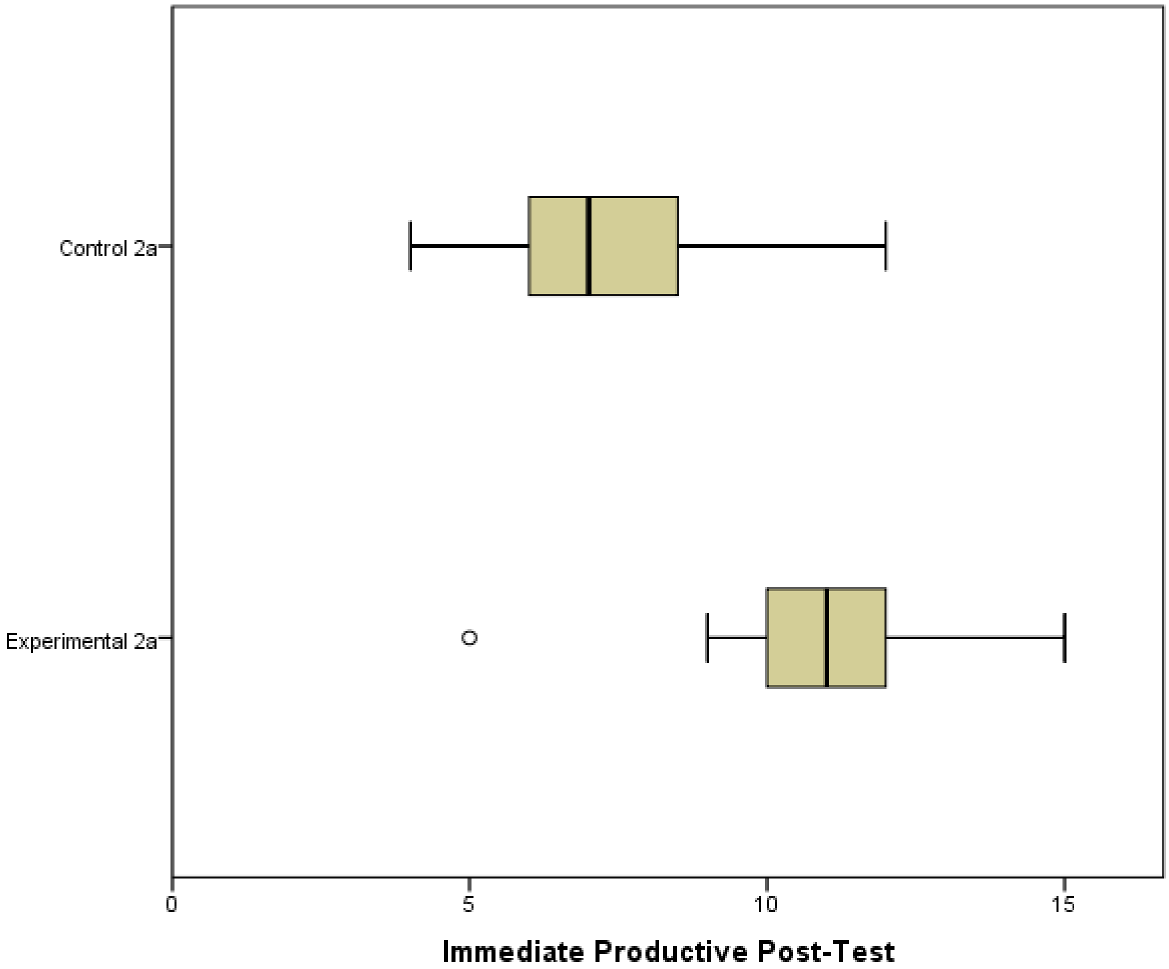
GGraph

Notes

Output Created	15-JUL-2017 20:34:42
Comments	

Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method PT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: PT=col(source(s), name("PT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("PT")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*PT)), label(id)) END GPL.
Resources	Processor Time	00:00:00.33
	Elapsed Time	00:00:00.23



GGraph

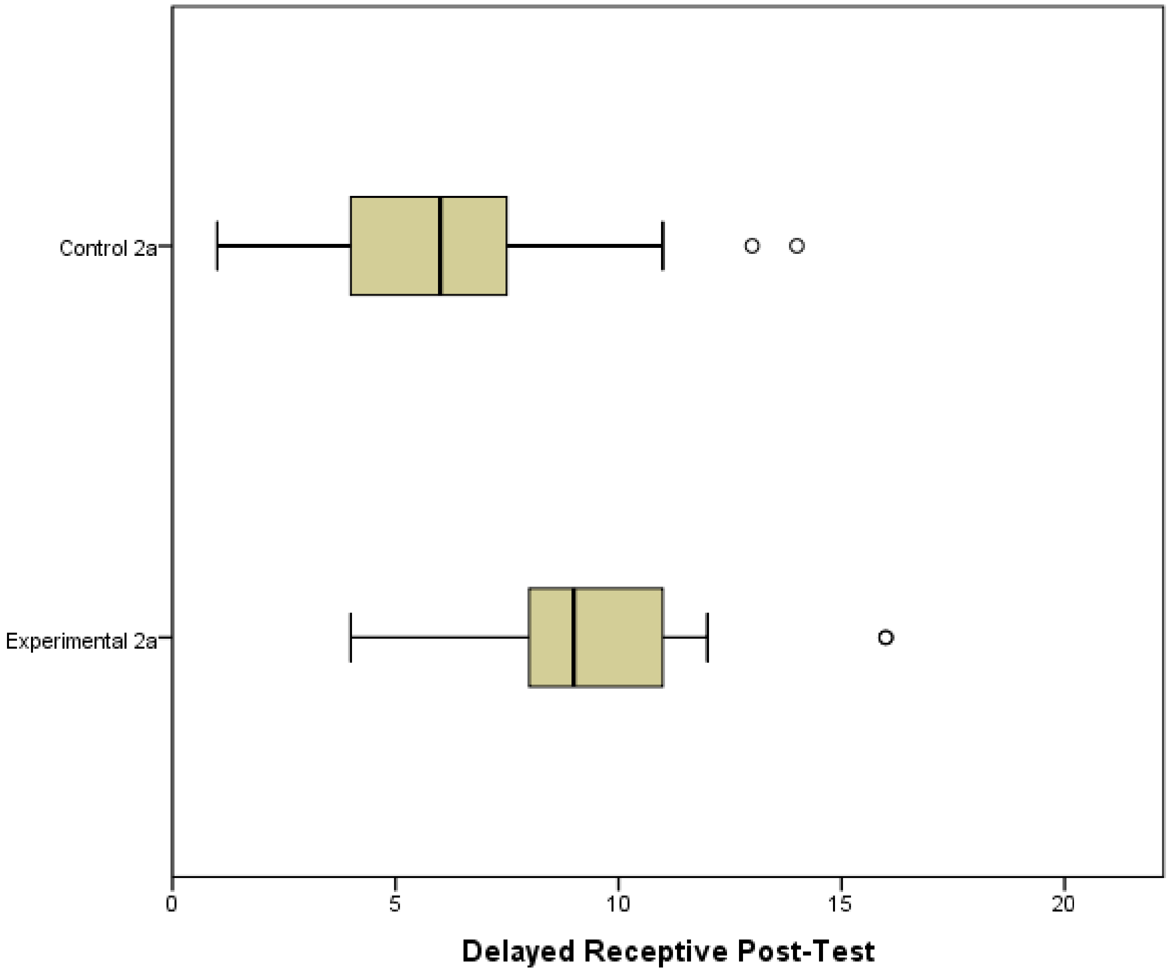
Notes

Output Created	15-JUL-2017 20:34:52
Comments	

Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DRT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: DRT=col(source(s), name("DRT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("Delayed Receptive")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*DRT)), label(id)) END GPL.
Resources	Processor Time	00:00:00.20

Elapsed Time	00:00:00.15



GGraph

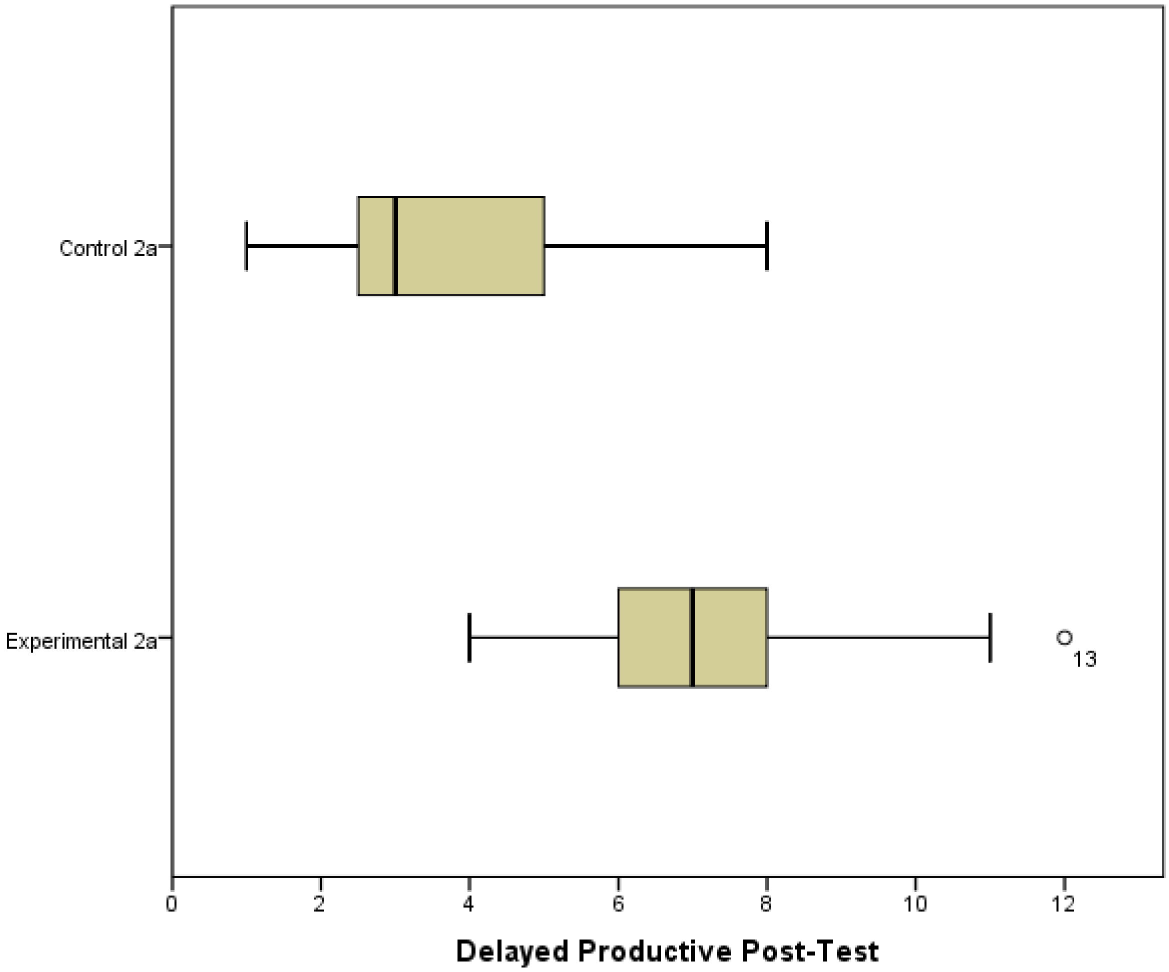
Notes

Output Created	15-JUL-2017 20:35:01

Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DPT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: DPT=col(source(s), name("DPT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("Delayed Productive")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*DPT)), label(id)) END GPL.
Resources	Processor Time	00:00:00.23

Elapsed Time	00:00:00.20



SPLIT FILE OFF.

ONEWAY VST DPT BY Group

/MISSING ANALYSIS.

Notes

Output Created		16-JUL-2017 07:41:05
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY VST DPT BY Group /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02

Oneway

Notes

Output Created		16-JUL-2017 07:42:20
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	Methodology
	N of Rows in Working Data File	55
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY VST DPT BY Group /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02

```
SPLIT FILE OFF.
ONEWAY VST DPT BY Group
  /STATISTICS HOMOGENEITY
  /MISSING ANALYSIS.
```

Oneway

Notes

Output Created		16-JUL-2017 07:44:35
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY VST DPT BY Group /STATISTICS HOMOGENEITY /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
VST	.369	1	53	.546
Delayed Productive	.009	1	53	.926

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
VST	Between Groups	.556	1	.556	.024	.877
	Within Groups	1227.153	53	23.154		
	Total	1227.709	54			
Delayed Productive	Between Groups	156.018	1	156.018	45.694	.000
	Within Groups	180.964	53	3.414		
	Total	336.982	54			

```
T-TEST GROUPS=Method('1' '2')
  /MISSING=ANALYSIS
  /VARIABLES=VST DPT
  /CRITERIA=CI(.95).
```

T-Test

Notes

Output Created		16-JUL-2017 07:47:08
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=Method('1' '2') /MISSING=ANALYSIS /VARIABLES=VST DPT /CRITERIA=CI(.95).
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Group Statistics

	Methodology	N	Mean	Std. Deviation	Std. Error Mean
VST	TB	28	23.43	4.970	.939
	MS	27	23.63	4.642	.893
Delayed Productive	TB	28	7.04	1.895	.358
	MS	27	3.67	1.797	.346

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
VST	Equal variances assumed	.369	.546	-.155	53	.877
	Equal variances not assumed			-.155	52.949	.877
Delayed Productive	Equal variances assumed	.009	.926	6.760	53	.000
	Equal variances not assumed			6.766	52.987	.000

Independent Samples Test

		t-test for Equality of Means			
				95% Confidence Interval of the Difference	
		Mean Difference	Std. Error Difference	Lower	Upper
VST	Equal variances assumed	-.201	1.298	-2.804	2.402

	Equal variances not assumed	-.201	1.296	-2.801	2.399
Delayed Productive	Equal variances assumed	3.369	.498	2.369	4.369
	Equal variances not assumed	3.369	.498	2.370	4.368

NPAR TESTS

/M-W= IELTS RT PT DRT BY Group(1 2)

/MISSING ANALYSIS.

NPar Tests

Notes

Output Created		16-JUL-2017 07:48:22
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55

Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= IELTS RT PT DRT BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed[a]	314572

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
IELTS	EG1	28	30.59	856.50
	CG1	27	25.31	683.50
	Total	55		
RT	EG1	28	36.41	1019.50

	CG1	27	19.28	520.50
	Total	55		
PT	EG1	28	38.30	1072.50
	CG1	27	17.31	467.50
	Total	55		
Delayed Receptive	EG1	28	36.91	1033.50
	CG1	27	18.76	506.50
	Total	55		

Test Statistics[a]

	IELTS	RT	PT	Delayed Receptive
Mann-Whitney U	305.500	142.500	89.500	128.500
Wilcoxon W	683.500	520.500	467.500	506.500
Z	-1.385	-3.984	-4.889	-4.238
Asymp. Sig. (2-tailed)	.166	.000	.000	.000

a. Grouping Variable: Group

```
NPAR TESTS
  /M-W= DPT BY Group(1 2)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		17-JUL-2017 12:44:00
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	55
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= DPT BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02
	Number of Cases Allowed[a]	449389

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
Delayed Productive	EG1	28	38.89	1089.00
	CG1	27	16.70	451.00
	Total	55		

Test Statistics[a]

	Delayed Productive
Mann-Whitney U	73.000
Wilcoxon W	451.000
Z	-5.171
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Group

Appendix P

```
GET
  DATASET NAME DataSet1 WINDOW=FRONT.

SORT CASES  BY Method.
SPLIT FILE SEPARATE BY Method.
EXAMINE VARIABLES=IELTS VST RT PT DRT DPT
  /ID=Method
  /PLOT BOXPLOT NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

Notes

Output Created		18-JUL-2017 06:35:21
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1

	Filter	<none>
	Weight	<none>
	Split File	Methodology
	N of Rows in Working Data File	52
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=IELTS VST RT PT DRT DPT /ID=Method /PLOT BOXPLOT NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:07.83
	Elapsed Time	00:00:04.96

Methodology = TB

Case Processing Summary[a]

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
IELTS	25	100.0%	0	0.0%	25	100.0%
VST	25	100.0%	0	0.0%	25	100.0%
RT	25	100.0%	0	0.0%	25	100.0%
PT	25	100.0%	0	0.0%	25	100.0%
Delayed Receptive	25	100.0%	0	0.0%	25	100.0%
Delayed Productive	25	100.0%	0	0.0%	25	100.0%

a. Methodology = TB

Descriptives[a]

			Statistic	Std. Error
IELTS	Mean		5.340	.0627
	95% Confidence Interval for Mean	Lower Bound	5.211	
		Upper Bound	5.469	
	5% Trimmed Mean		5.322	
	Median		5.500	
	Variance		.098	
	Std. Deviation		.3136	

	Minimum		5.0	
	Maximum		6.0	
	Range		1.0	
	Interquartile Range		.5	
	Skewness		.345	.464
	Kurtosis		-.527	.902
VST	Mean		23.20	1.017
	95% Confidence Interval for Mean	Lower Bound	21.10	
		Upper Bound	25.30	
	5% Trimmed Mean		23.10	
	Median		23.00	
	Variance		25.833	
	Std. Deviation		5.083	
	Minimum		14	
	Maximum		34	
	Range		20	
	Interquartile Range		9	
	Skewness		.271	.464
	Kurtosis		-.556	.902
RT	Mean		14.48	.400
	95% Confidence Interval for Mean	Lower Bound	13.65	
		Upper Bound	15.31	
	5% Trimmed Mean		14.59	
	Median		15.00	
	Variance		4.010	
	Std. Deviation		2.002	
	Minimum		9	

	Maximum		18	
	Range		9	
	Interquartile Range		3	
	Skewness		-1.034	.464
	Kurtosis		1.284	.902
PT	Mean		10.52	.425
	95% Confidence Interval for Mean	Lower Bound	9.64	
		Upper Bound	11.40	
	5% Trimmed Mean		10.67	
	Median		11.00	
	Variance		4.510	
	Std. Deviation		2.124	
	Minimum		5	
	Maximum		13	
	Range		8	
	Interquartile Range		3	
	Skewness		-1.009	.464
	Kurtosis		.399	.902
Delayed Receptive	Mean		9.88	.463
	95% Confidence Interval for Mean	Lower Bound	8.92	
		Upper Bound	10.84	
	5% Trimmed Mean		9.91	
	Median		10.00	
	Variance		5.360	
	Std. Deviation		2.315	
	Minimum		4	
	Maximum		15	

	Range		11	
	Interquartile Range		3	
	Skewness		-.214	.464
	Kurtosis		.888	.902
Delayed Productive	Mean		6.72	.394
	95% Confidence Interval for Mean	Lower Bound	5.91	
		Upper Bound	7.53	
	5% Trimmed Mean		6.71	
	Median		7.00	
	Variance		3.877	
	Std. Deviation		1.969	
	Minimum		3	
	Maximum		11	
	Range		8	
	Interquartile Range		3	
	Skewness		-.180	.464
	Kurtosis		-.063	.902

a. Methodology = TB

Tests of Normality[a]

	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
IELTS	.295	25	.000	.766	25	.000
VST	.136	25	.200[*]	.971	25	.660
RT	.184	25	.029	.890	25	.011

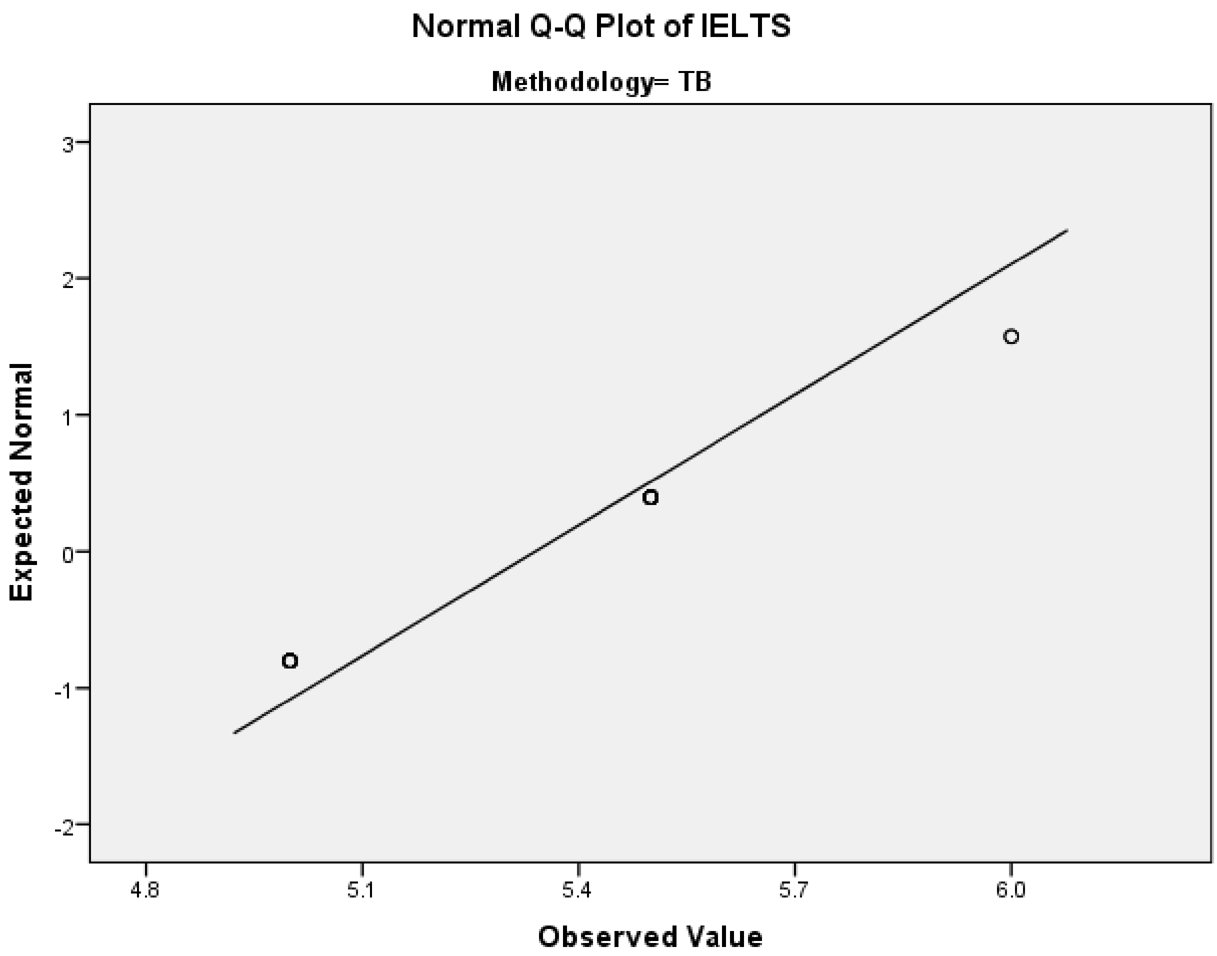
PT	.229	25	.002	.881	25	.007
Delayed Receptive	.121	25	.200*	.973	25	.719
Delayed Productive	.157	25	.116	.960	25	.412

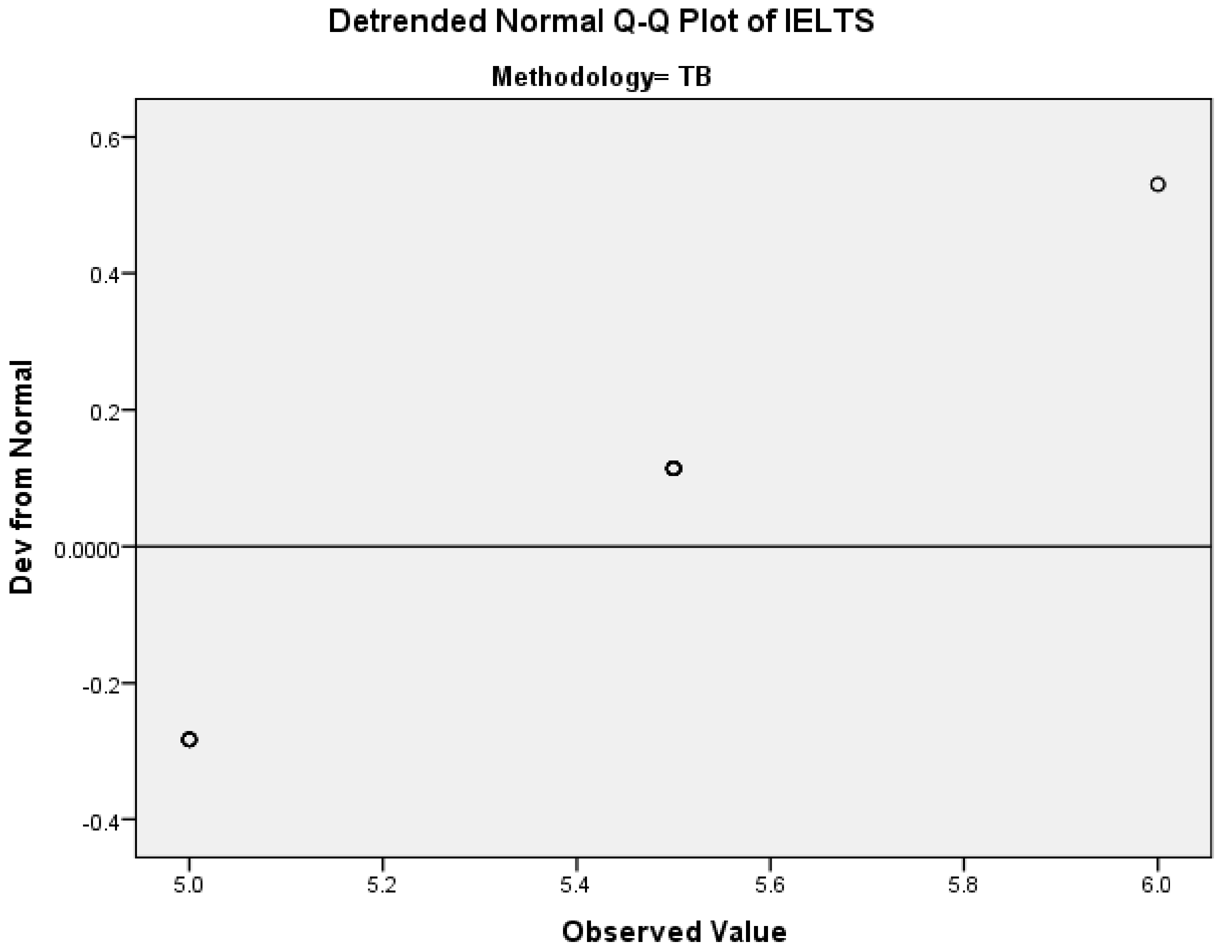
*. This is a lower bound of the true significance.

a. Methodology = TB

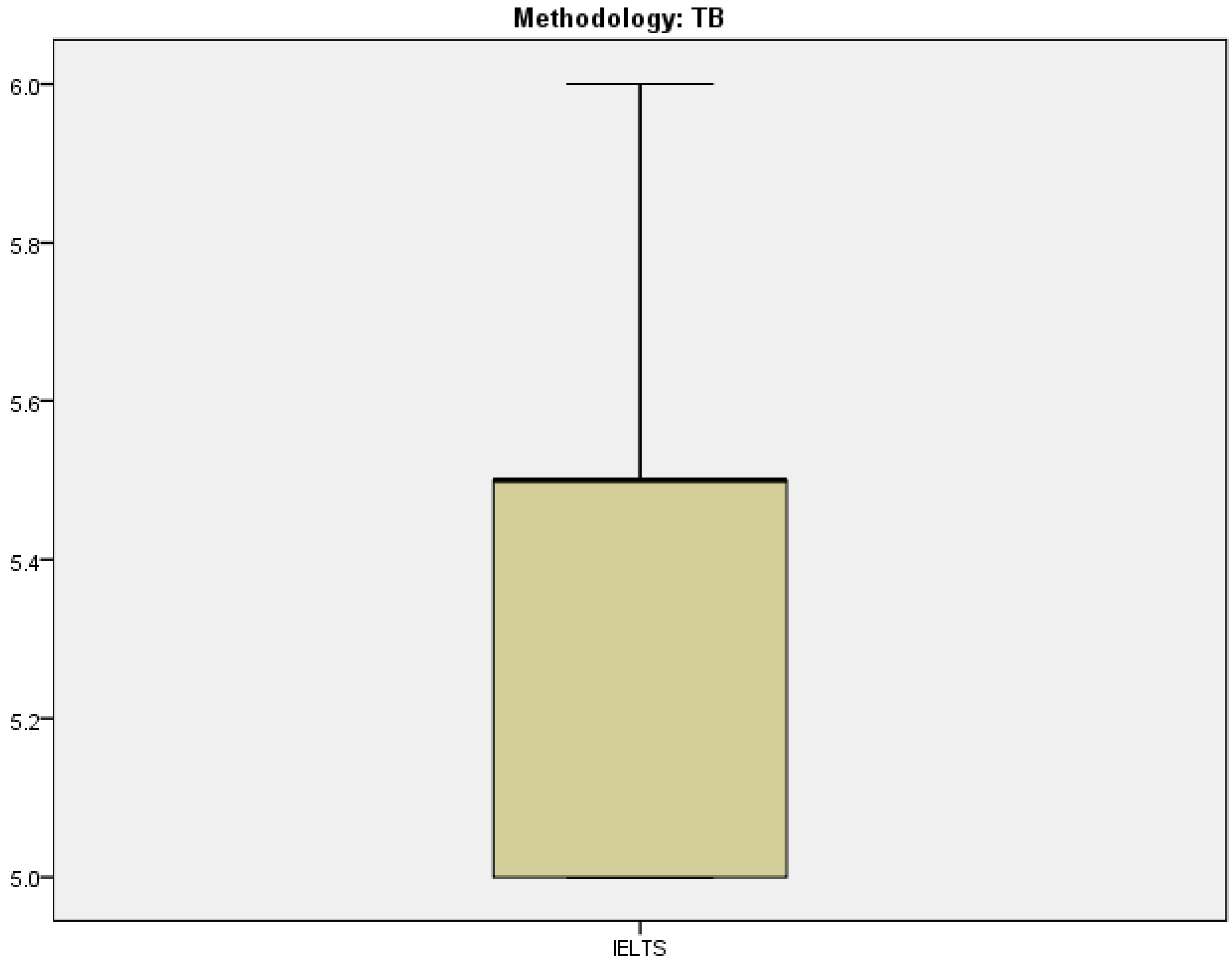
b. Lilliefors Significance Correction

IELTS

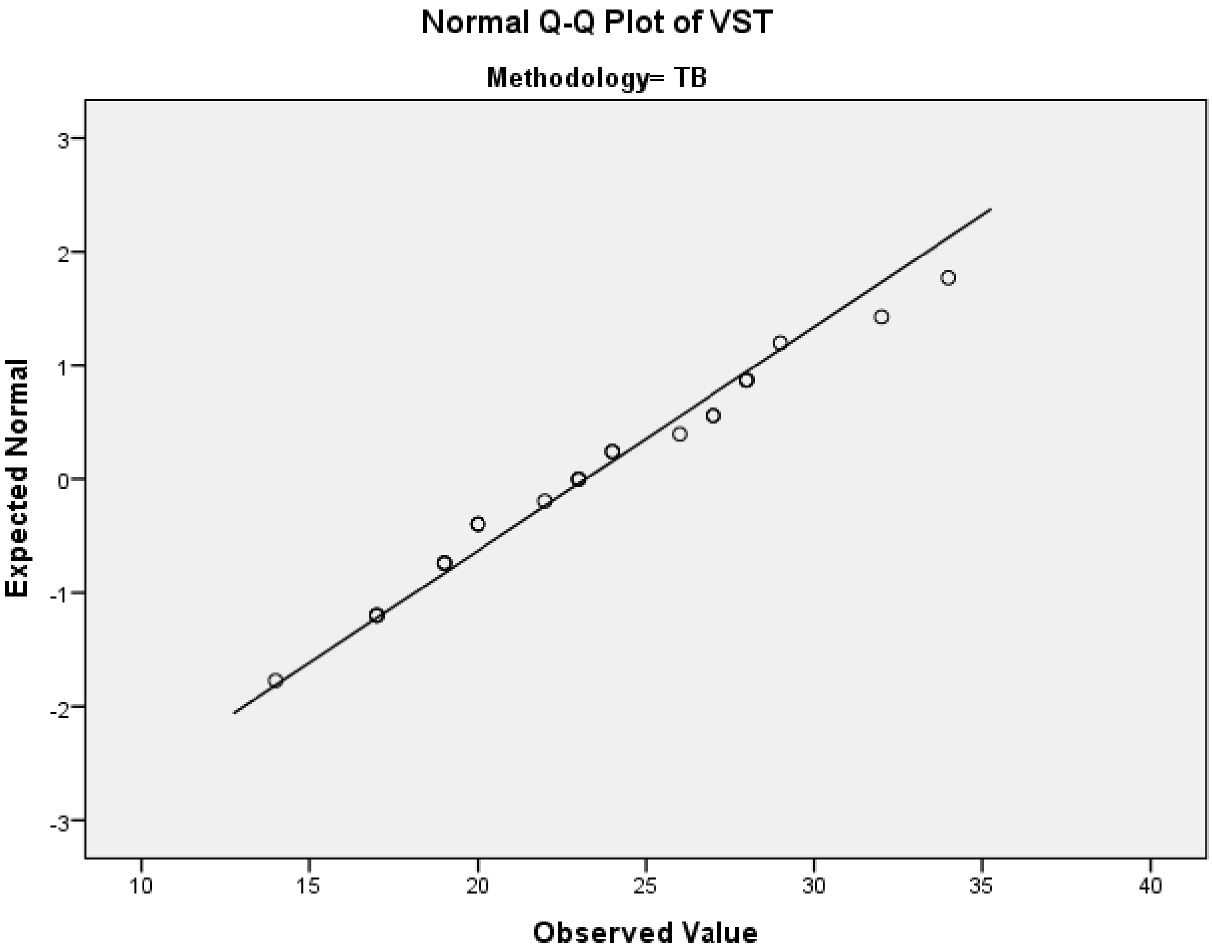


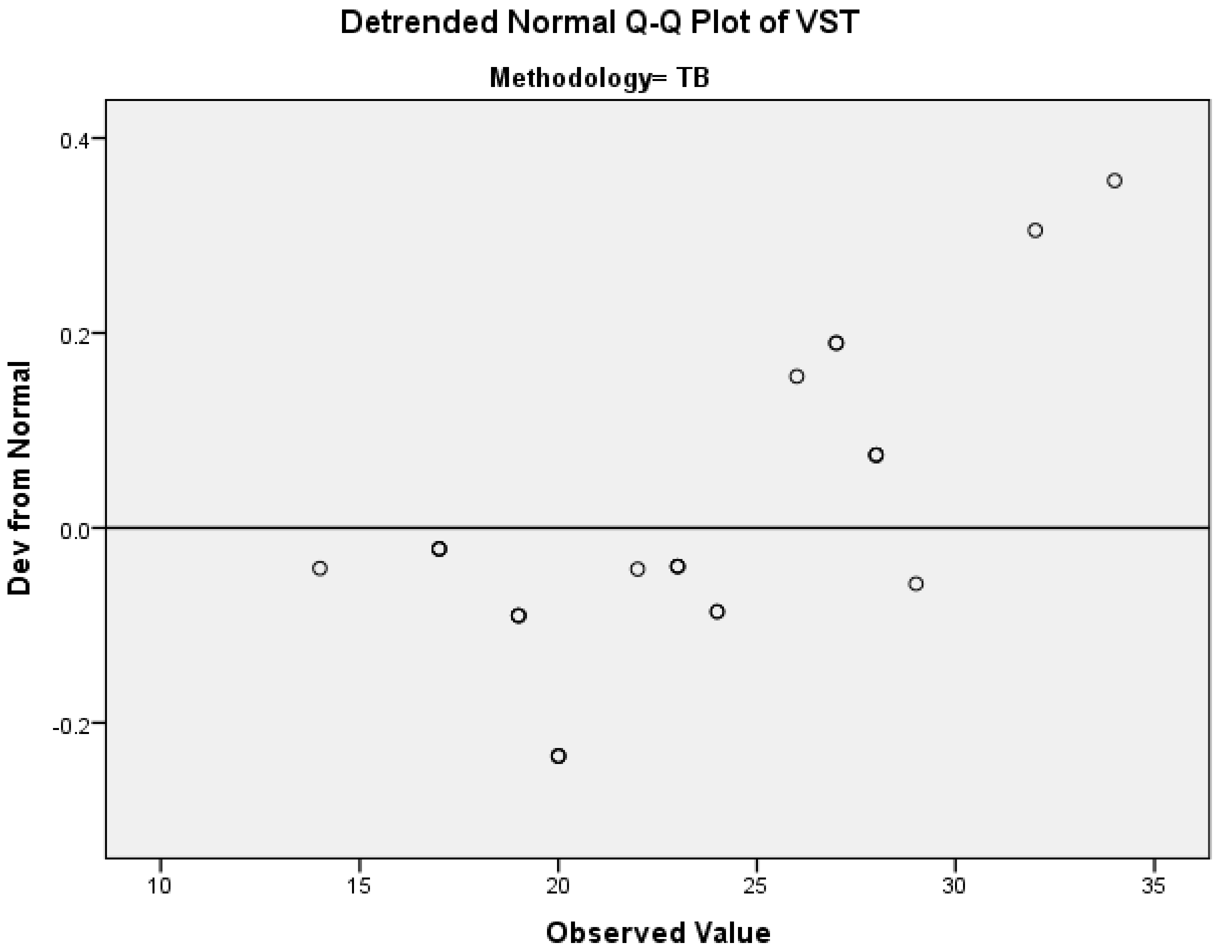


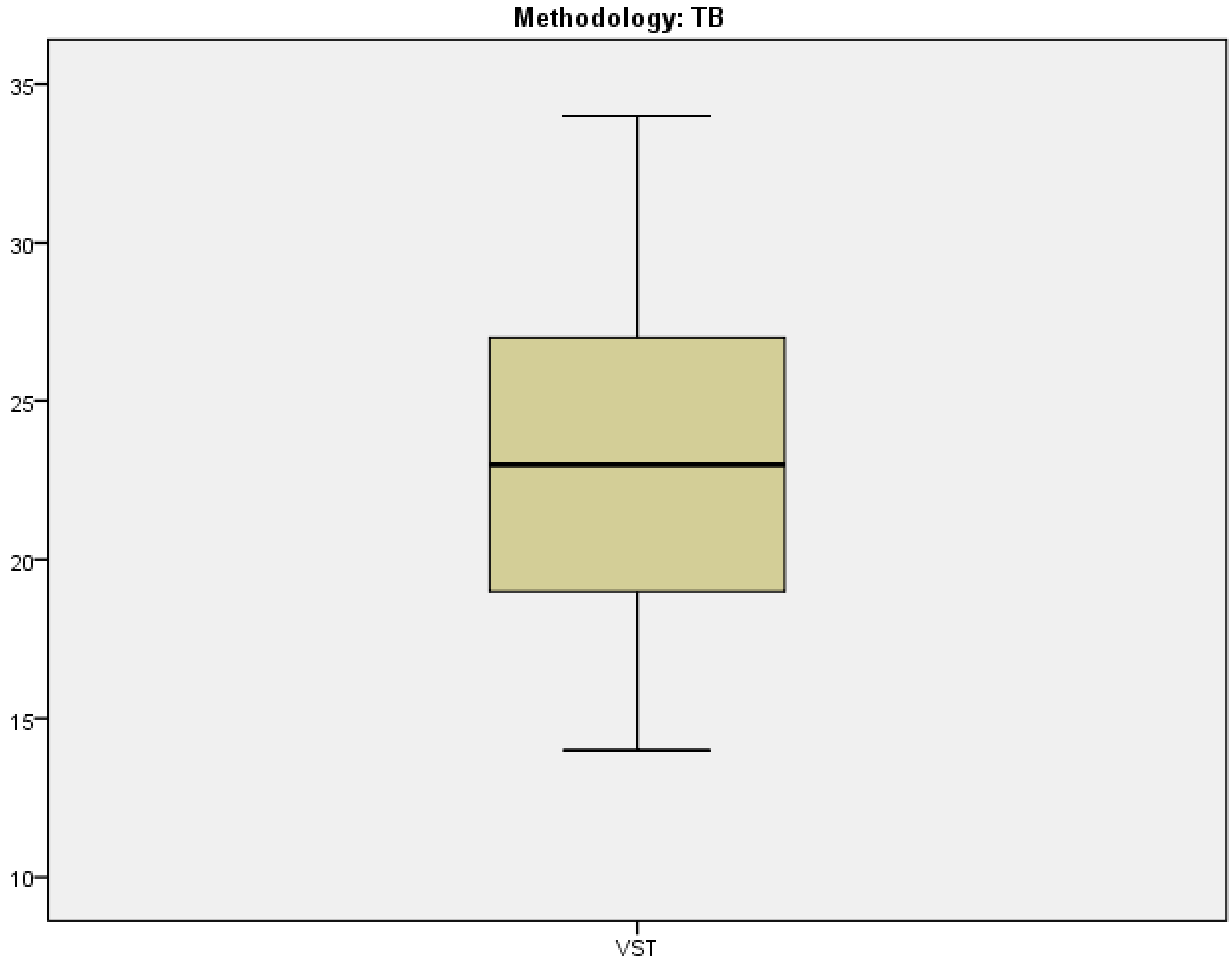
Detrended Normal Q-Q Plot of IELTS
Methodology= TB
Dev from Normal
0.6
0.4
0.2
0.0000
-0.2
-0.4
5.0
5.2
5.4
5.6
5.8
6.0
Observed Value



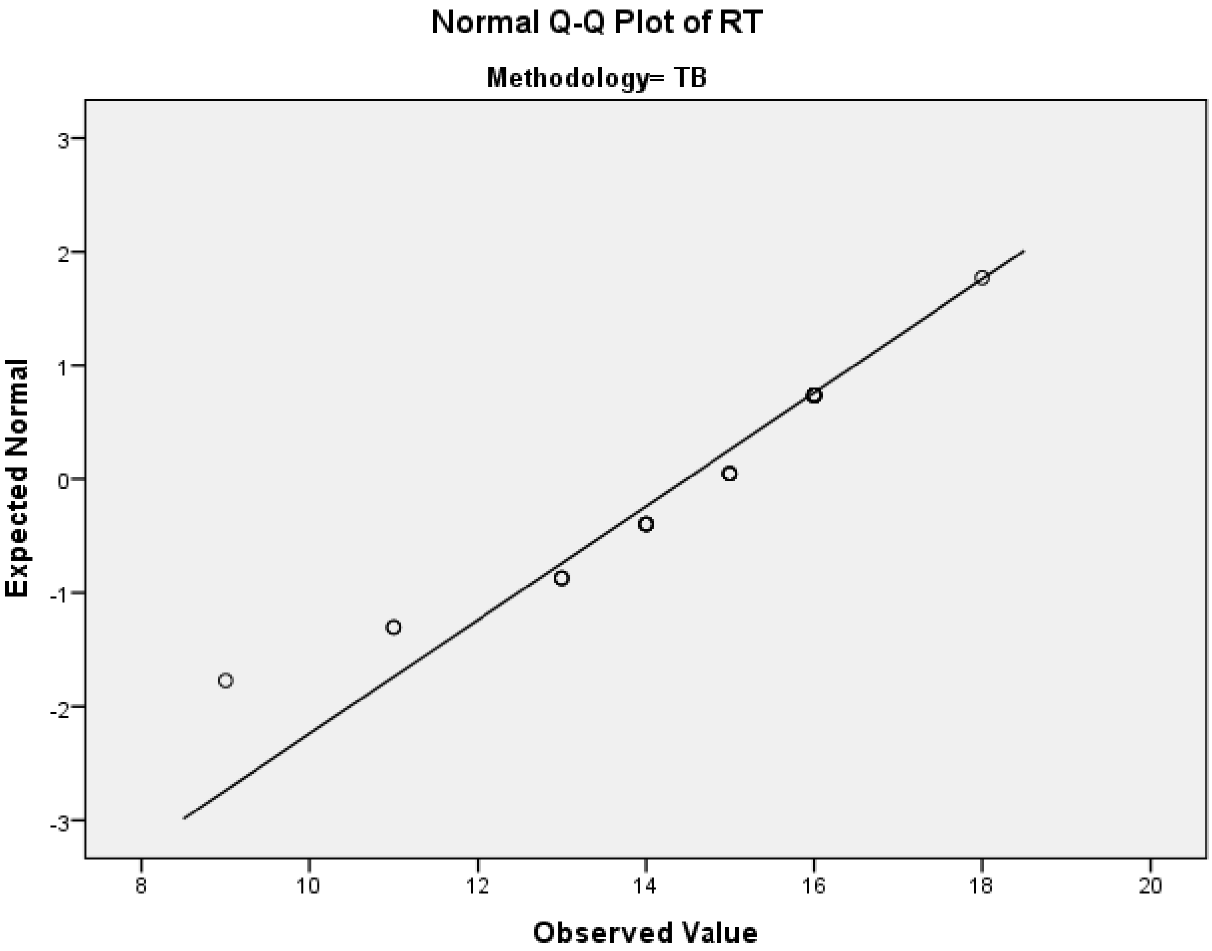
VST

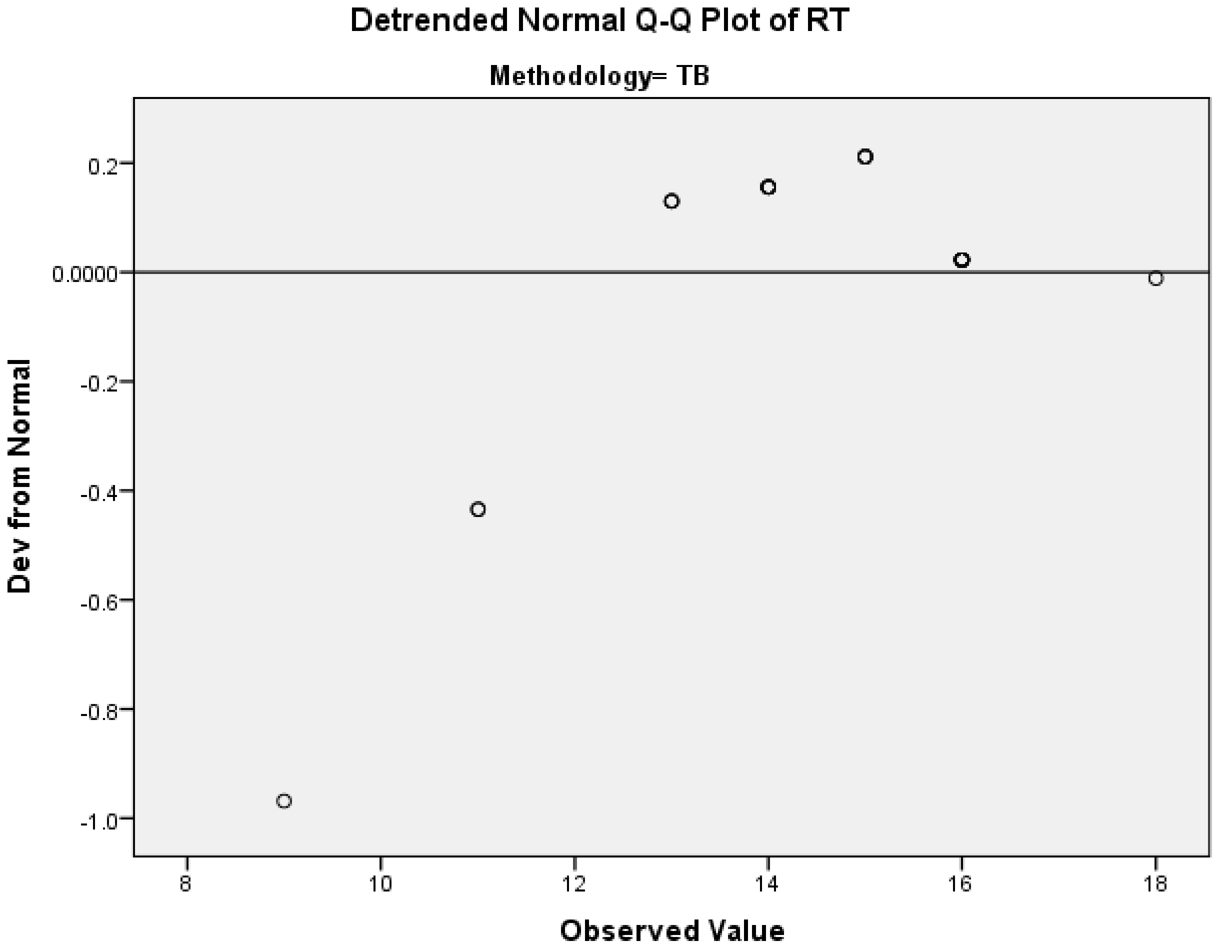

Normal Q-Q Plot of VST
Methodology= TB
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
10
15
20
25
30
35
40

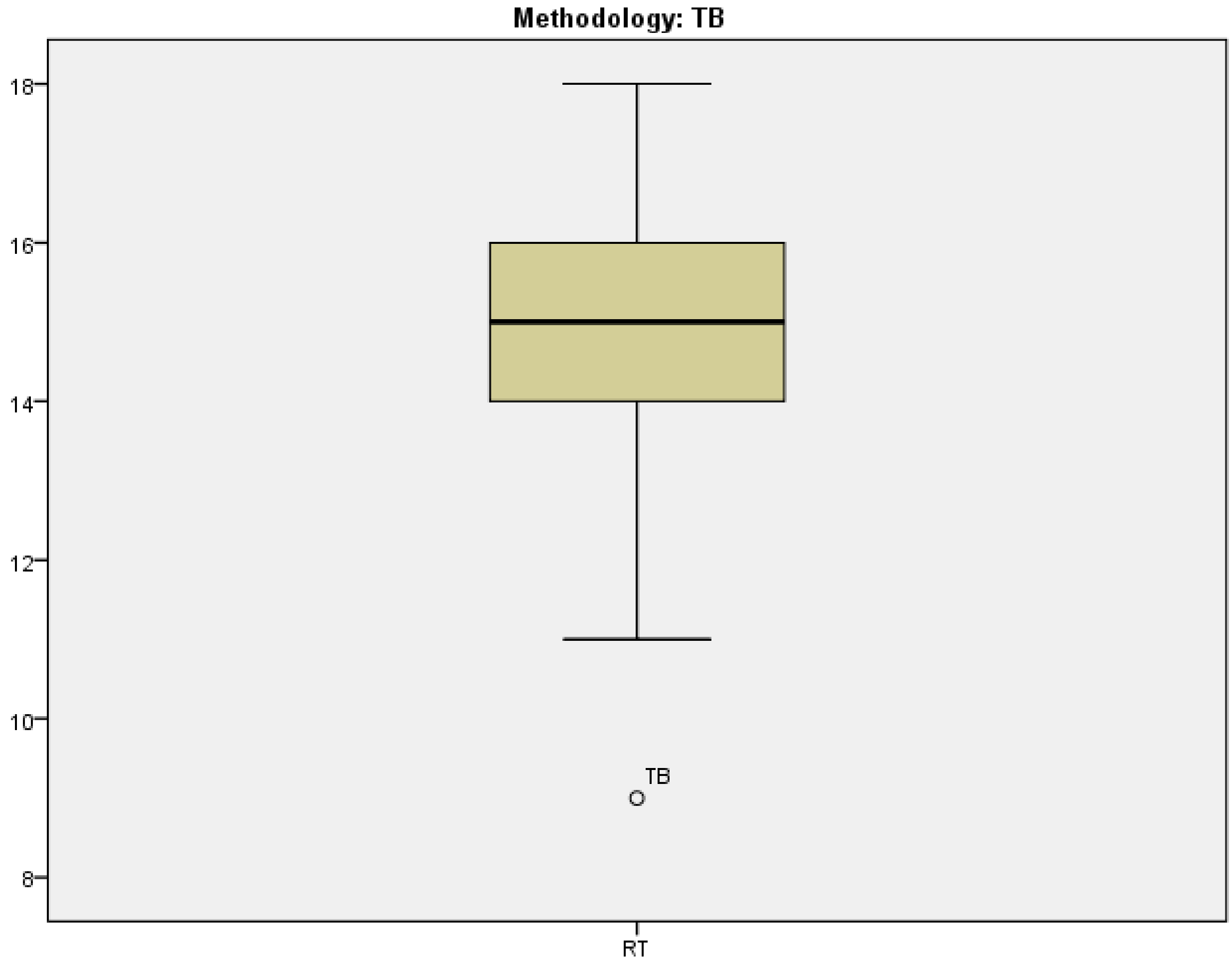

Detrended Normal Q-Q Plot of VST
Methodology= TB
Dev from Normal
0.4
0.2
0.0
-0.2
Observed Value
10
15
20
25
30
35



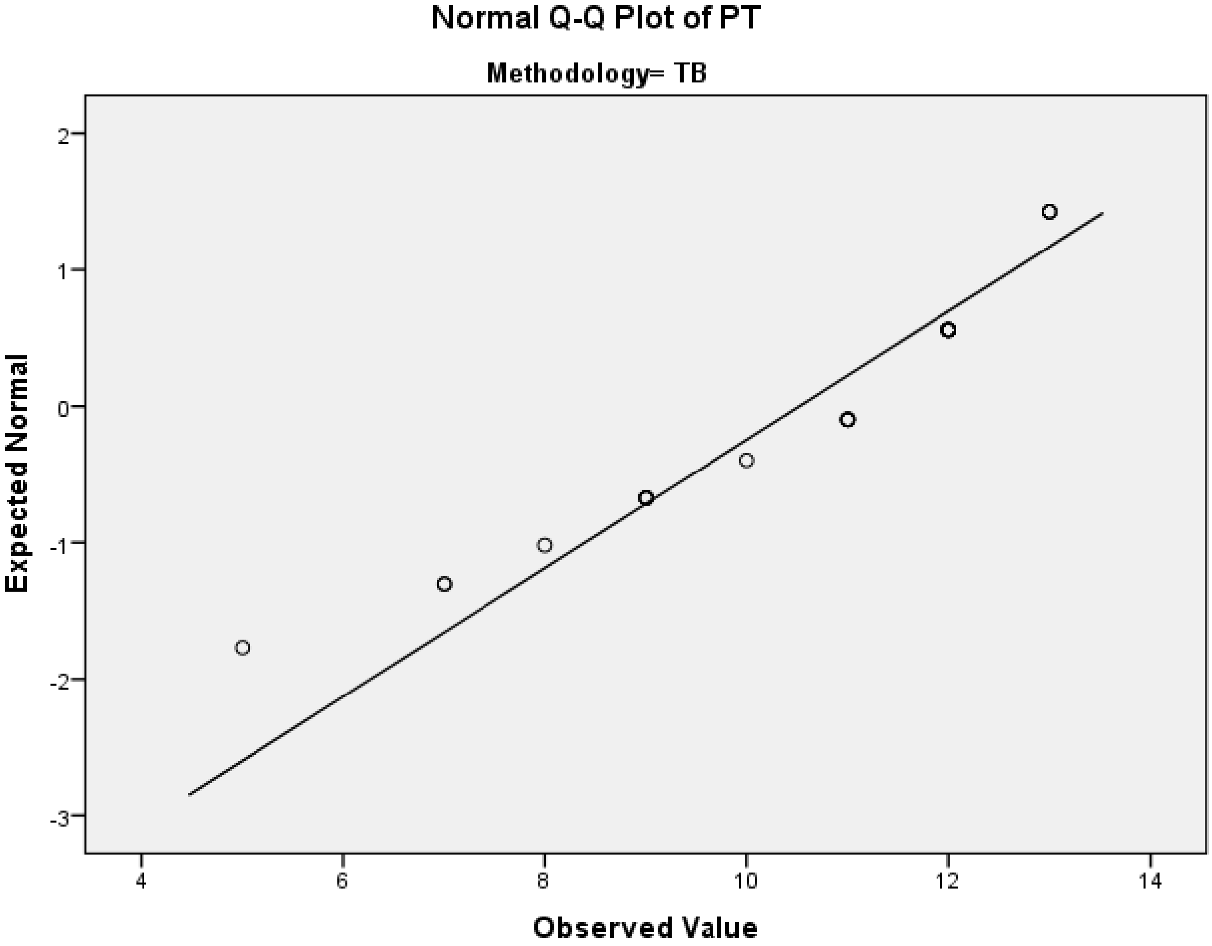
RT

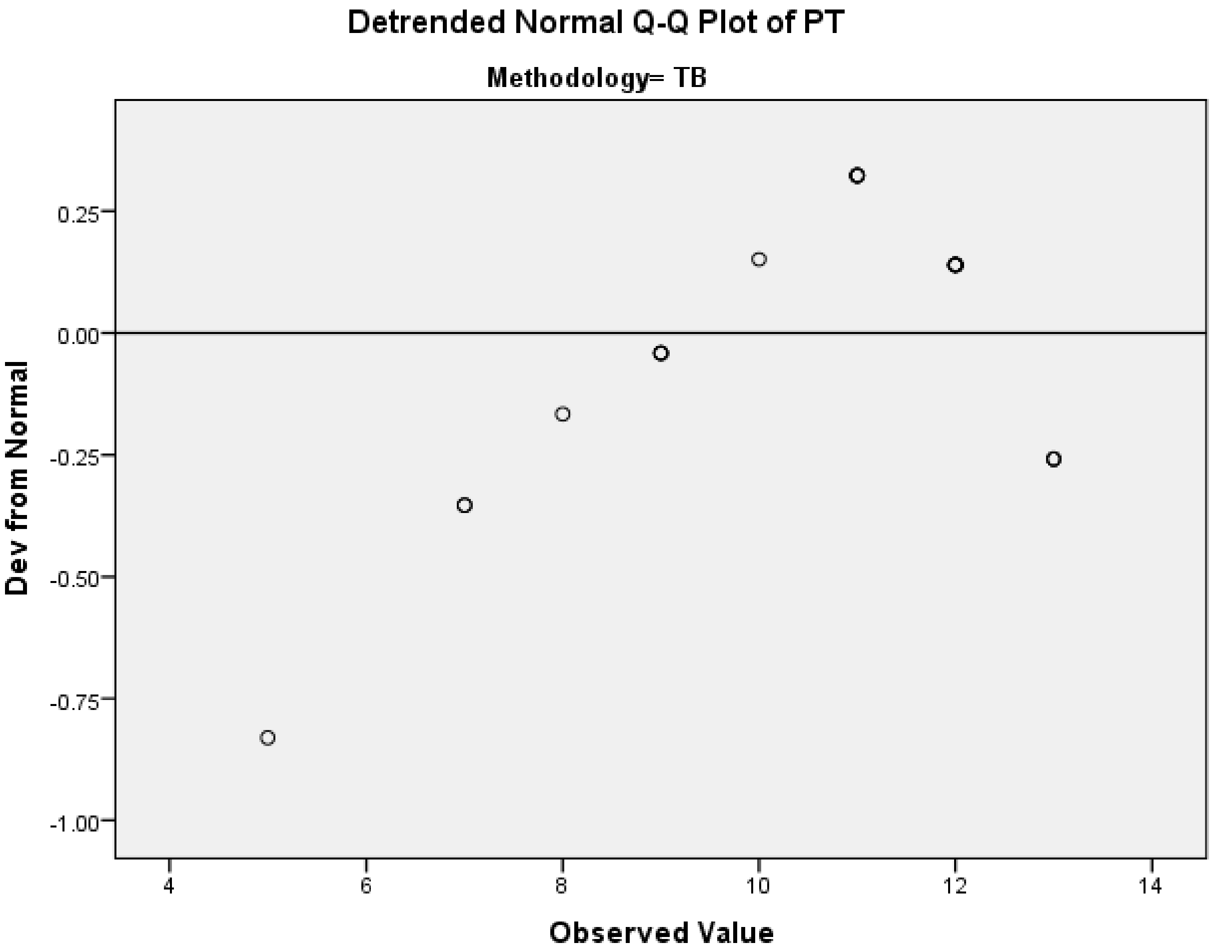

Normal Q-Q Plot of RT
Methodology= TB
Expected Normal
3
2
1
0
-1
-2
-3
8
10
12
14
16
18
20
Observed Value


Detrended Normal Q-Q Plot of RT
Methodology= TB
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
Dev from Normal
8
10
12
14
16
18
Observed Value

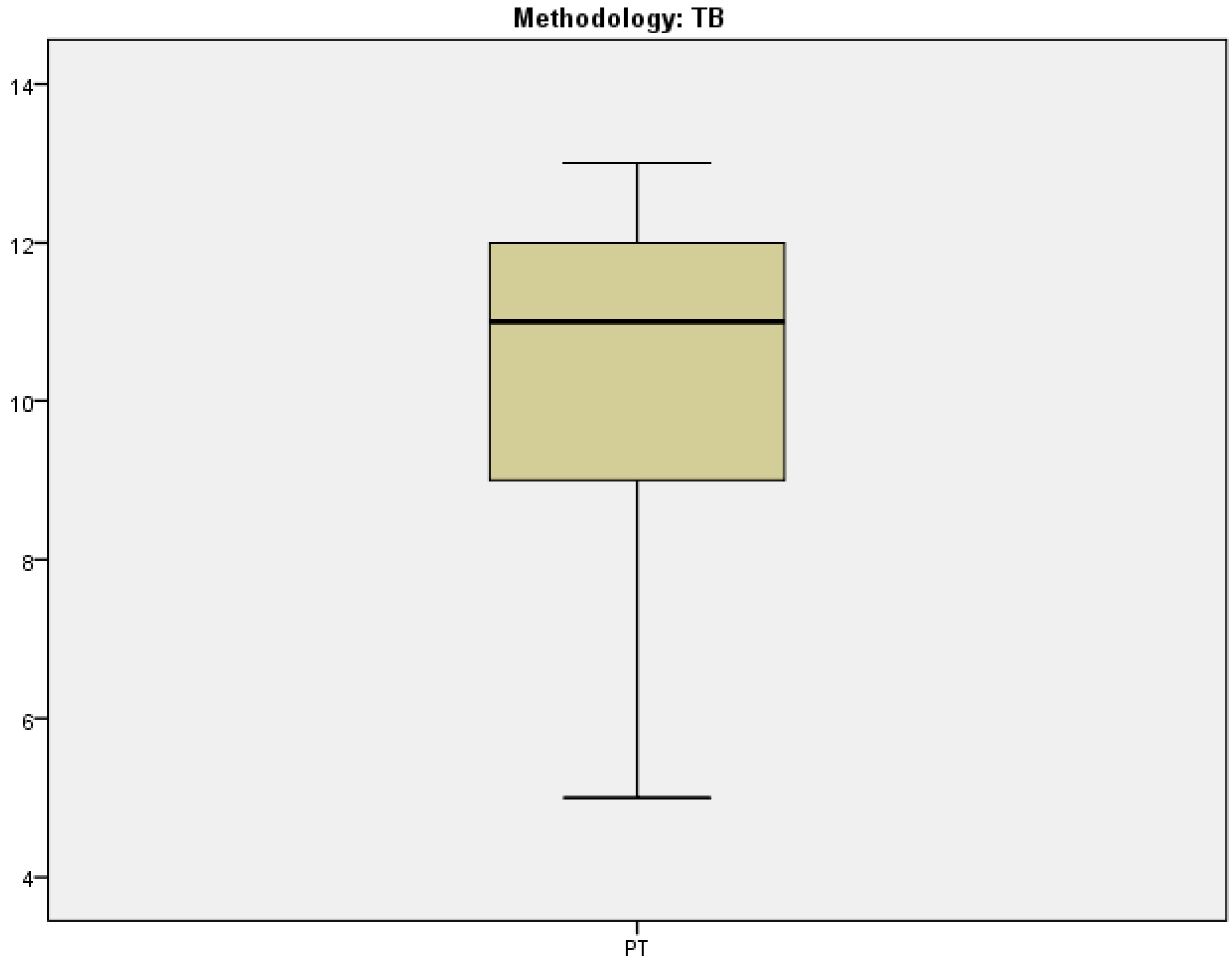


PT

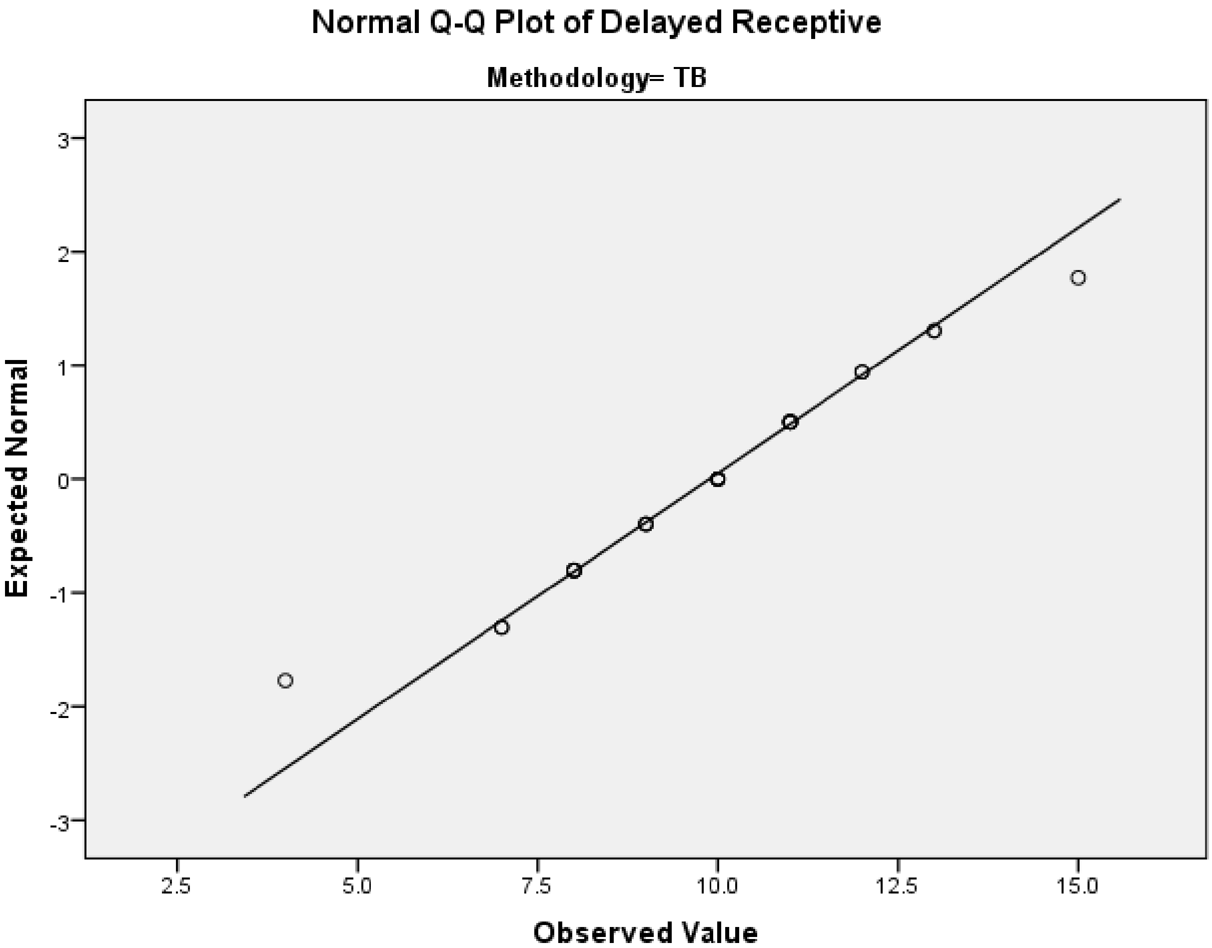

Normal Q-Q Plot of PT
Methodology= TB
Expected Normal
Observed Value
2
1
0
-1
-2
-3
4
6
8
10
12
14



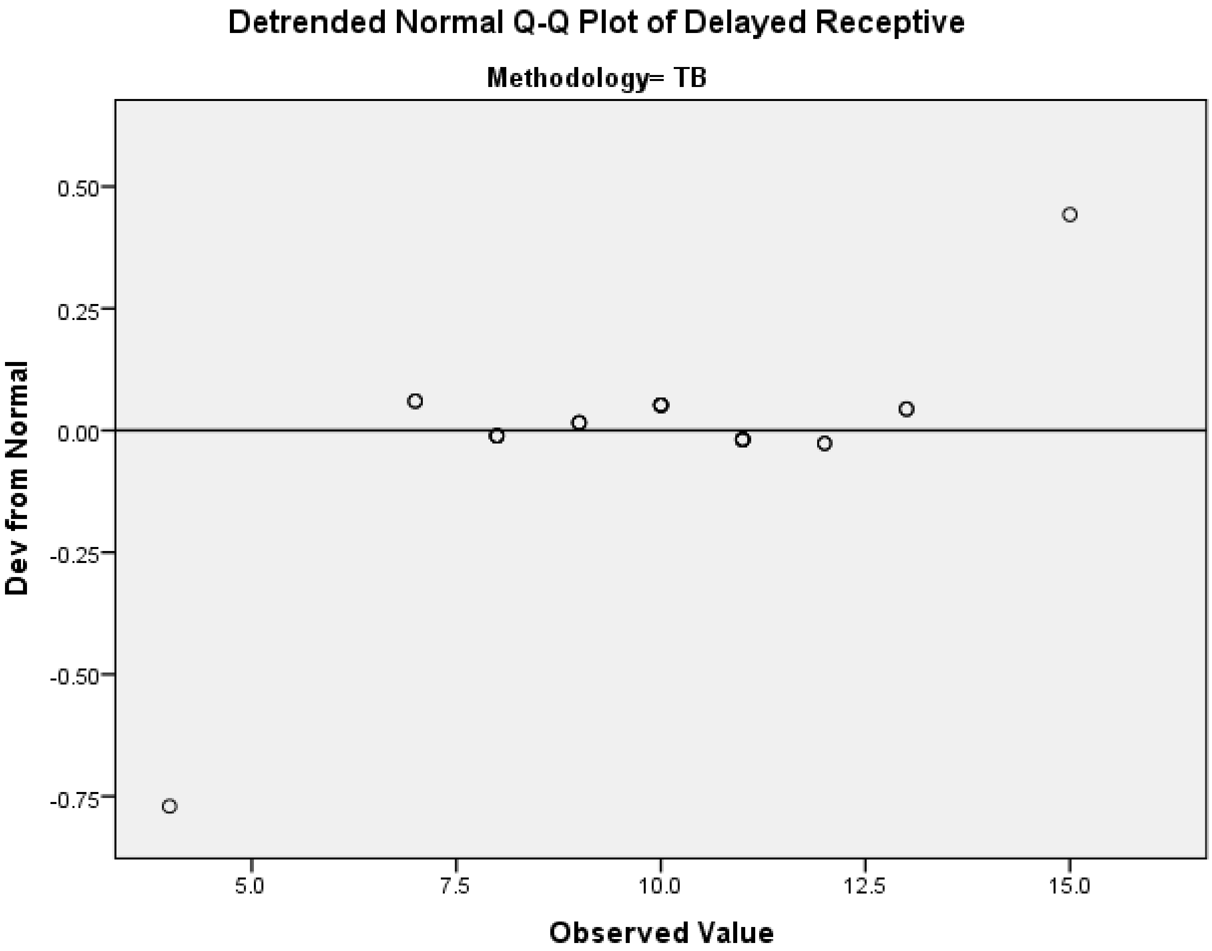
Detrended Normal Q-Q Plot of PT
Methodology= TB
Dev from Normal
0.25
0.00
-0.25
-0.50
-0.75
-1.00
4
6
8
10
12
14
Observed Value

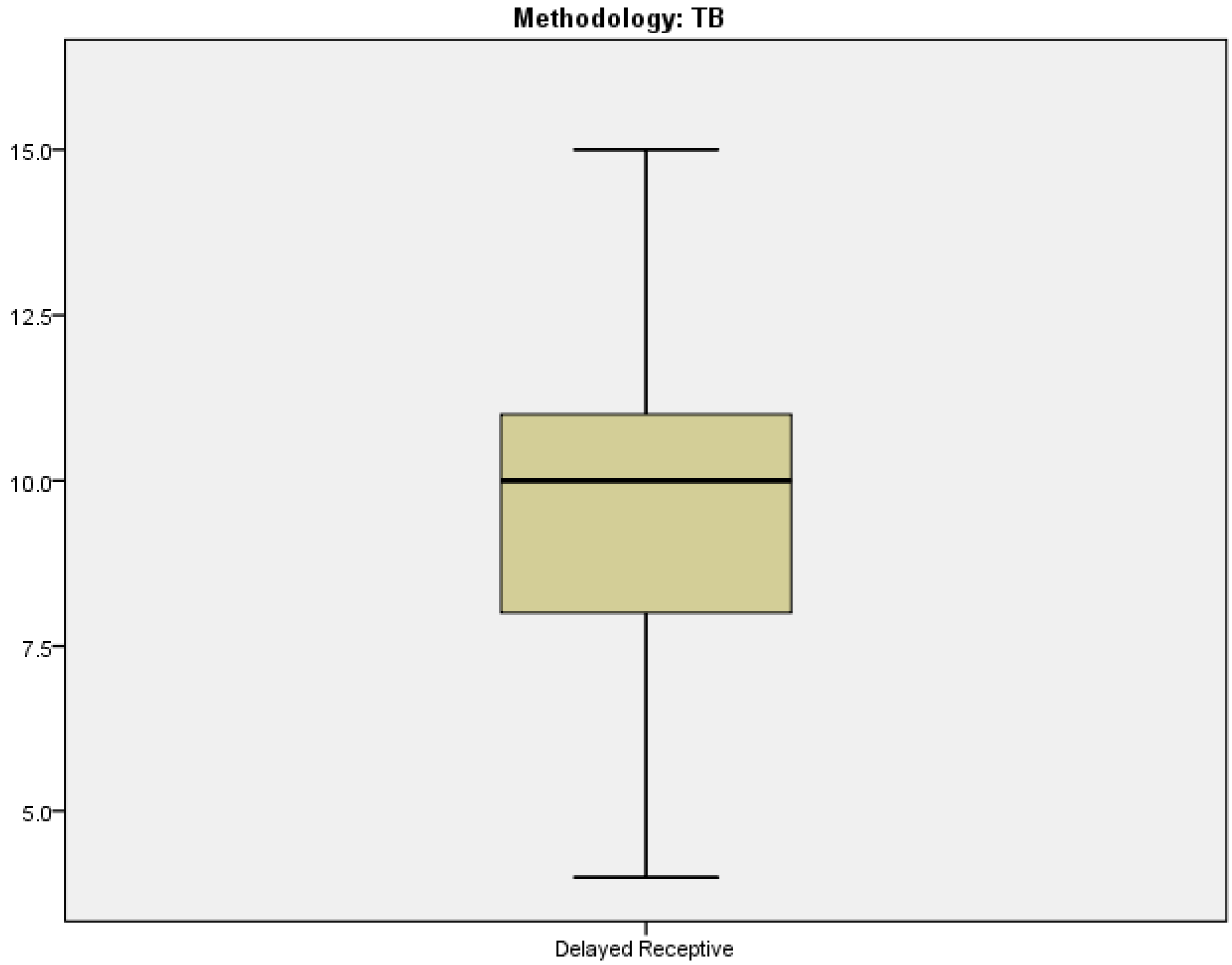


Delayed Receptive

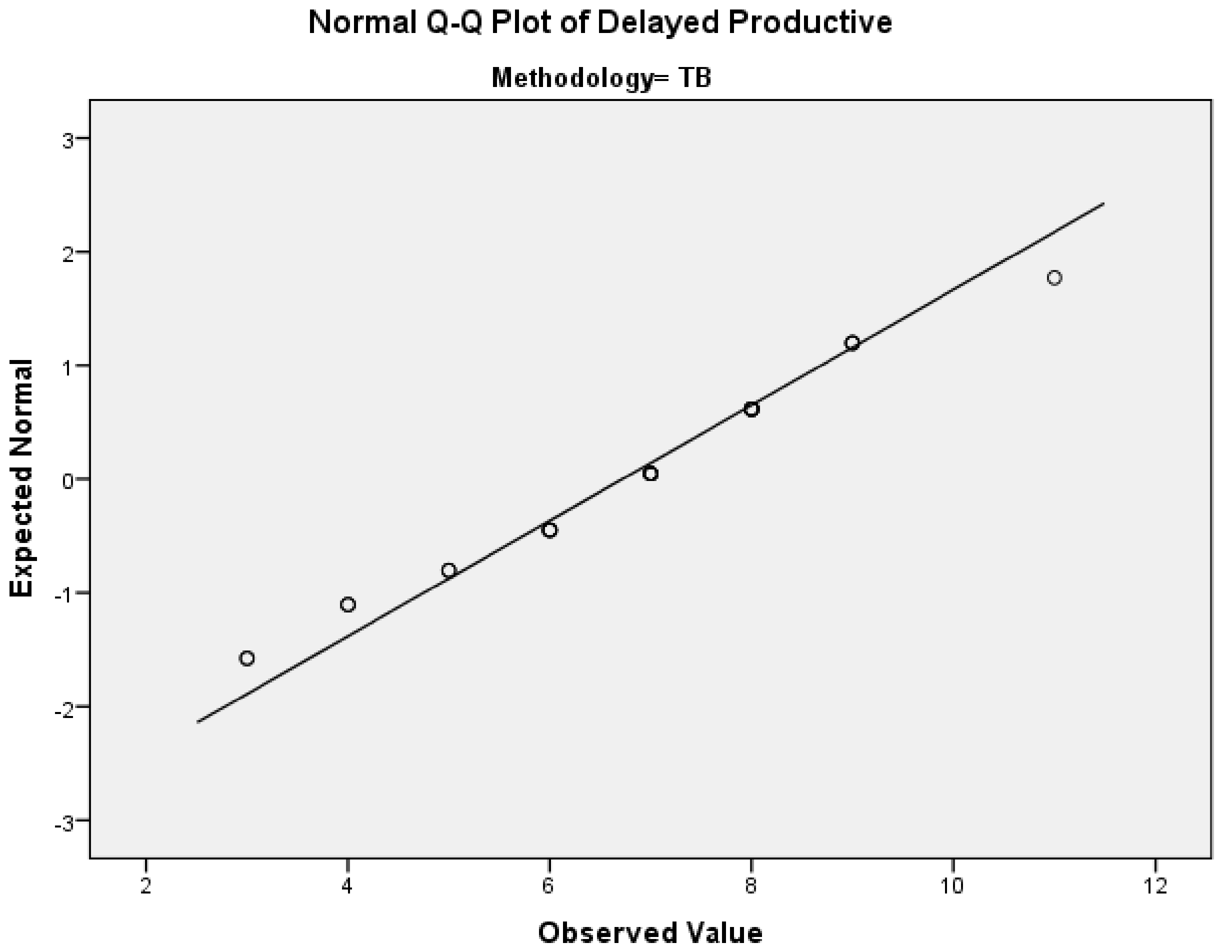


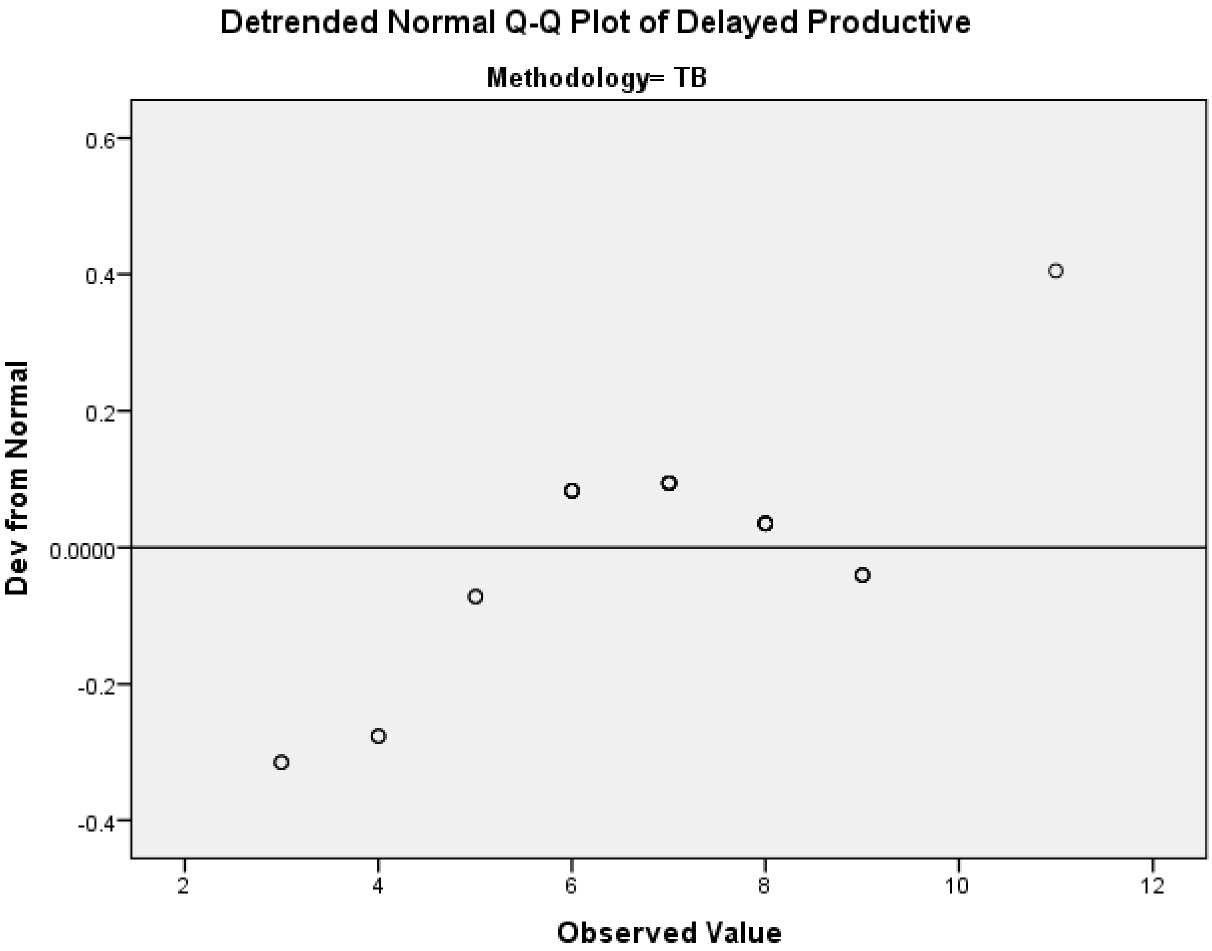
Normal Q-Q Plot of Delayed Receptive
Methodology= TB
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
2.5
5.0
7.5
10.0
12.5
15.0


Detrended Normal Q-Q Plot of Delayed Receptive
Methodology= TB
Dev from Normal
0.50
0.25
0.00
-0.25
-0.50
-0.75
5.0
7.5
10.0
12.5
15.0
Observed Value

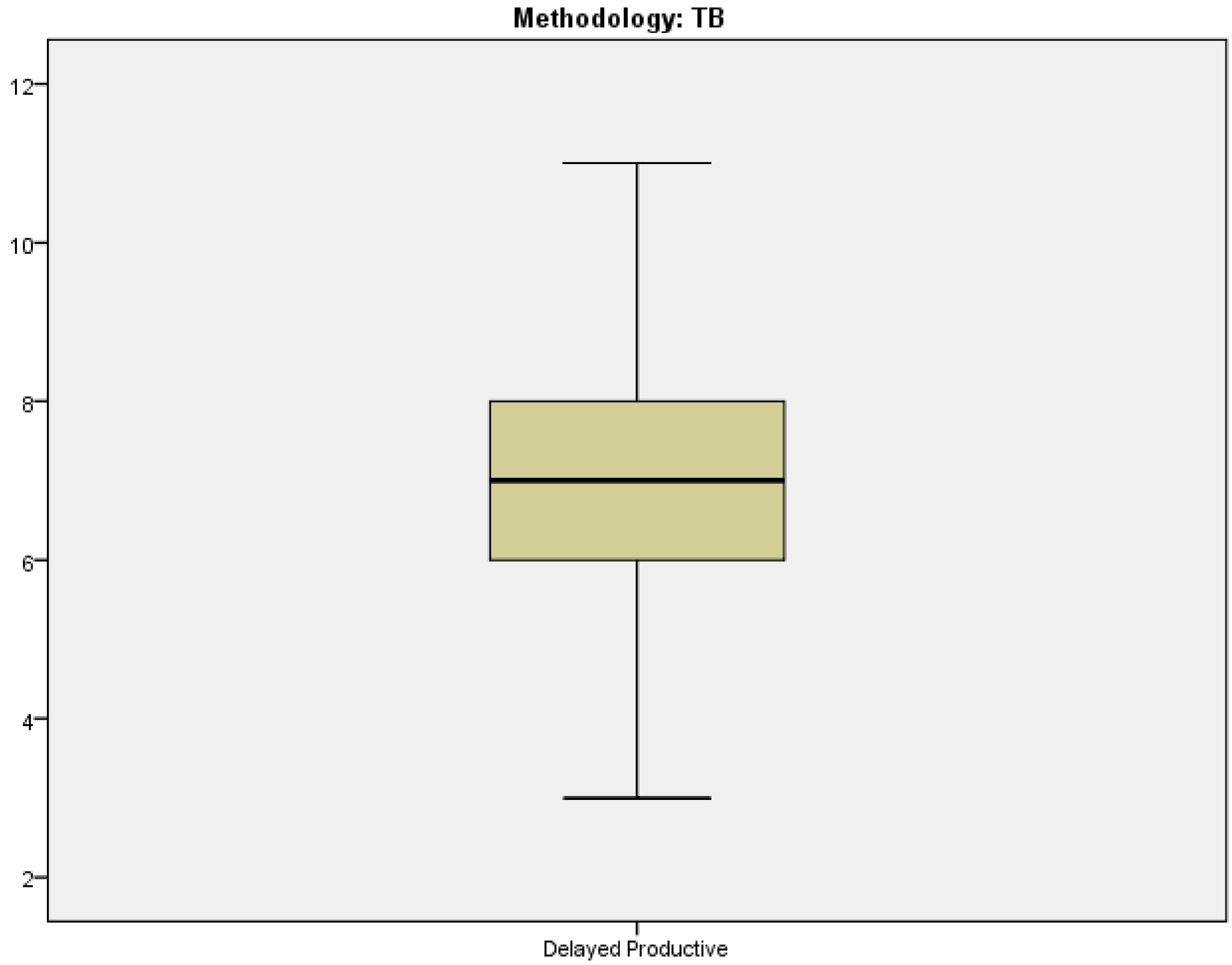


Delayed Productive


Normal Q-Q Plot of Delayed Productive
Methodology= TB
Expected Normal
3
2
1
0
-1
-2
-3
2
4
6
8
10
12
Observed Value



Detrended Normal Q-Q Plot of Delayed Productive
Methodology= TB
Dev from Normal
0.6
0.4
0.2
0.0000
-0.2
-0.4
2
4
6
8
10
12
Observed Value



Methodology = MS

Case Processing Summary[a]

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent

IELTS	27	100.0%	0	0.0%	27	100.0%
VST	27	100.0%	0	0.0%	27	100.0%
RT	27	100.0%	0	0.0%	27	100.0%
PT	27	100.0%	0	0.0%	27	100.0%
Delayed Receptive	27	100.0%	0	0.0%	27	100.0%
Delayed Productive	27	100.0%	0	0.0%	27	100.0%

a. Methodology = MS

Descriptives[a]

			Statistic	Std. Error
IELTS	Mean		5.204	.0719
	95% Confidence Interval for Mean	Lower Bound	5.056	
		Upper Bound	5.352	
	5% Trimmed Mean		5.171	
	Median		5.000	
	Variance		.140	
	Std. Deviation		.3736	
	Minimum		5.0	
	Maximum		6.0	
	Range		1.0	
	Interquartile Range		.5	
	Skewness		1.536	.448
	Kurtosis		.762	.872
VST	Mean		23.70	1.103
		Lower Bound	21.44	

	95% Confidence Interval for Mean	Upper Bound	25.97	
	5% Trimmed Mean		23.50	
	Median		22.00	
	Variance		32.832	
	Std. Deviation		5.730	
	Minimum		15	
	Maximum		36	
	Range		21	
	Interquartile Range		9	
	Skewness		.502	.448
	Kurtosis		-.484	.872
RT	Mean		12.04	.556
	95% Confidence Interval for Mean	Lower Bound	10.89	
		Upper Bound	13.18	
	5% Trimmed Mean		12.04	
	Median		13.00	
	Variance		8.345	
	Std. Deviation		2.889	
	Minimum		6	
	Maximum		18	
	Range		12	
	Interquartile Range		5	
	Skewness		-.133	.448
	Kurtosis		-.291	.872
PT	Mean		8.04	.527
	95% Confidence Interval for Mean	Lower Bound	6.95	
		Upper Bound	9.12	

	5% Trimmed Mean		8.04	
	Median		9.00	
	Variance		7.499	
	Std. Deviation		2.738	
	Minimum		3	
	Maximum		13	
	Range		10	
	Interquartile Range		4	
	Skewness		-.151	.448
	Kurtosis		-.959	.872
Delayed Receptive	Mean		7.37	.599
	95% Confidence Interval for Mean	Lower Bound	6.14	
		Upper Bound	8.60	
	5% Trimmed Mean		7.27	
	Median		7.00	
	Variance		9.704	
	Std. Deviation		3.115	
	Minimum		2	
	Maximum		15	
	Range		13	
	Interquartile Range		5	
	Skewness		.468	.448
	Kurtosis		-.107	.872
Delayed Productive	Mean		5.07	.495
	95% Confidence Interval for Mean	Lower Bound	4.06	
		Upper Bound	6.09	
	5% Trimmed Mean		5.04	

	Median	5.00	
	Variance	6.610	
	Std. Deviation	2.571	
	Minimum	1	
	Maximum	10	
	Range	9	
	Interquartile Range	4	
	Skewness	.029	.448
	Kurtosis	-.857	.872

a. Methodology = MS

Tests of Normality[a]

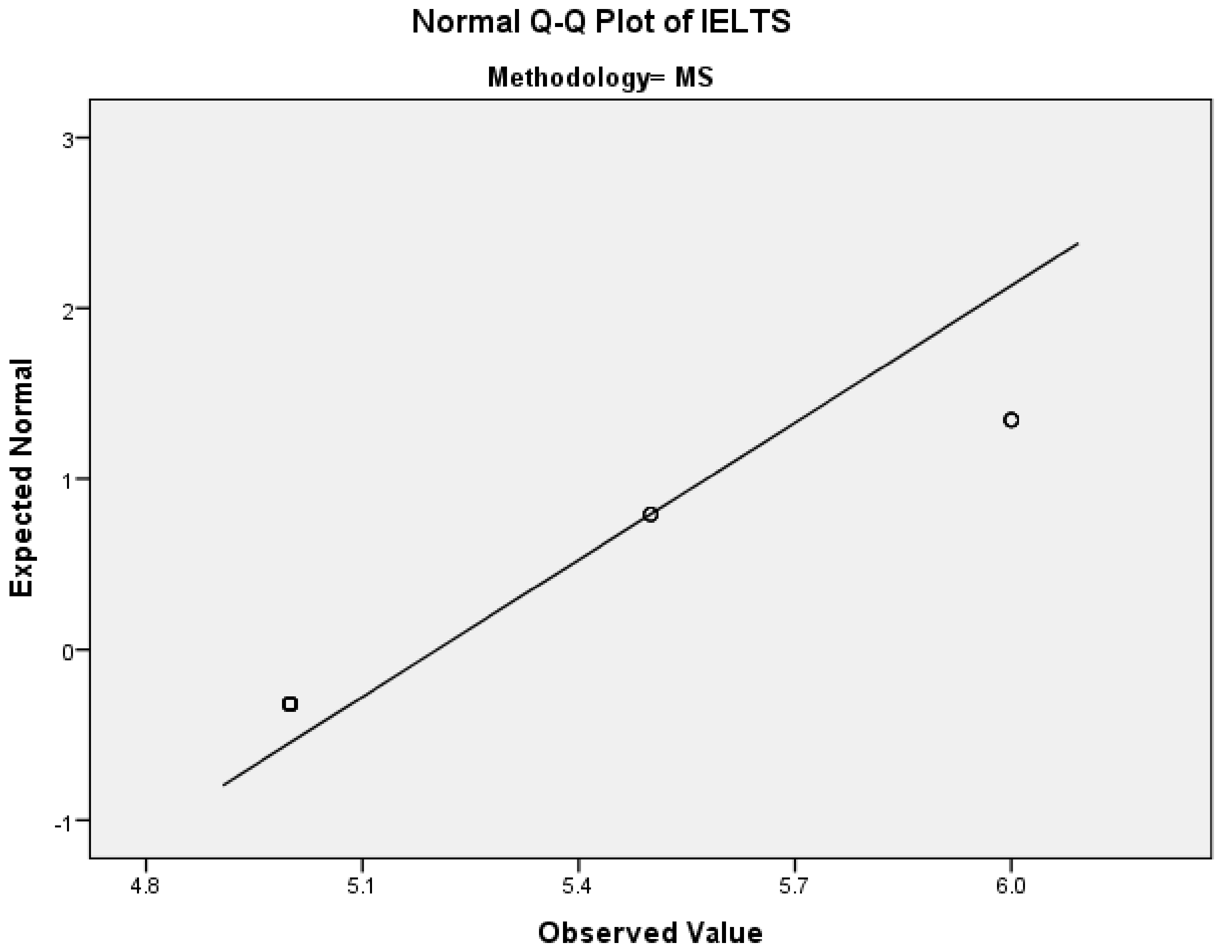
	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
IELTS	.448	27	.000	.577	27	.000
VST	.135	27	.200*	.957	27	.314
RT	.149	27	.128	.962	27	.406
PT	.156	27	.090	.958	27	.334
Delayed Receptive	.114	27	.200*	.971	27	.640
Delayed Productive	.122	27	.200*	.959	27	.345

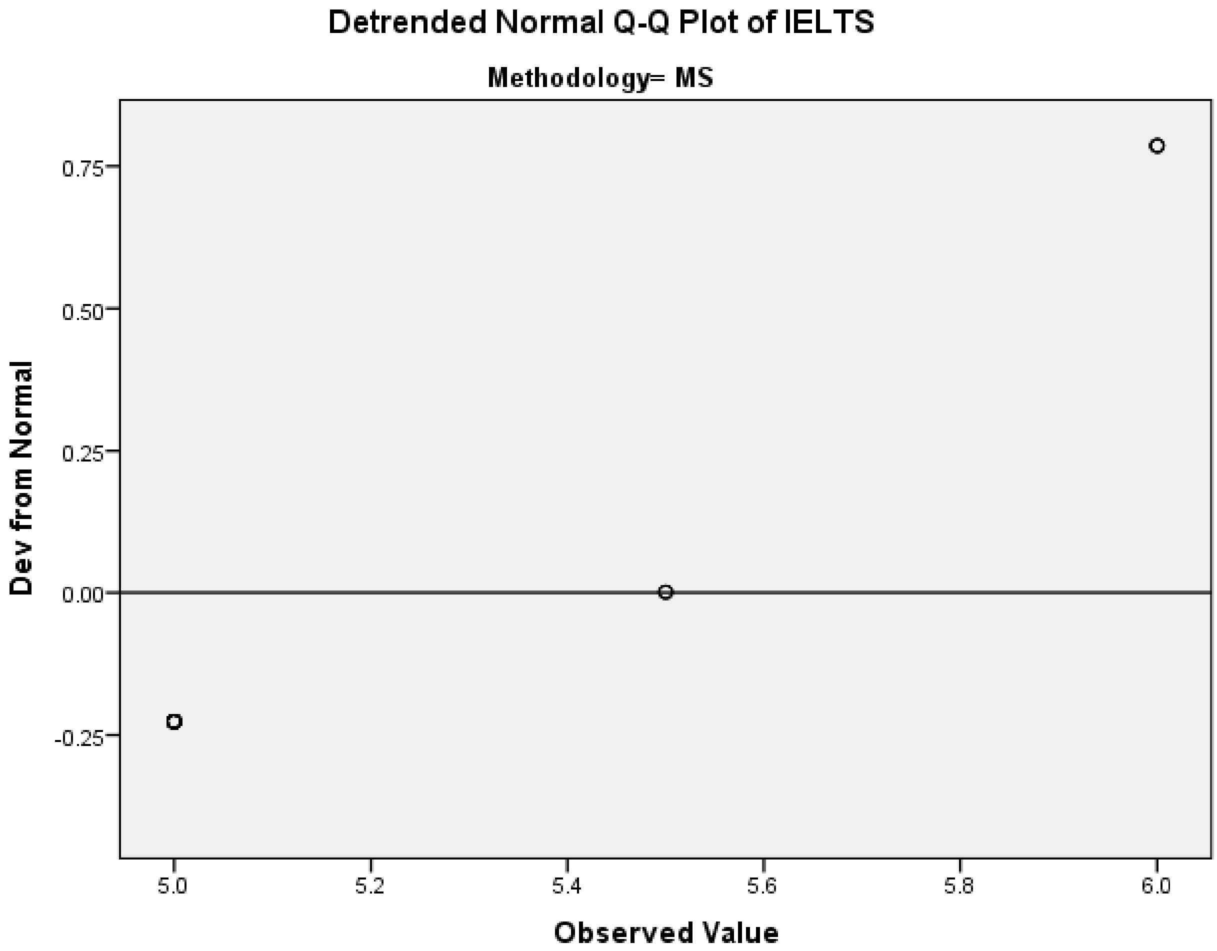
*. This is a lower bound of the true significance.

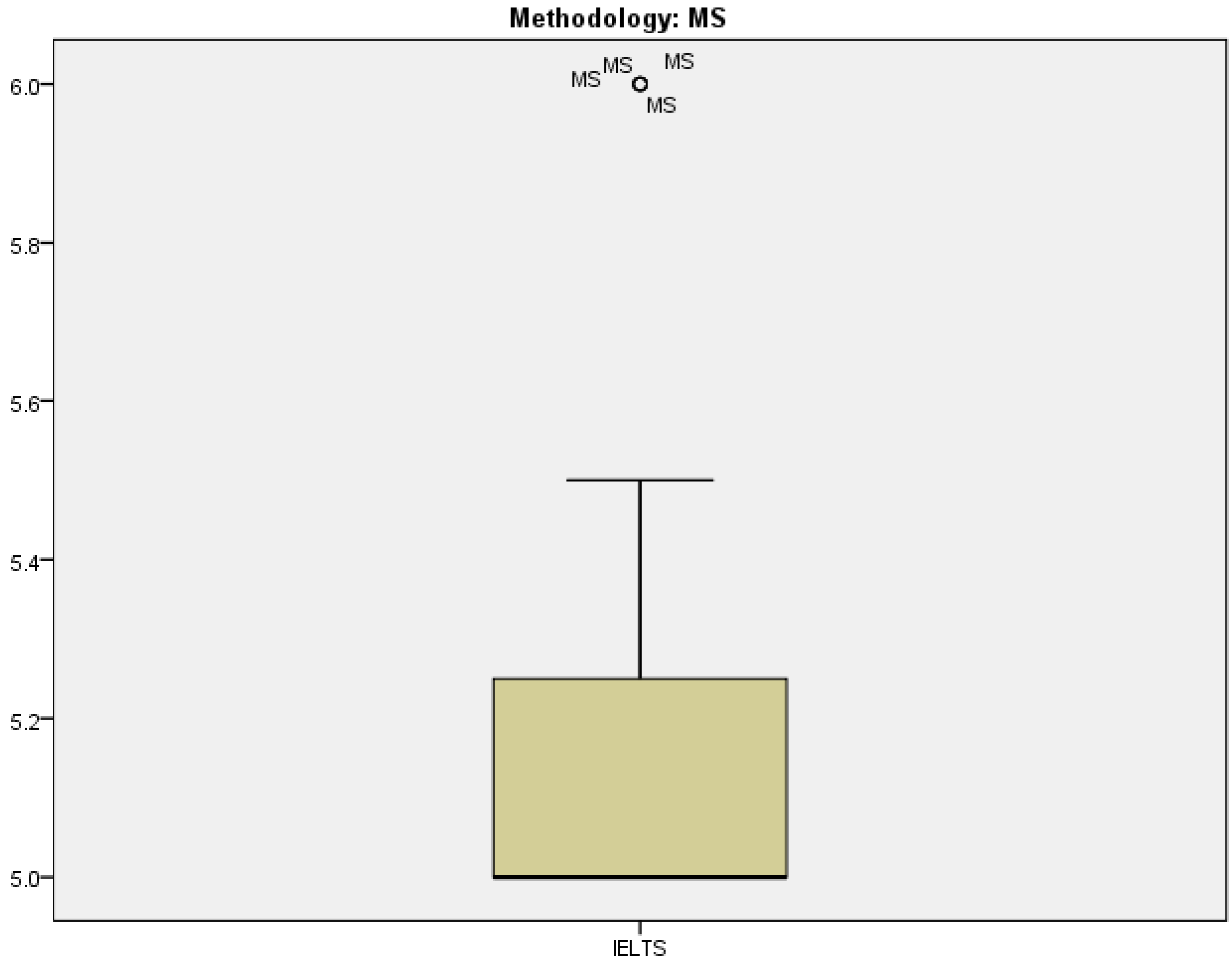
a. Methodology = MS

b. Lilliefors Significance Correction

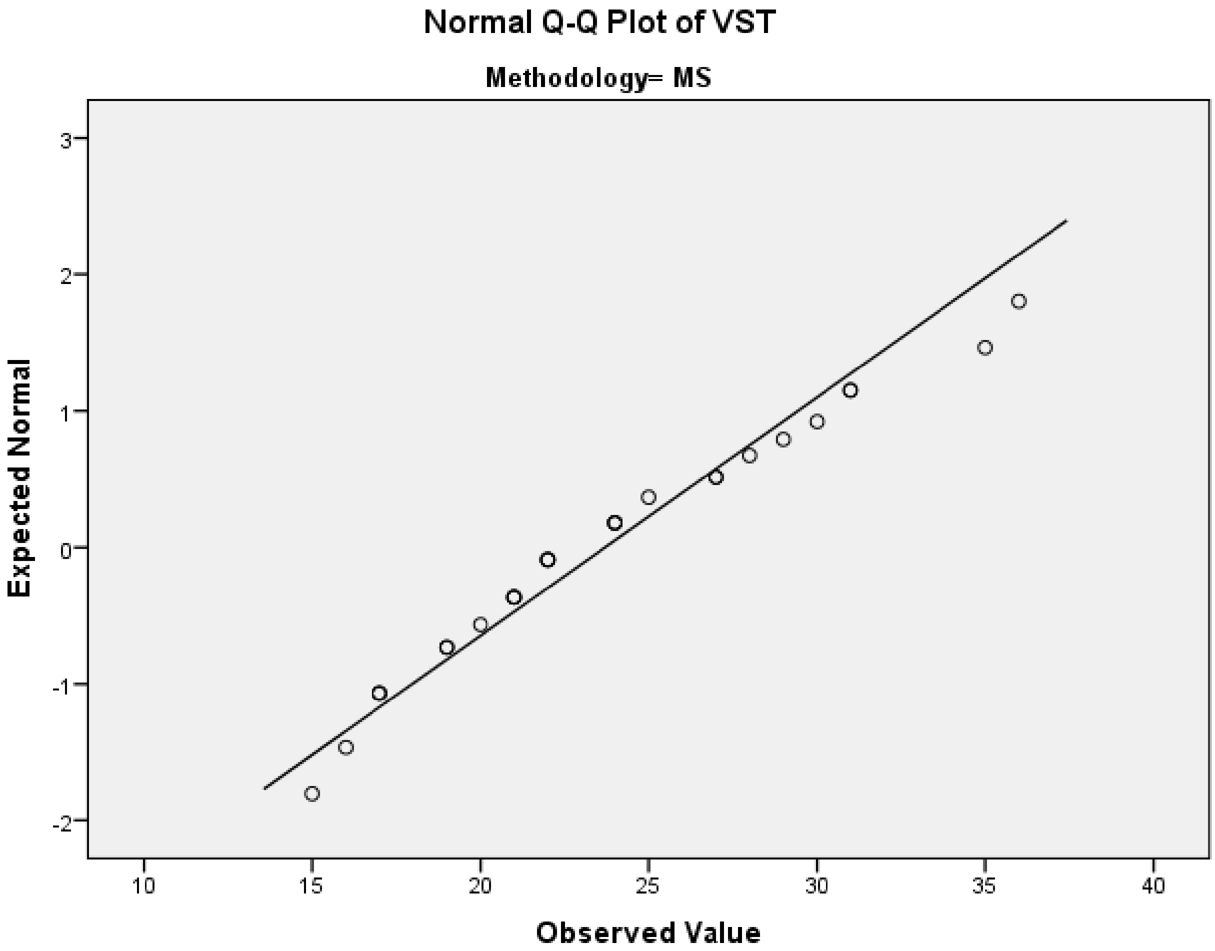
IELTS

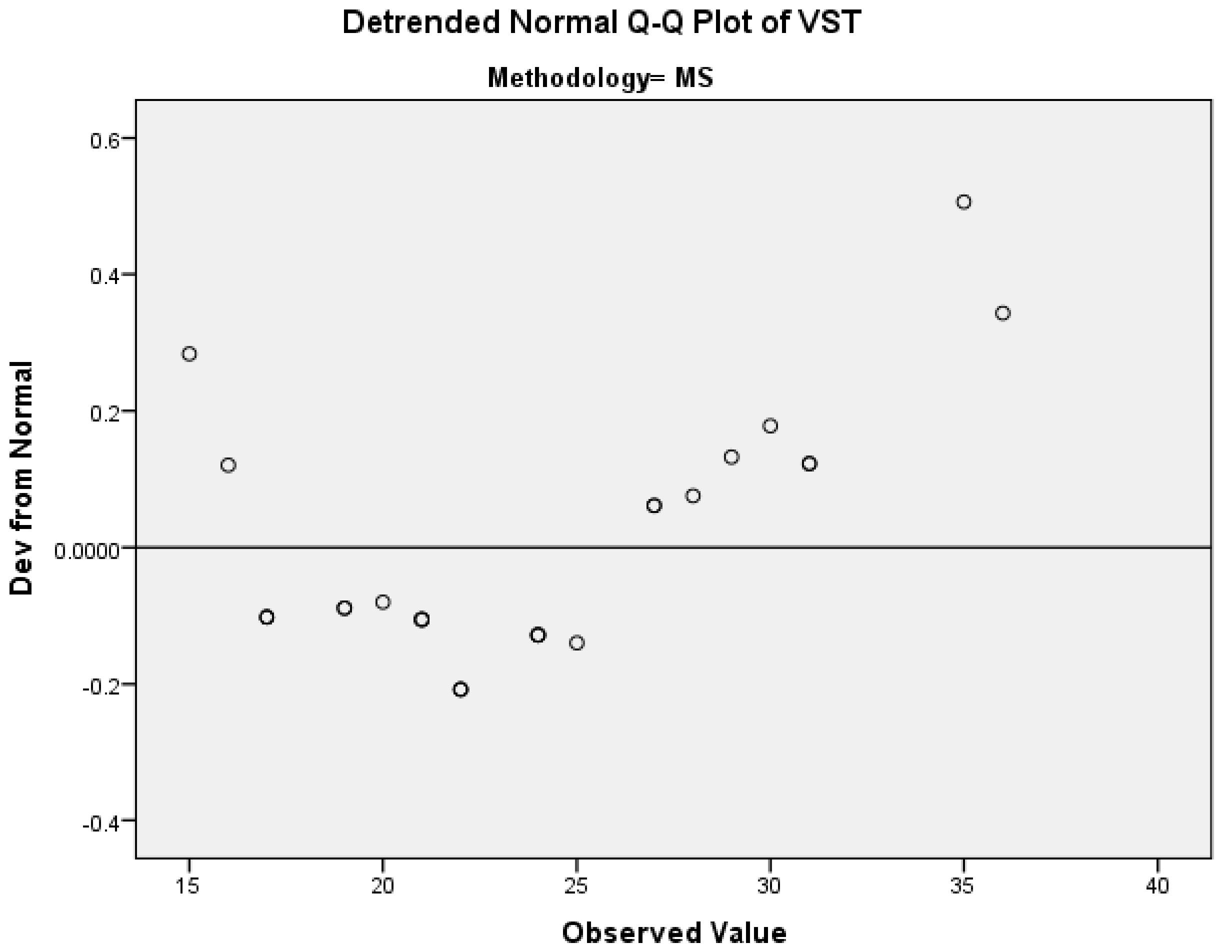

Normal Q-Q Plot of IELTS
Methodology= MS
3
2
1
0
-1
Expected Normal
4.8
5.1
5.4
5.7
6.0
Observed Value

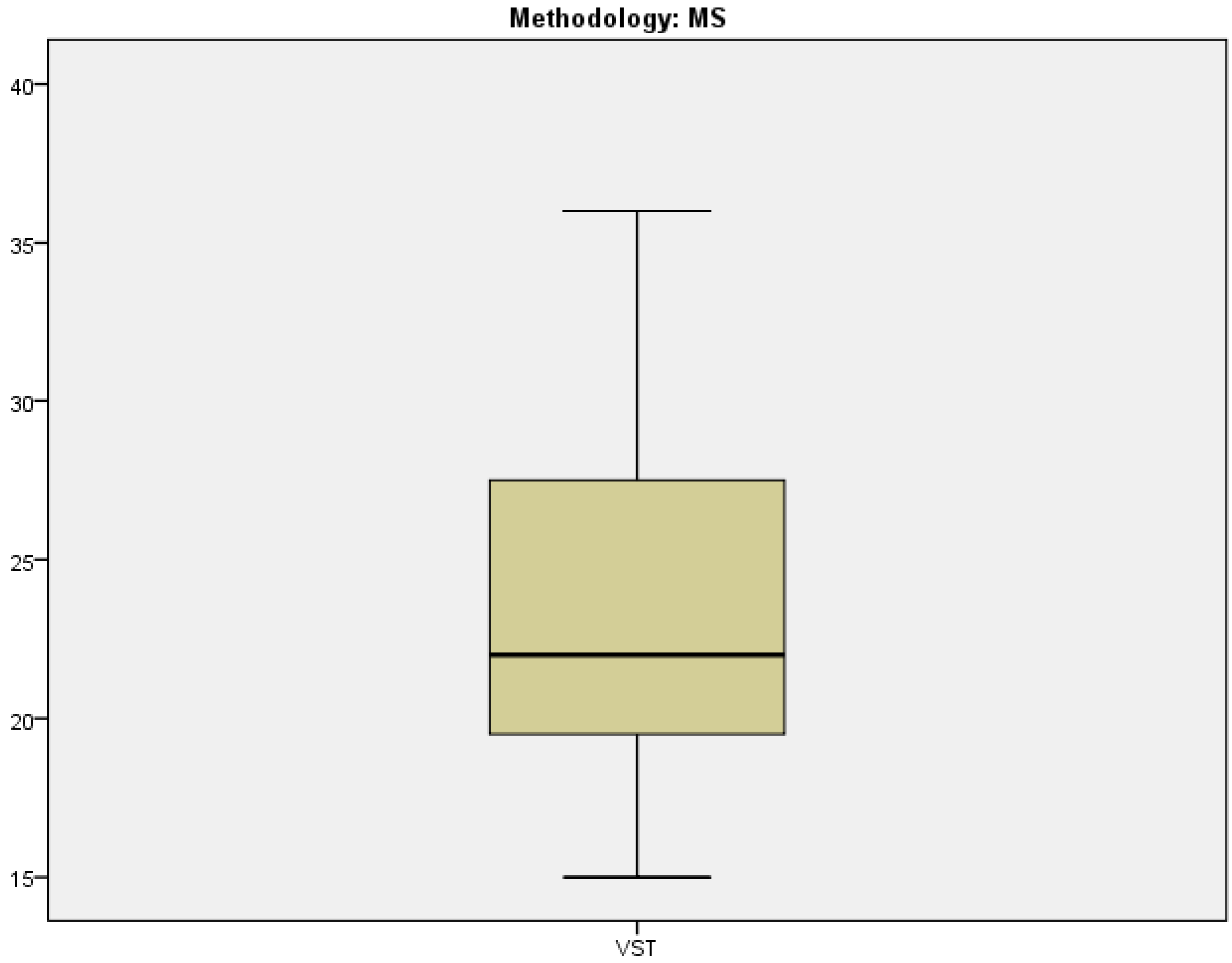

Detrended Normal Q-Q Plot of IELTS
Methodology= MS
Dev from Normal
0.75
0.50
0.25
0.00
-0.25
5.0
5.2
5.4
5.6
5.8
6.0
Observed Value



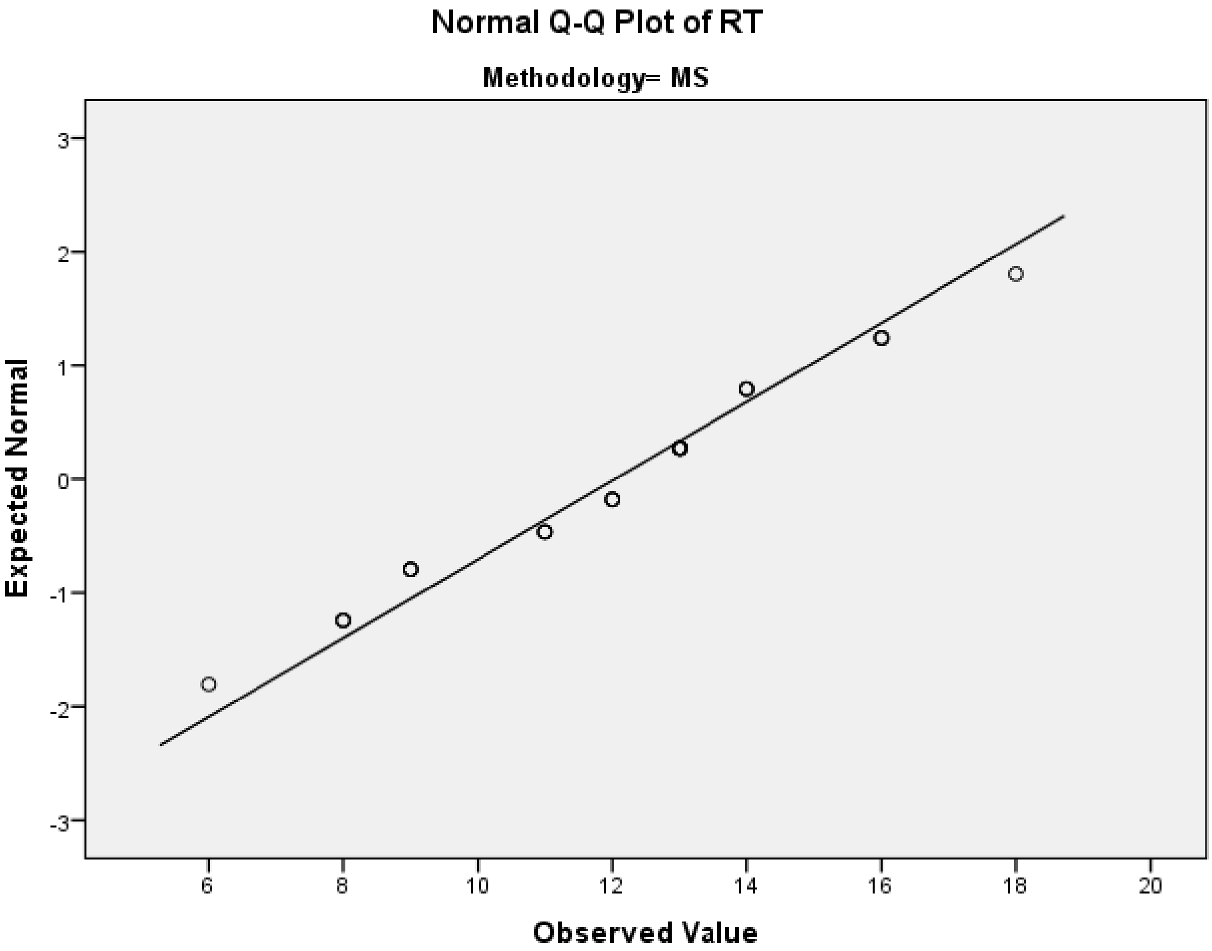
VST

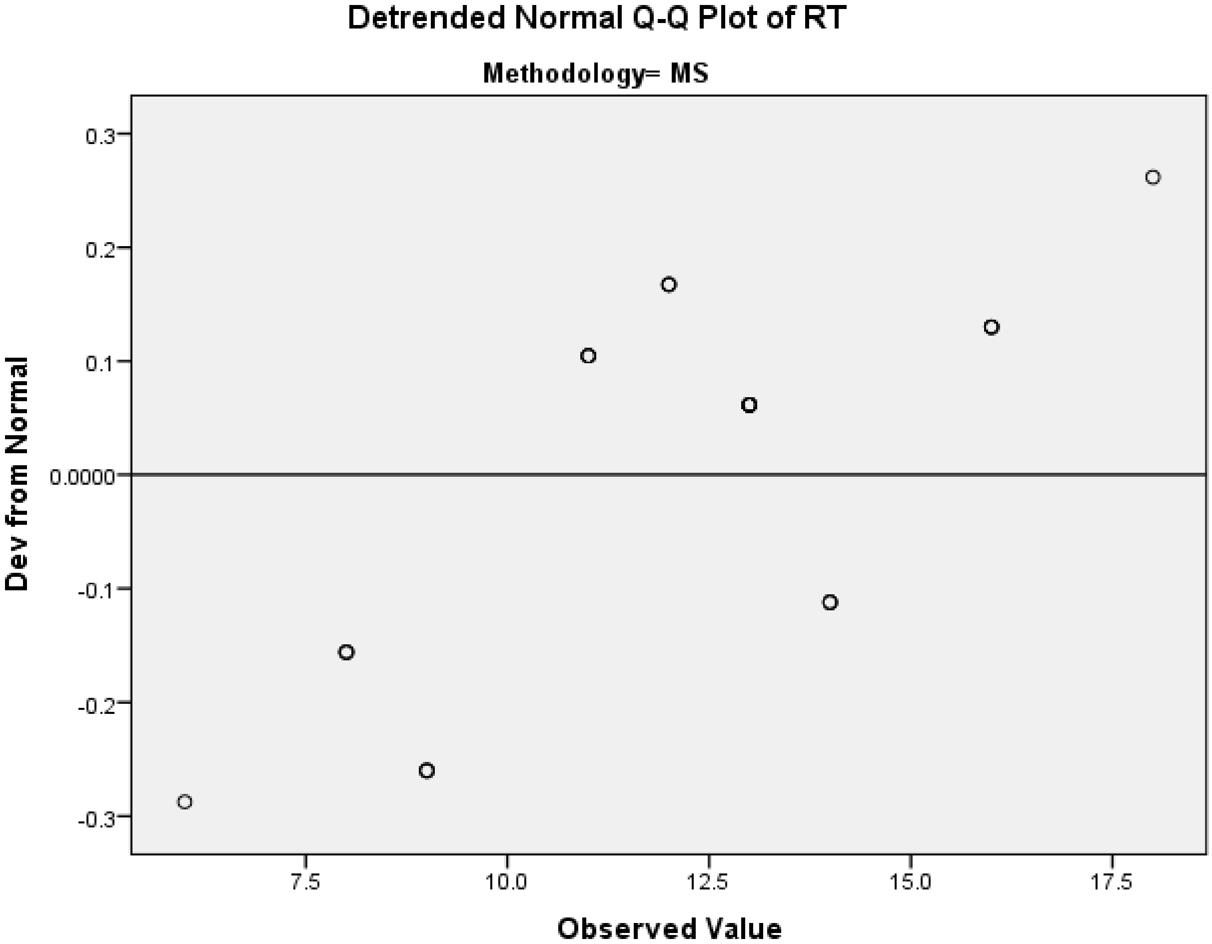

Normal Q-Q Plot of VST
Methodology= MS
Expected Normal
Observed Value
3
2
1
0
-1
-2
10
15
20
25
30
35
40

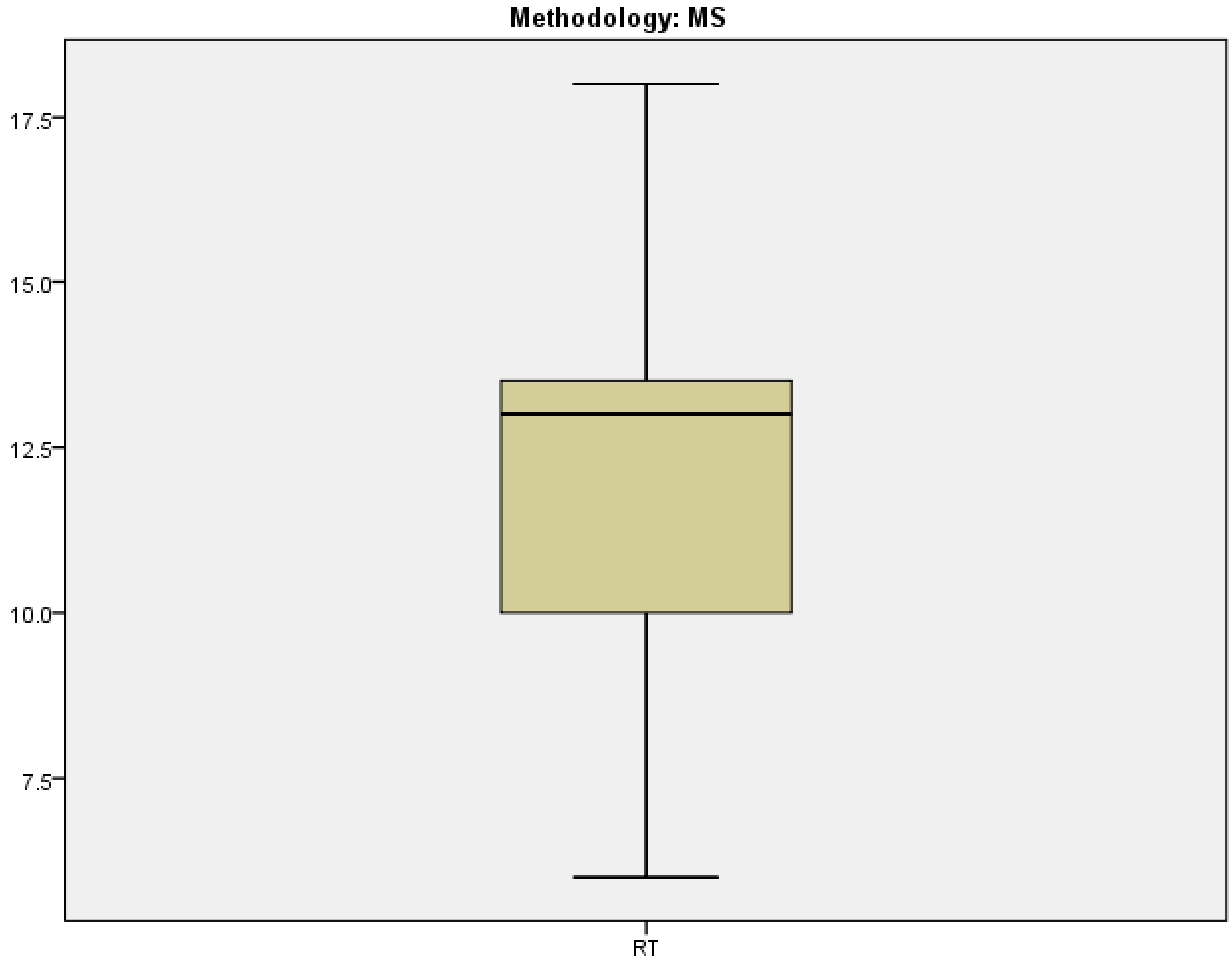

Detrended Normal Q-Q Plot of VST
Methodology= MS
Dev from Normal
0.6
0.4
0.2
0.0000
-0.2
-0.4
15
20
25
30
35
40
Observed Value



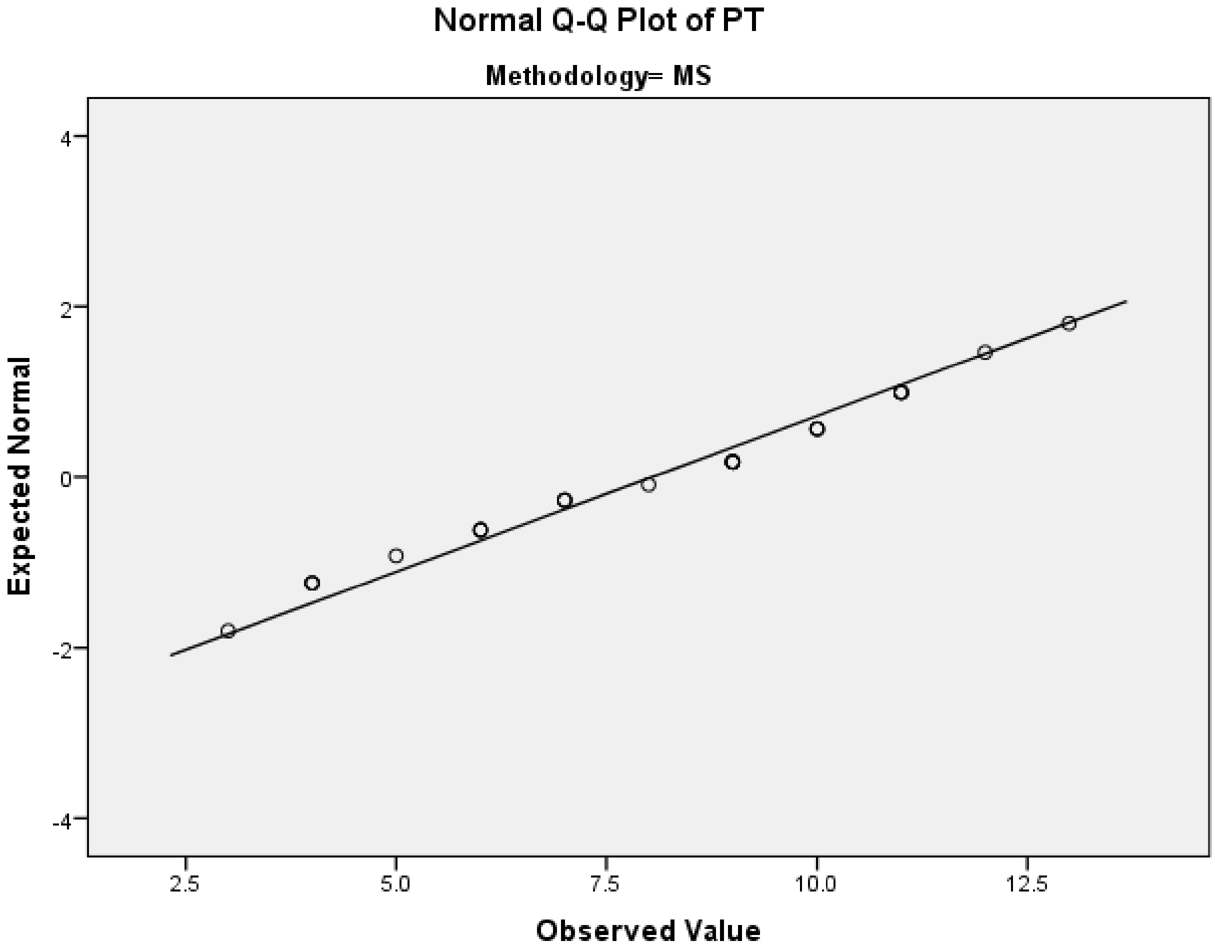
RT

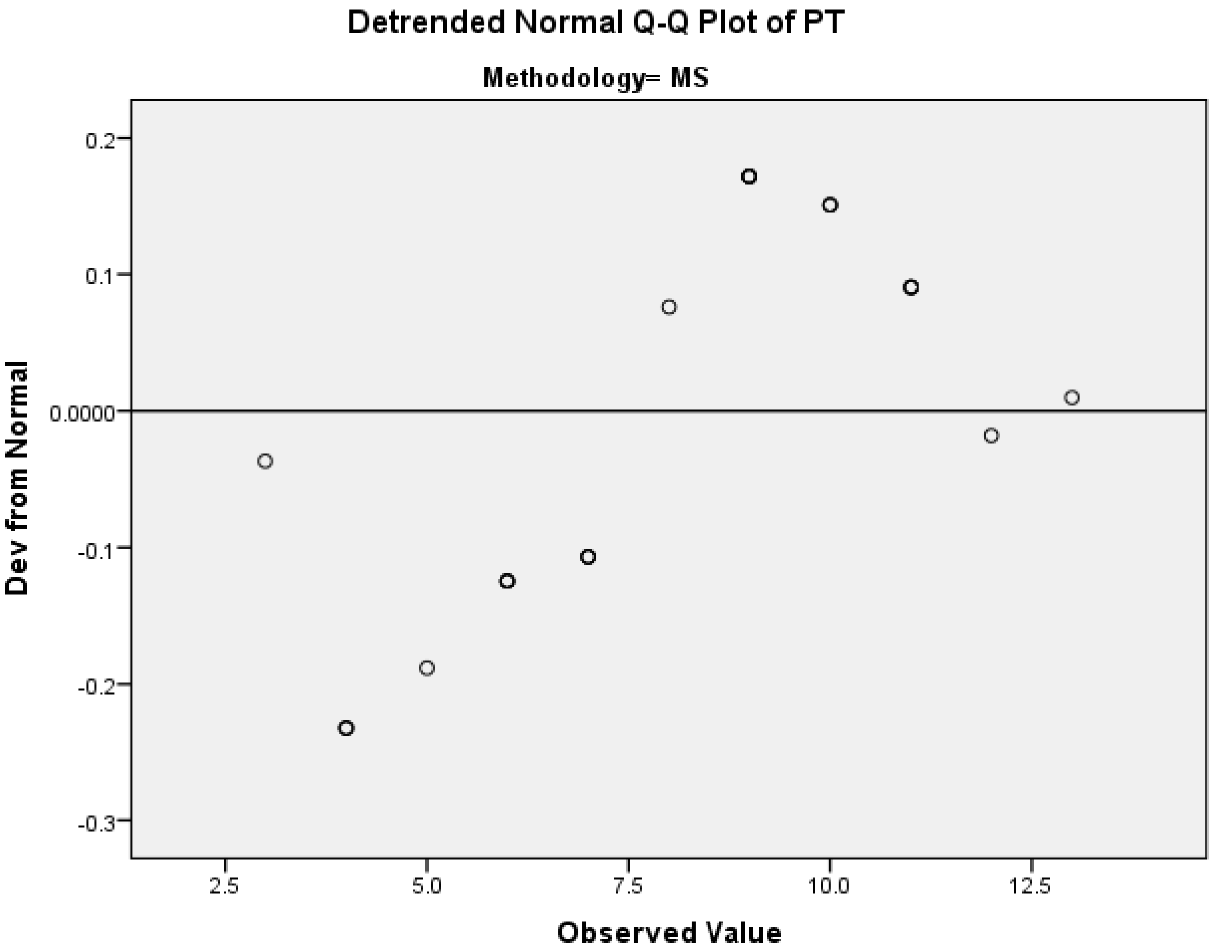

Normal Q-Q Plot of RT
Methodology= MS
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
6
8
10
12
14
16
18
20

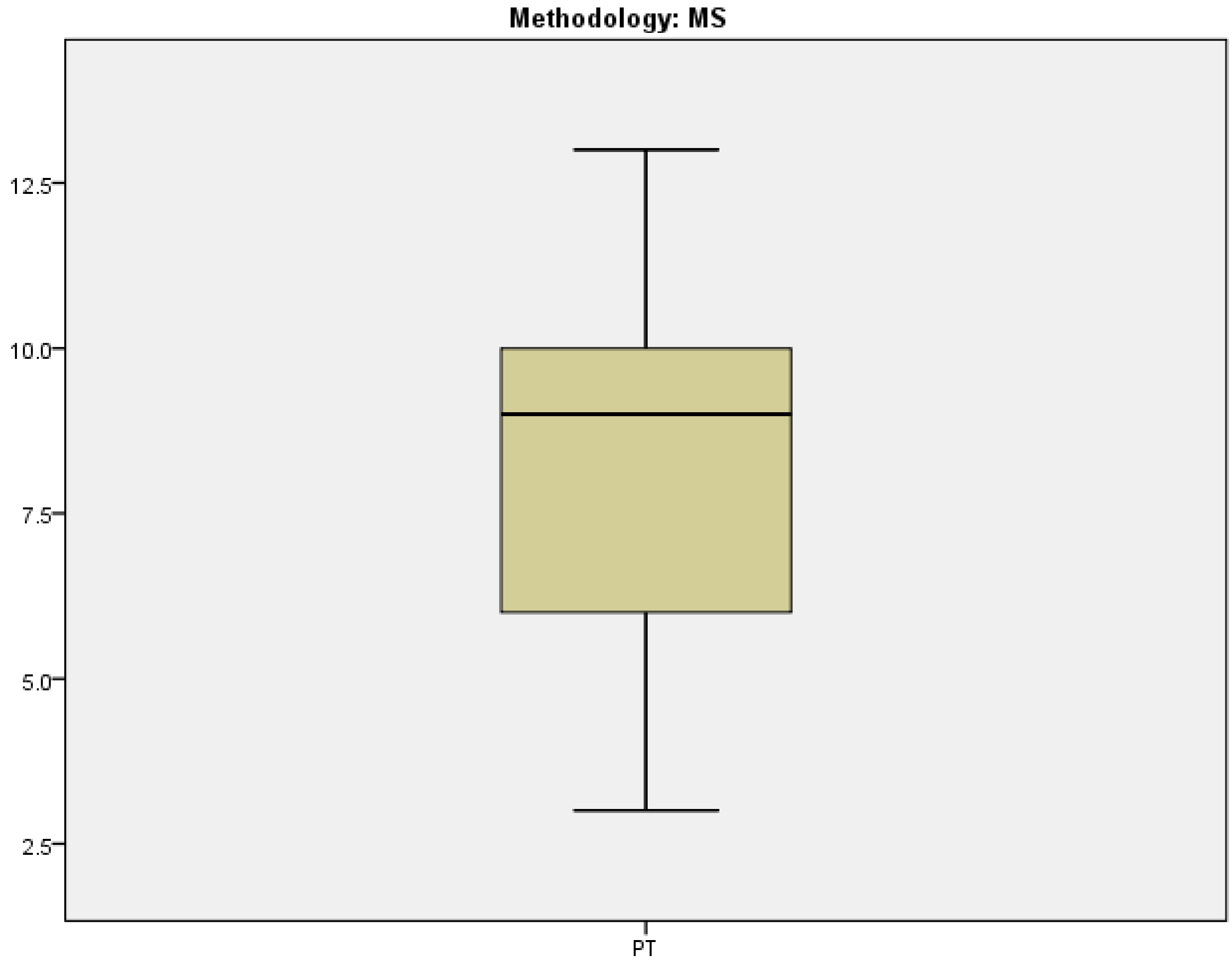

Detrended Normal Q-Q Plot of RT
Methodology= MS
Dev from Normal
0.3
0.2
0.1
0.0000
-0.1
-0.2
-0.3
7.5
10.0
12.5
15.0
17.5
Observed Value



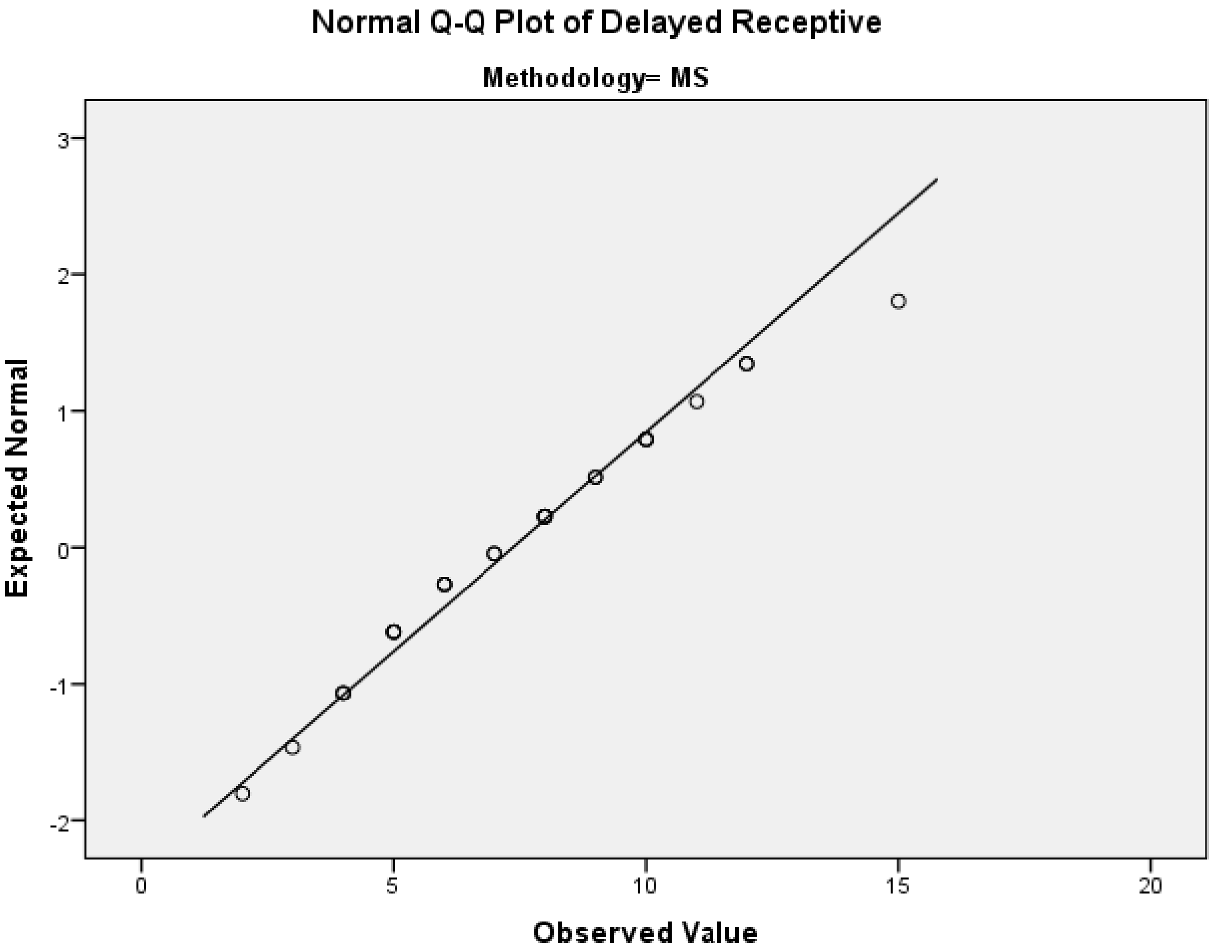
PT

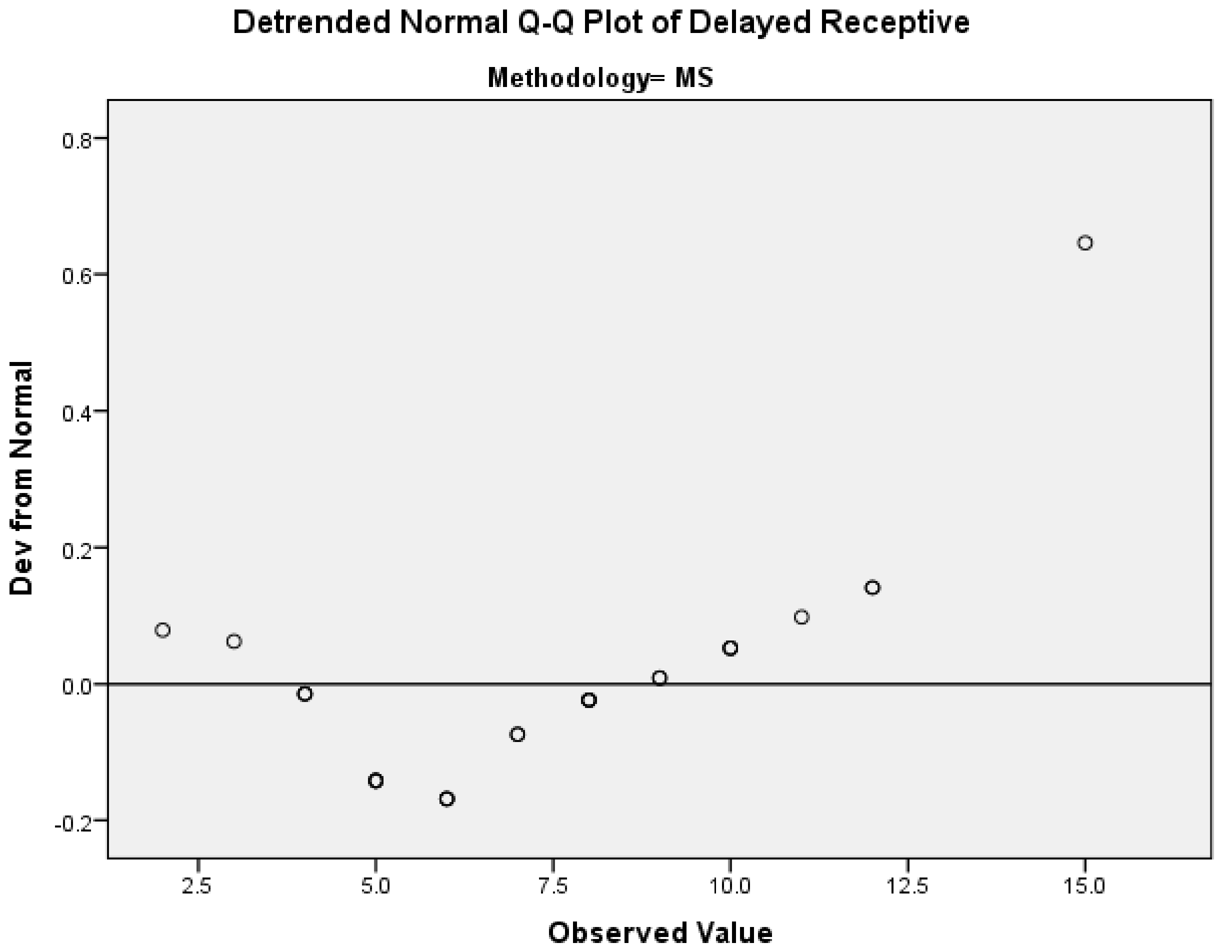

Normal Q-Q Plot of PT
Methodology= MS
Expected Normal
4
2
0
-2
-4
2.5
5.0
7.5
10.0
12.5
Observed Value

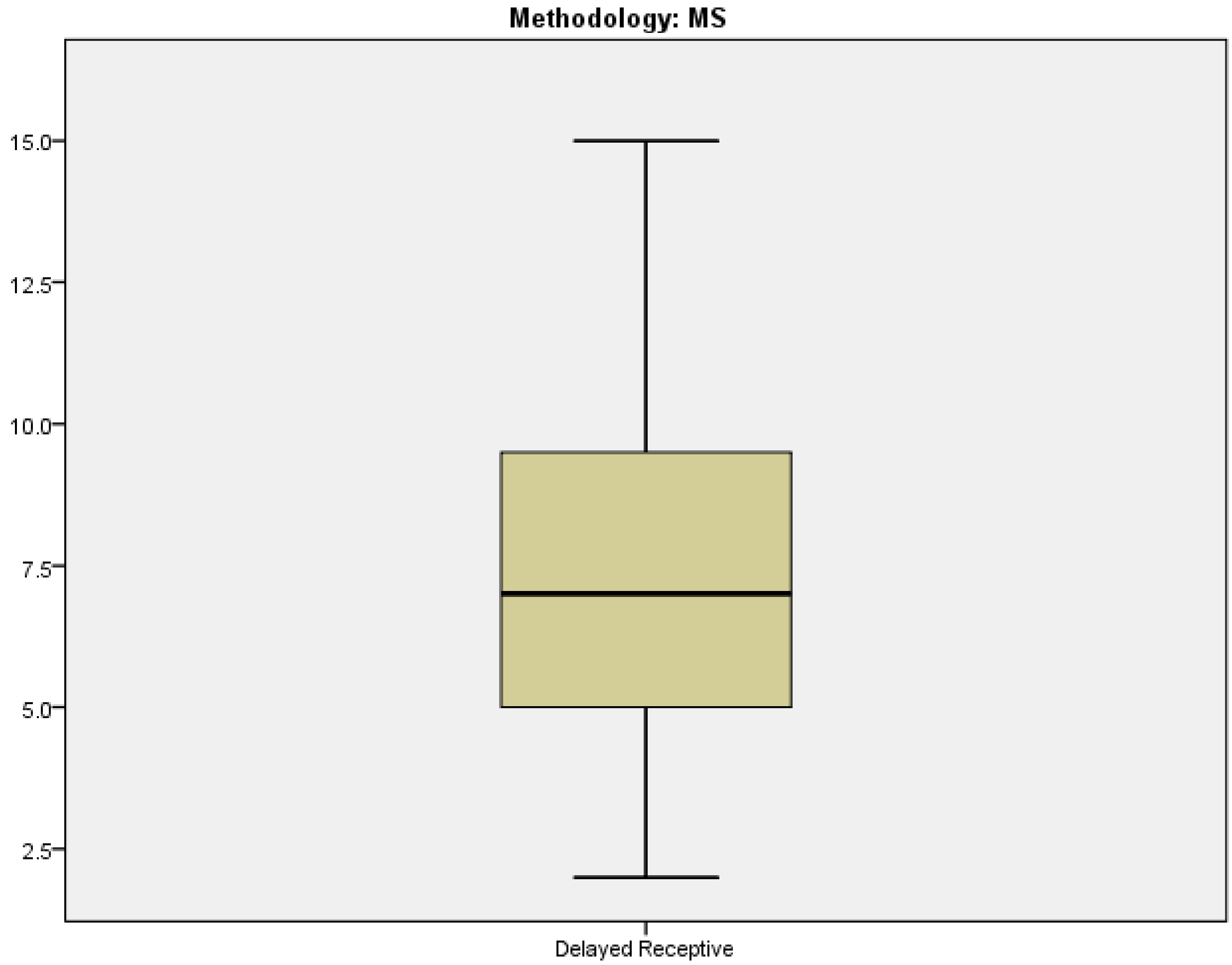

Detrended Normal Q-Q Plot of PT
Methodology= MS
Dev from Normal
0.2
0.1
0.0000
-0.1
-0.2
-0.3
2.5
5.0
7.5
10.0
12.5
Observed Value



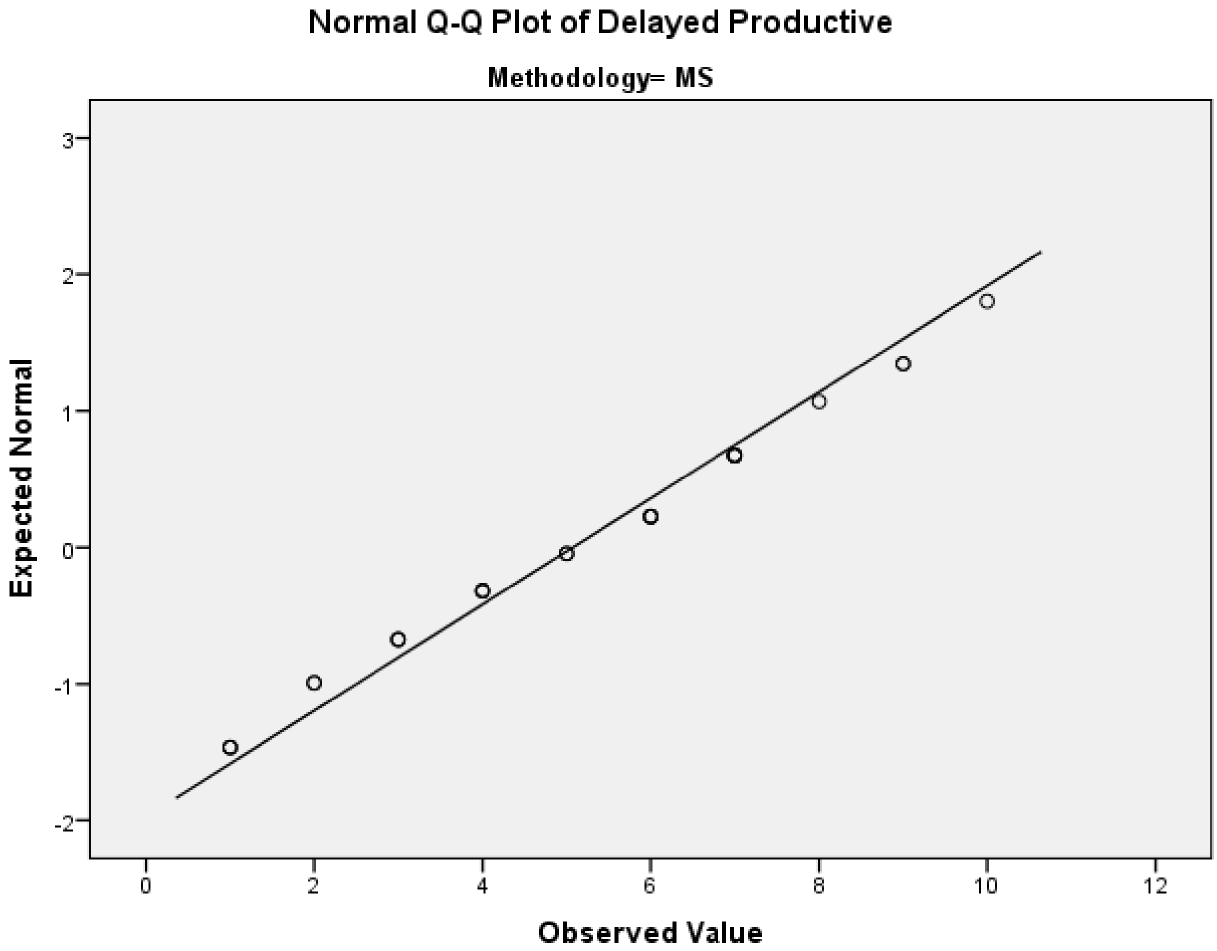
Delayed Receptive

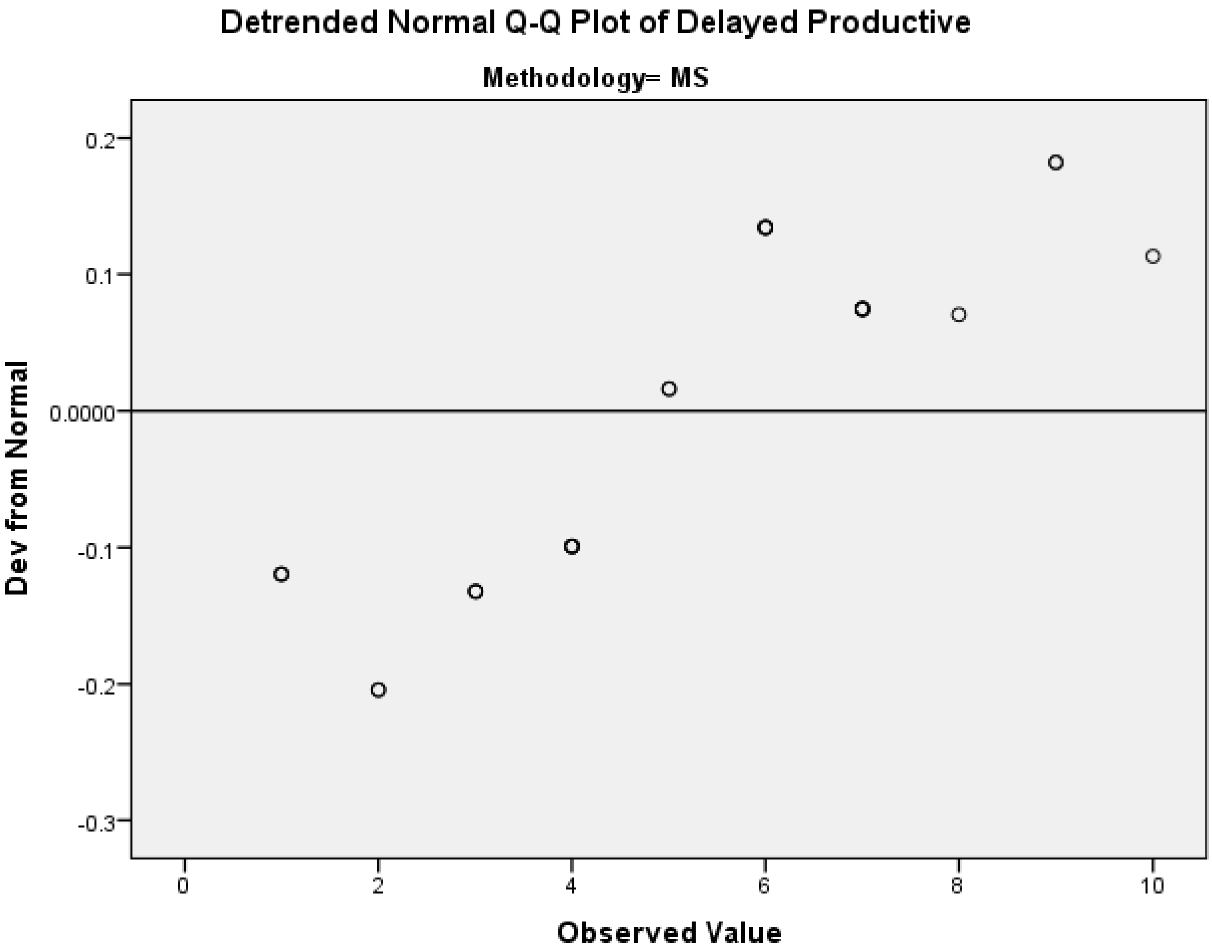

Normal Q-Q Plot of Delayed Receptive
Methodology= MS
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
5
10
15
20

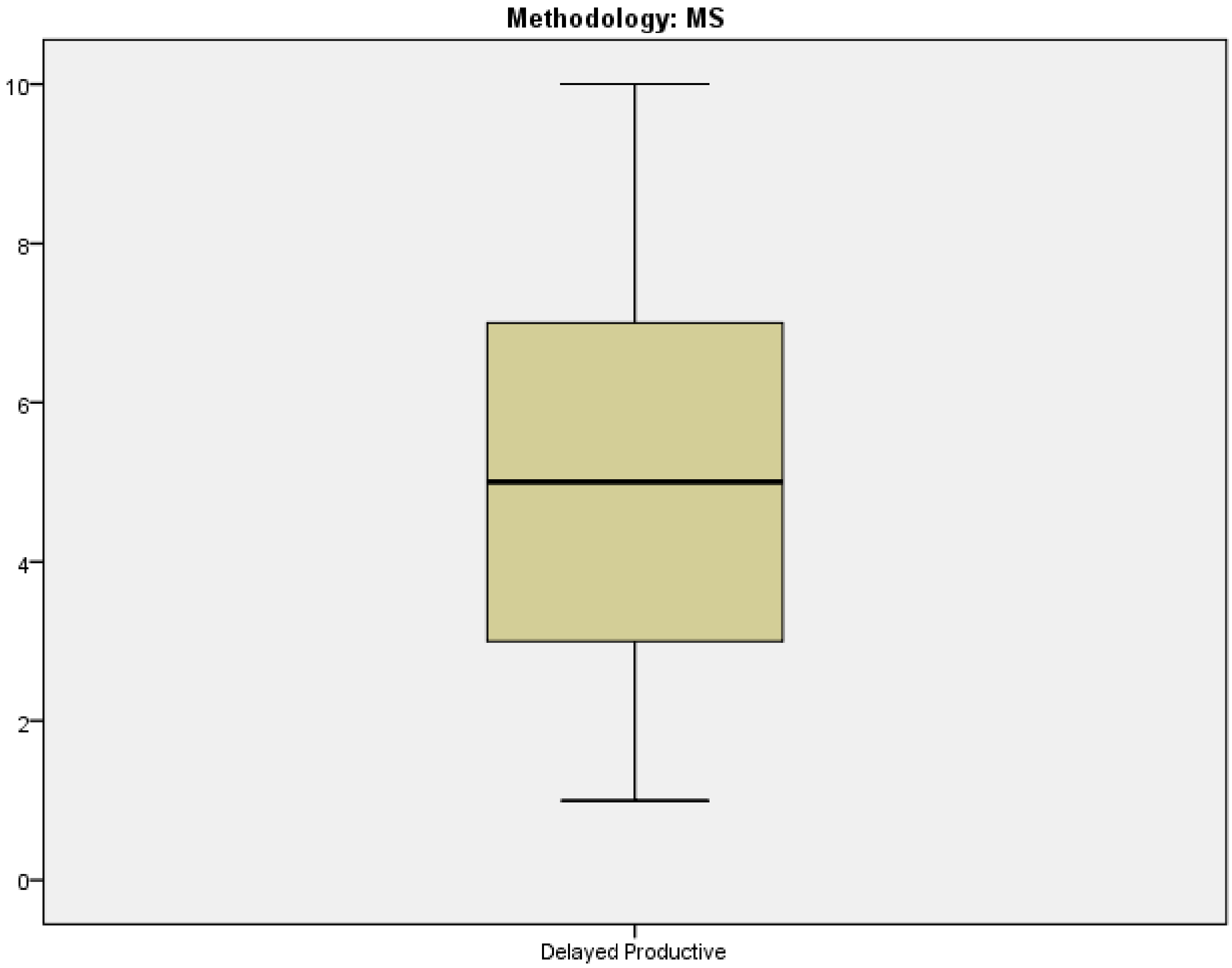

Detrended Normal Q-Q Plot of Delayed Receptive
Methodology= MS
Dev from Normal
0.8
0.6
0.4
0.2
0.0
-0.2
2.5
5.0
7.5
10.0
12.5
15.0
Observed Value



Delayed Productive


Normal Q-Q Plot of Delayed Productive
Methodology= MS
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
2
4
6
8
10
12


Detrended Normal Q-Q Plot of Delayed Productive
Methodology= MS
Dev from Normal
0.2
0.1
0.0000
-0.1
-0.2
-0.3
0
2
4
6
8
10
Observed Value



SPLIT FILE OFF.

NPAR TESTS

/M-W= IELTS BY Group(1 2)

/MISSING ANALYSIS.

NPar Tests

Notes

Output Created		18-JUL-2017 06:57:07
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	52
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= IELTS BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed[a]	449389

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
IELTS	EG1	25	30.18	754.50
	CG1	27	23.09	623.50
	Total	52		

Test Statistics[a]

	IELTS
Mann-Whitney U	245.500
Wilcoxon W	623.500
Z	-1.911
Asymp. Sig. (2-tailed)	.056

a. Grouping Variable: Group

```
T-TEST GROUPS=Group(1 2)
  /MISSING=ANALYSIS
  /VARIABLES=VST
  /CRITERIA=CI(.95).
```

T-Test

Notes

Output Created		18-JUL-2017 06:58:49
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	52
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=Group(1 2) /MISSING=ANALYSIS /VARIABLES=VST /CRITERIA=CI(.95).

Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
VST	EG1	25	23.20	5.083	1.017
	CG1	27	23.70	5.730	1.103

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
VST	Equal variances assumed	.370	.546	-.334	50	.740	-.504
	Equal variances not assumed			-.336	49.915	.738	-.504

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
VST	Equal variances assumed	1.507	-3.530	2.523
	Equal variances not assumed	1.500	-3.516	2.509

* Chart Builder.

```
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=Method RT
MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: Method=col(source(s), name("Method"), unit.category())
  DATA: RT=col(source(s), name("RT"))
  DATA: id=col(source(s), name("$CASENUM"), unit.category())
  GUIDE: axis(dim(1), label("Methodology"))
  GUIDE: axis(dim(2), label("RT"))
  SCALE: cat(dim(1), include("1", "2"))
  SCALE: linear(dim(2), include(0))
  ELEMENT: schema(position(bin.quantile.letter(Method*RT)), label(id))
END GPL.
```

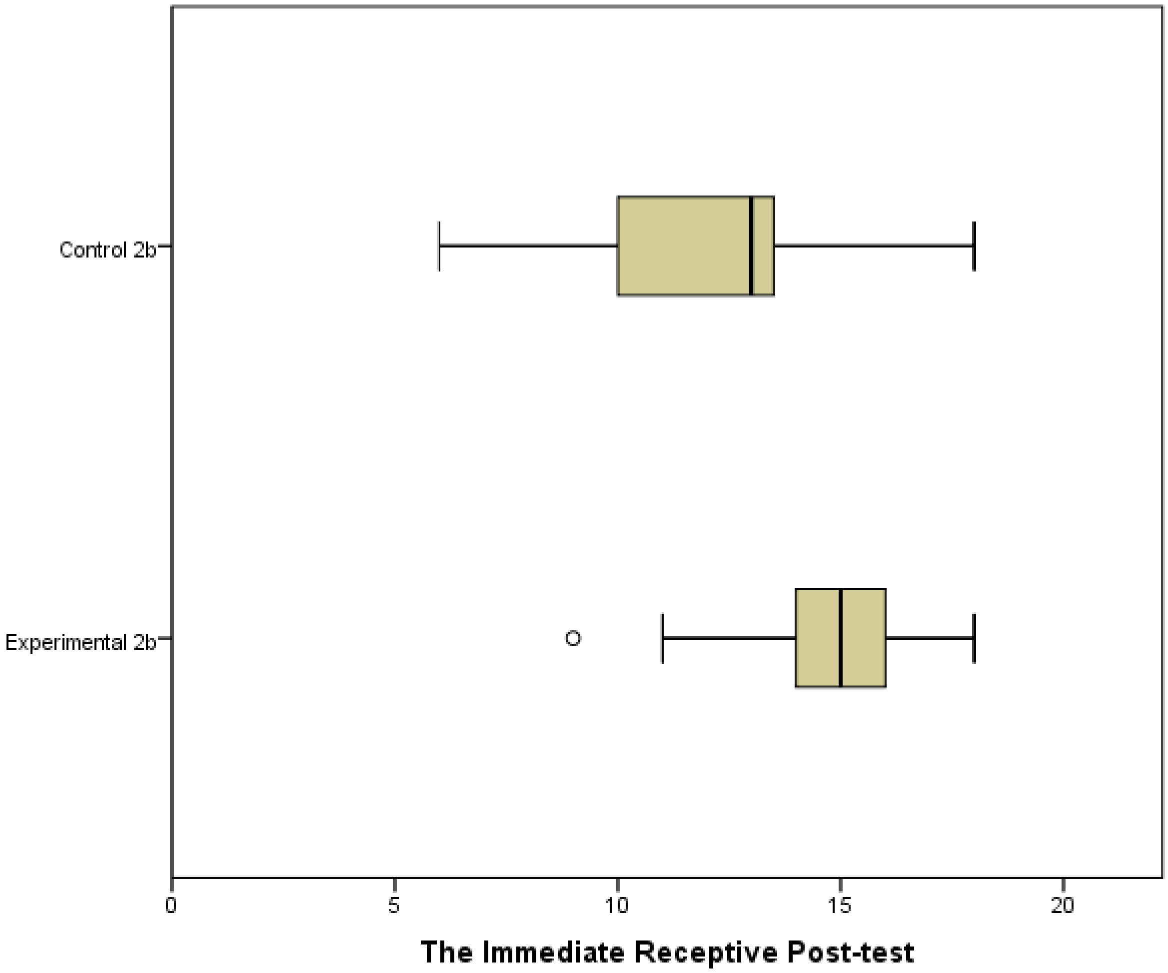
GGraph

Notes

Output Created		18-JUL-2017 09:27:59
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav

Active Dataset	DataSet1
Filter	<none>
Weight	<none>
Split File	<none>
N of Rows in Working Data File	52

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method RT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: RT=col(source(s), name("RT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("RT")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*RT)), label(id)) END GPL.
Resources	Processor Time	00:00:02.97
	Elapsed Time	00:00:01.07



NPAR TESTS

/M-W= RT PT BY Group(1 2)

/MISSING ANALYSIS.

NPar Tests

Notes

Output Created		18-JUL-2017 09:49:55
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	52
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= RT PT BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Number of Cases Allowed[a]	393216

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
RT	EG1	25	33.74	843.50
	CG1	27	19.80	534.50
	Total	52		
PT	EG1	25	33.72	843.00
	CG1	27	19.81	535.00
	Total	52		

Test Statistics[a]

	RT	PT
Mann-Whitney U	156.500	157.000
Wilcoxon W	534.500	535.000
Z	-3.357	-3.336

Asymp. Sig. (2-tailed)	.001	.001

a. Grouping Variable: Group

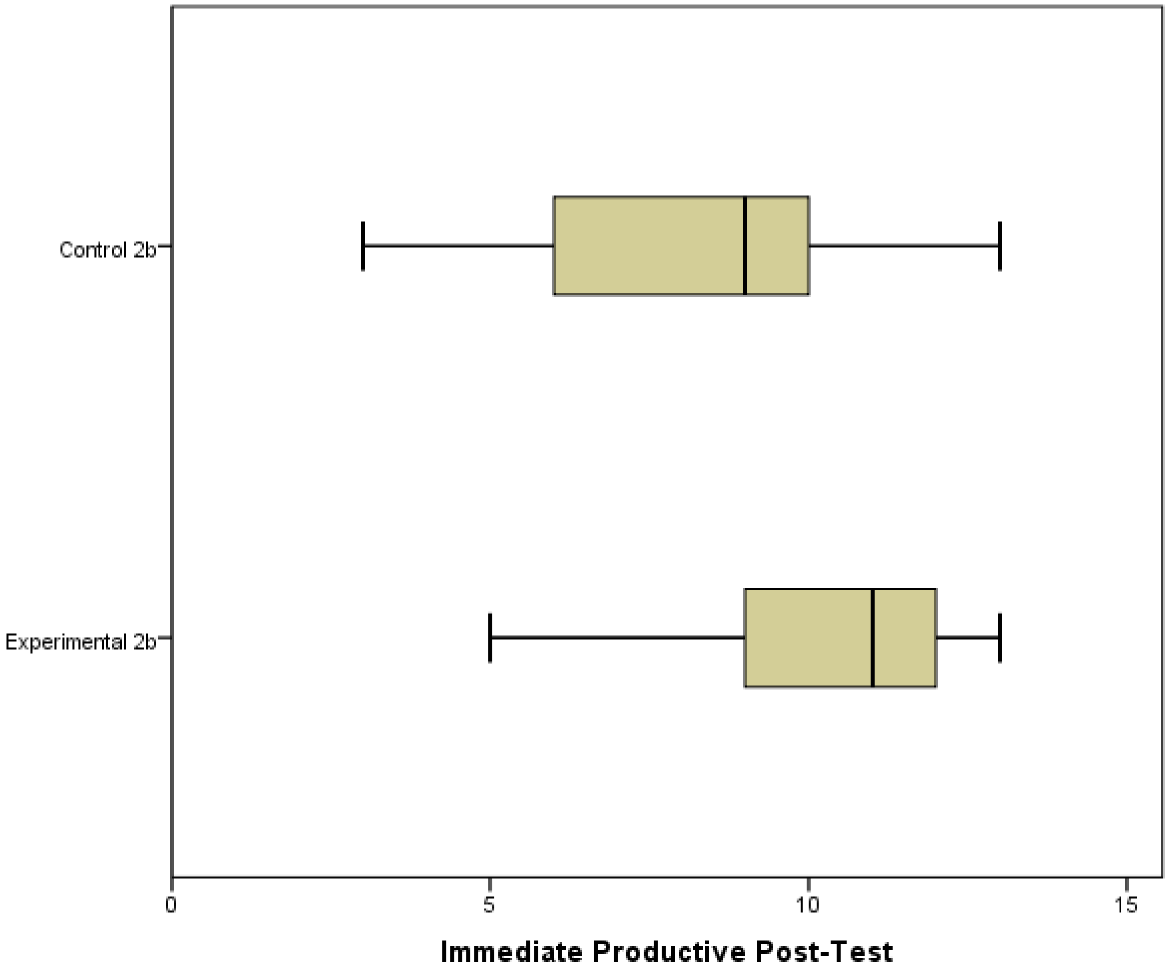
```
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=Method PT
MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: Method=col(source(s), name("Method"), unit.category())
  DATA: PT=col(source(s), name("PT"))
  DATA: id=col(source(s), name("$CASENUM"), unit.category())
  GUIDE: axis(dim(1), label("Methodology"))
  GUIDE: axis(dim(2), label("PT"))
  SCALE: cat(dim(1), include("1", "2"))
  SCALE: linear(dim(2), include(0))
  ELEMENT: schema(position(bin.quantile.letter(Method*PT)), label(id))
END GPL.
```

GGraph

Notes

Output Created		18-JUL-2017 10:11:54
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	52

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method PT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: PT=col(source(s), name("PT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("PT")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*PT)), label(id)) END GPL.
Resources	Processor Time	00:00:00.86
	Elapsed Time	00:00:00.29




```
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DRT
MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: Method=col(source(s), name("Method"), unit.category())
  DATA: DRT=col(source(s), name("DRT"))
  DATA: id=col(source(s), name("$CASENUM"), unit.category())
  GUIDE: axis(dim(1), label("Methodology"))
```

```
  GUIDE: axis(dim(2), label("Delayed Receptive"))
  SCALE: cat(dim(1), include("1", "2"))
  SCALE: linear(dim(2), include(0))
  ELEMENT: schema(position(bin.quantile.letter(Method*DRT)), label(id))
END GPL.
```

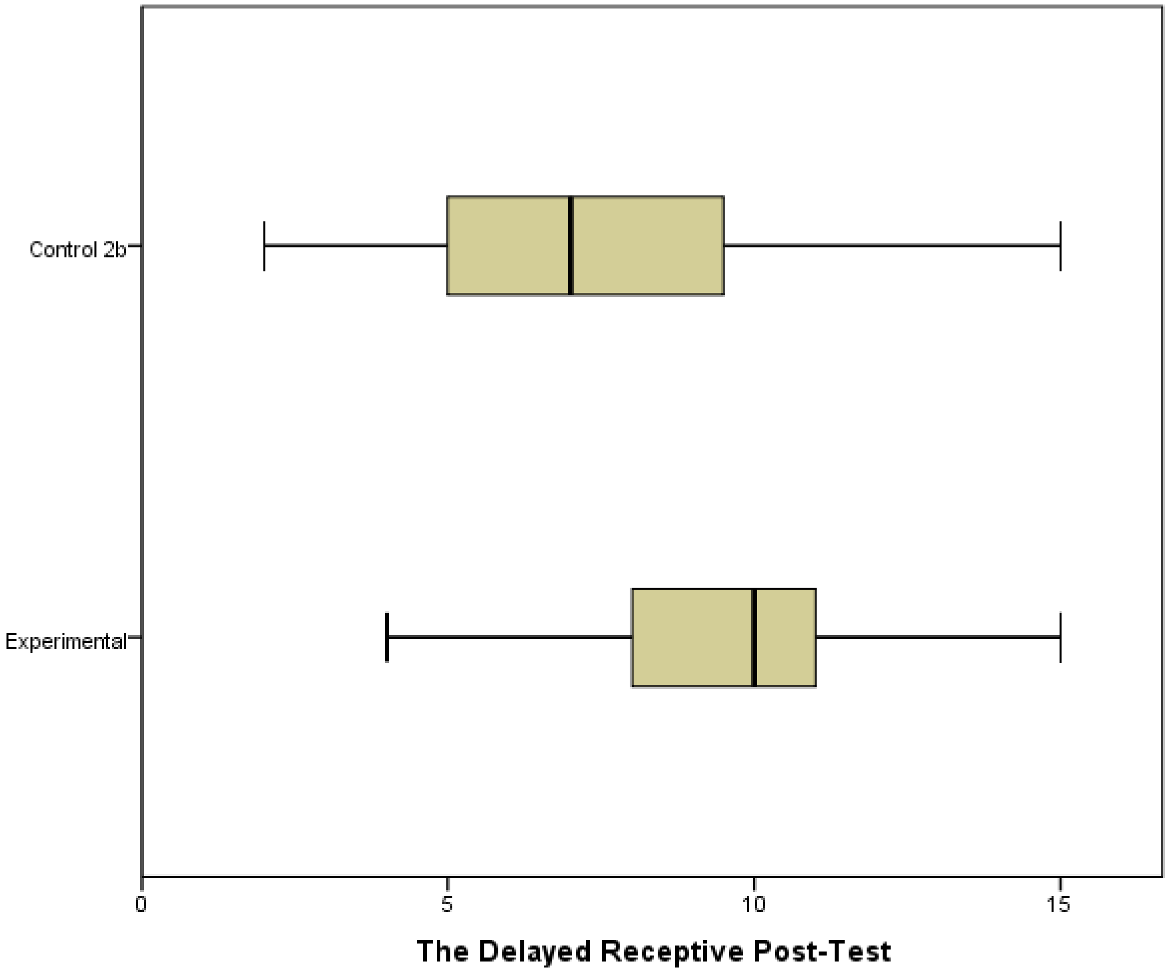
GGraph

Notes

Output Created		18-JUL-2017 10:33:50
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	52

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DRT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: DRT=col(source(s), name("DRT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("Delayed Receptive")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*DRT)), label(id)) END GPL.
Resources	Processor Time	00:00:00.37

Elapsed Time	00:00:00.21




```
T-TEST GROUPS=Group(1 2)
  /MISSING=ANALYSIS
  /VARIABLES=DRT DPT
  /CRITERIA=CI(.95).
```

T-Test

Notes

Output Created		18-JUL-2017 10:57:11
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	52
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=Group(1 2) /MISSING=ANALYSIS /VARIABLES=DRT DPT /CRITERIA=CI(.95).
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Delayed Receptive	EG1	25	9.88	2.315	.463
	CG1	27	7.37	3.115	.599
Delayed Productive	EG1	25	6.72	1.969	.394
	CG1	27	5.07	2.571	.495

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Delayed Receptive	Equal variances assumed	3.060	.086	3.276	50	.002
	Equal variances not assumed			3.313	47.833	.002
Delayed Productive	Equal variances assumed	3.030	.088	2.576	50	.013
	Equal variances not assumed			2.603	48.353	.012

Independent Samples Test

	t-test for Equality of Means		
	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference

				Lower	Upper
Delayed Receptive	Equal variances assumed	2.510	.766	.971	4.048
	Equal variances not assumed	2.510	.757	.986	4.033
Delayed Productive	Equal variances assumed	1.646	.639	.363	2.929
	Equal variances not assumed	1.646	.632	.375	2.917

```
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DPT
MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: Method=col(source(s), name("Method"), unit.category())
  DATA: DPT=col(source(s), name("DPT"))
  DATA: id=col(source(s), name("$CASENUM"), unit.category())
  GUIDE: axis(dim(1), label("Methodology"))
  GUIDE: axis(dim(2), label("Delayed Productive"))
  SCALE: cat(dim(1), include("1", "2"))
  SCALE: linear(dim(2), include(0))
  ELEMENT: schema(position(bin.quantile.letter(Method*DPT)), label(id))
END GPL.
```

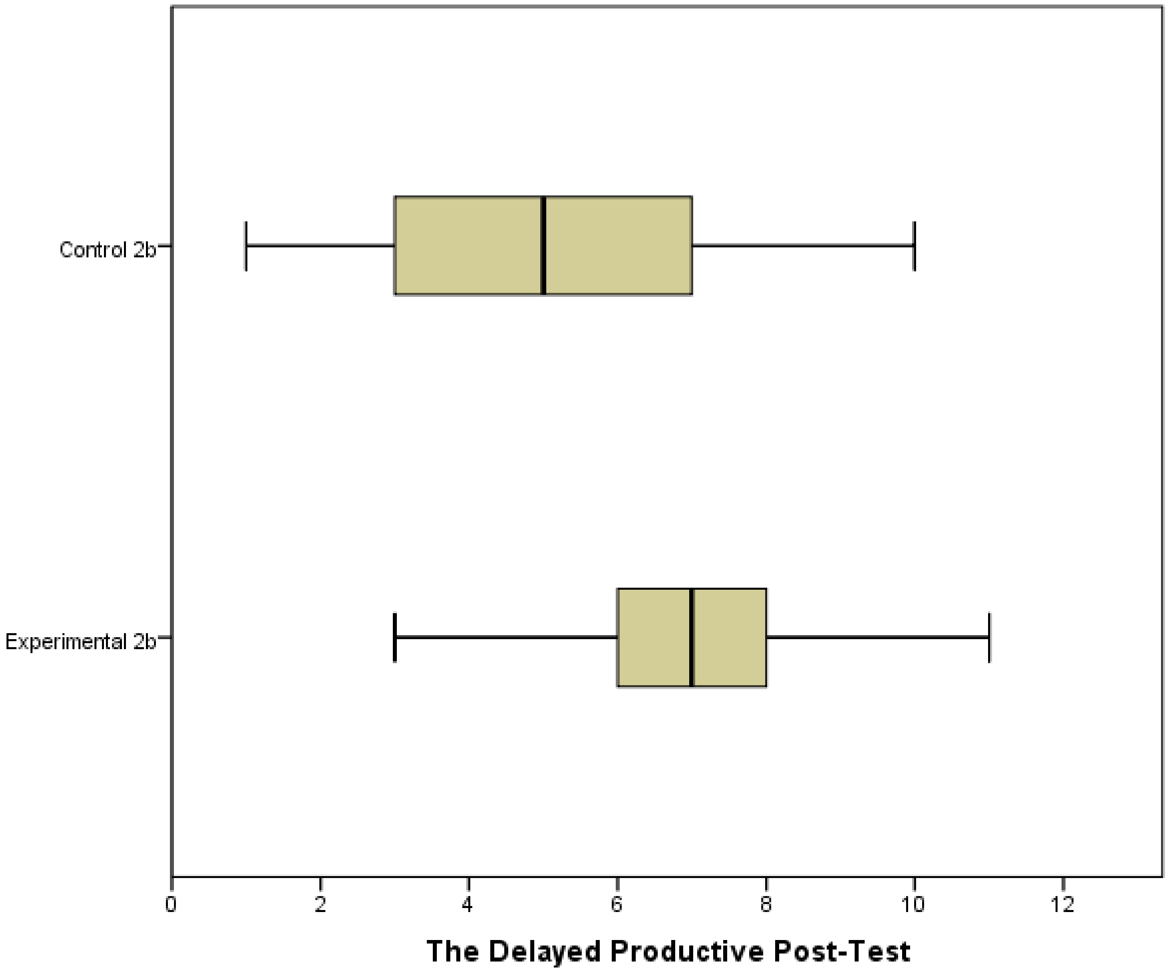
GGraph

Notes

Output Created		18-JUL-2017 11:07:25
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	52

Syntax		GGRAPH /GRAPHDATASET NAME="graphdataset" VARIABLES=Method DPT MISSING=LISTWISE REPORTMISSING=NO /GRAPHSPEC SOURCE=INLINE. BEGIN GPL SOURCE: s=userSource(id("graphdataset")) DATA: Method=col(source(s), name("Method"), unit.category()) DATA: DPT=col(source(s), name("DPT")) DATA: id=col(source(s), name("$CASENUM"), unit.category()) GUIDE: axis(dim(1), label("Methodology")) GUIDE: axis(dim(2), label("Delayed Productive")) SCALE: cat(dim(1), include("1", "2")) SCALE: linear(dim(2), include(0)) ELEMENT: schema(position(bin.quantile.letter(Method*DPT)), label(id)) END GPL.
Resources	Processor Time	00:00:00.41

Elapsed Time	00:00:00.21



NPAR TESTS

/M-W= RT PT DRT DPT BY Group(1 2)

/MISSING ANALYSIS.

NPar Tests

Notes

Output Created		18-JUL-2017 11:23:31
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	52
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= RT PT DRT DPT BY Group(1 2) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01
	Number of Cases Allowed[a]	314572

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
RT	EG1	25	33.74	843.50
	CG1	27	19.80	534.50
	Total	52		
PT	EG1	25	33.72	843.00
	CG1	27	19.81	535.00
	Total	52		
Delayed Receptive	EG1	25	33.16	829.00
	CG1	27	20.33	549.00
	Total	52		
Delayed Productive	EG1	25	31.62	790.50
	CG1	27	21.76	587.50
	Total	52		

Test Statistics[a]

	RT	PT	Delayed Receptive	Delayed Productive
Mann-Whitney U	156.500	157.000	171.000	209.500
Wilcoxon W	534.500	535.000	549.000	587.500
Z	-3.357	-3.336	-3.067	-2.366
Asymp. Sig. (2-tailed)	.001	.001	.002	.018

a. Grouping Variable: Group

Appendix Q

```
GET

DATASET NAME DataSet1 WINDOW=FRONT.

SORT CASES  BY Method.

SPLIT FILE LAYERED BY Method.

NONPAR CORR
  /VARIABLES=VST RT PT DRT DPT
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Notes

Output Created		22-JUL-2017 09:50:28
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_1_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	Method
	N of Rows in Working Data File	56

Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=VST RT PT DRT DPT /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed	393216 cases[a]

a. Based on availability of workspace memory

Correlations

Method				VST	RT	PT	Delayed Receptive	Delayed Productive
Spearman's rho	TB	VST	Correlation Coefficient	1.000	.892**	.477**	.771**	.604**
			Sig. (2-tailed)	.	.000	.009	.000	.001
			N	29	29	29	29	29

	RT	Correlation Coefficient	.892**	1.000	.666**	.795**	.595**
		Sig. (2-tailed)	.000	.	.000	.000	.001
		N	29	29	29	29	29
	PT	Correlation Coefficient	.477**	.666**	1.000	.502**	.711**
		Sig. (2-tailed)	.009	.000	.	.006	.000
		N	29	29	29	29	29
	Delayed Receptive	Correlation Coefficient	.771**	.795**	.502**	1.000	.484**
		Sig. (2-tailed)	.000	.000	.006	.	.008
		N	29	29	29	29	29
	Delayed Productive	Correlation Coefficient	.604**	.595**	.711**	.484**	1.000
		Sig. (2-tailed)	.001	.001	.000	.008	.
		N	29	29	29	29	29
MS	VST	Correlation Coefficient	1.000	.791**	.652**	.862**	.699**
		Sig. (2-tailed)	.	.000	.000	.000	.000
		N	27	27	27	27	27
	RT	Correlation Coefficient	.791**	1.000	.650**	.718**	.786**
		Sig. (2-tailed)	.000	.	.000	.000	.000
		N	27	27	27	27	27
	PT	Correlation Coefficient	.652**	.650**	1.000	.596**	.592**
		Sig. (2-tailed)	.000	.000	.	.001	.001
		N	27	27	27	27	27

	Delayed Receptive	Correlation Coefficient	.862**	.718**	.596**	1.000	.627**
		Sig. (2-tailed)	.000	.000	.001	.	.000
		N	27	27	27	27	27
	Delayed Productive	Correlation Coefficient	.699**	.786**	.592**	.627**	1.000
		Sig. (2-tailed)	.000	.000	.001	.000	.
		N	27	27	27	27	27

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

```
NONPAR CORR
  /VARIABLES=VST RT PT DRT DPT
  /PRINT=SPEARMAN ONETAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Notes

Output Created	22-JUL-2017 09:52:17
Comments	

Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_1_VN_june.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	Method
	N of Rows in Working Data File	56
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=VST RT PT DRT DPT /PRINT=SPEARMAN ONETAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed	393216 cases[a]

a. Based on availability of workspace memory

Correlations

Method				VST	RT	PT	Delayed Receptive	Delayed Productive
Spearman's rho	TB	VST	Correlation Coefficient	1.000	.892**	.477**	.771**	.604**
			Sig. (1-tailed)	.	.000	.004	.000	.000
			N	29	29	29	29	29
		RT	Correlation Coefficient	.892**	1.000	.666**	.795**	.595**
			Sig. (1-tailed)	.000	.	.000	.000	.000
			N	29	29	29	29	29
		PT	Correlation Coefficient	.477**	.666**	1.000	.502**	.711**
			Sig. (1-tailed)	.004	.000	.	.003	.000
			N	29	29	29	29	29
		Delayed Receptive	Correlation Coefficient	.771**	.795**	.502**	1.000	.484**
			Sig. (1-tailed)	.000	.000	.003	.	.004
			N	29	29	29	29	29
		Delayed Productive	Correlation Coefficient	.604**	.595**	.711**	.484**	1.000
			Sig. (1-tailed)	.000	.000	.000	.004	.
			N	29	29	29	29	29
	MS	VST	Correlation Coefficient	1.000	.791**	.652**	.862**	.699**
			Sig. (1-tailed)	.	.000	.000	.000	.000
			N	27	27	27	27	27
		RT	Correlation Coefficient	.791**	1.000	.650**	.718**	.786**
			Sig. (1-tailed)	.000	.	.000	.000	.000

		N	27	27	27	27	27
	PT	Correlation Coefficient	.652**	.650**	1.000	.596**	.592**
		Sig. (1-tailed)	.000	.000	.	.001	.001
		N	27	27	27	27	27
	Delayed Receptive	Correlation Coefficient	.862**	.718**	.596**	1.000	.627**
		Sig. (1-tailed)	.000	.000	.001	.	.000
		N	27	27	27	27	27
	Delayed Productive	Correlation Coefficient	.699**	.786**	.592**	.627**	1.000
		Sig. (1-tailed)	.000	.000	.001	.000	.
		N	27	27	27	27	27

**. Correlation is significant at the 0.01 level (1-tailed).

```
GET
DATASET NAME DataSet2 WINDOW=FRONT.
NONPAR CORR
  /VARIABLES=VST RT PT DRT DPT
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Notes

Output Created		22-JUL-2017 10:05:07
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	53
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=VST RT PT DRT DPT /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed	393216 cases[a]

a. Based on availability of workspace memory

Correlations

			VST	RT	PT	Delayed Receptive
Spearman's rho	VST	Correlation Coefficient	1.000	.698**	.578**	.568**
		Sig. (2-tailed)	.	.000	.000	.000
		N	53	53	53	53
	RT	Correlation Coefficient	.698**	1.000	.811**	.868**
		Sig. (2-tailed)	.000	.	.000	.000
		N	53	53	53	53
	PT	Correlation Coefficient	.578**	.811**	1.000	.788**
		Sig. (2-tailed)	.000	.000	.	.000
		N	53	53	53	53
	Delayed Receptive	Correlation Coefficient	.568**	.868**	.788**	1.000
		Sig. (2-tailed)	.000	.000	.000	.
		N	53	53	53	53
	Delayed Productive	Correlation Coefficient	.546**	.761**	.810**	.769**
		Sig. (2-tailed)	.000	.000	.000	.000
		N	53	53	53	53

Correlations

			Delayed Productive
Spearman's rho	VST	Correlation Coefficient	.546**
		Sig. (2-tailed)	.000
		N	53
	RT	Correlation Coefficient	.761**
		Sig. (2-tailed)	.000
		N	53
	PT	Correlation Coefficient	.810**
		Sig. (2-tailed)	.000
		N	53
	Delayed Receptive	Correlation Coefficient	.769**
		Sig. (2-tailed)	.000
		N	53
	Delayed Productive	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	53

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

```
SORT CASES  BY Method.
SPLIT FILE LAYERED BY Method.
NONPAR CORR
  /VARIABLES=VST RT PT DRT DPT
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Notes

Output Created		22-JUL-2017 10:07:06
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Ex_2_VN_june.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	Methodology
	N of Rows in Working Data File	53
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.

Syntax		NONPAR CORR /VARIABLES=VST RT PT DRT DPT /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed	393216 cases[a]

a. Based on availability of workspace memory

Correlations

Methodology				VST	RT	PT	Delayed Receptive	Delayed Productive
Spearman's rho	TB	VST	Correlation Coefficient	1.000	.775**	.696**	.728**	.686**
			Sig. (2-tailed)	.	.000	.000	.000	.000
			N	27	27	27	27	27
		RT	Correlation Coefficient	.775**	1.000	.828**	.852**	.716**
			Sig. (2-tailed)	.000	.	.000	.000	.000
			N	27	27	27	27	27
		PT	Correlation Coefficient	.696**	.828**	1.000	.795**	.750**
			Sig. (2-tailed)	.000	.000	.	.000	.000
			N	27	27	27	27	27

	Delayed Receptive	Correlation Coefficient	.728**	.852**	.795**	1.000	.721**
		Sig. (2-tailed)	.000	.000	.000	.	.000
		N	27	27	27	27	27
	Delayed Productive	Correlation Coefficient	.686**	.716**	.750**	.721**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.
		N	27	27	27	27	27
MS	VST	Correlation Coefficient	1.000	.892**	.720**	.797**	.671**
		Sig. (2-tailed)	.	.000	.000	.000	.000
		N	26	26	26	26	26
	RT	Correlation Coefficient	.892**	1.000	.622**	.855**	.647**
		Sig. (2-tailed)	.000	.	.001	.000	.000
		N	26	26	26	26	26
	PT	Correlation Coefficient	.720**	.622**	1.000	.577**	.677**
		Sig. (2-tailed)	.000	.001	.	.002	.000
		N	26	26	26	26	26
	Delayed Receptive	Correlation Coefficient	.797**	.855**	.577**	1.000	.671**
		Sig. (2-tailed)	.000	.000	.002	.	.000
		N	26	26	26	26	26
	Delayed Productive	Correlation Coefficient	.671**	.647**	.677**	.671**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.
		N	26	26	26	26	26

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

```
GET
DATASET NAME DataSet3 WINDOW=FRONT.
SORT CASES  BY Method.
SPLIT FILE LAYERED BY Method.
NONPAR CORR
  /VARIABLES=VST RT PT DRT DPT
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Notes

Output Created		22-JUL-2017 10:09:34
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2a_Adj_N_july.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	Methodology

	N of Rows in Working Data File	55
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=VST RT PT DRT DPT /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed	393216 cases[a]

a. Based on availability of workspace memory

Correlations

Methodology				VST	RT	PT	Delayed Receptive	Delayed Productive
Spearman's rho	TB	VST	Correlation Coefficient	1.000	.924**	.693**	.762**	.620**

		Sig. (2-tailed)	.	.000	.000	.000	.000
		N	28	28	28	28	28
	RT	Correlation Coefficient	.924**	1.000	.739**	.780**	.603**
		Sig. (2-tailed)	.000	.	.000	.000	.001
		N	28	28	28	28	28
	PT	Correlation Coefficient	.693**	.739**	1.000	.578**	.443*
		Sig. (2-tailed)	.000	.000	.	.001	.018
		N	28	28	28	28	28
	Delayed Receptive	Correlation Coefficient	.762**	.780**	.578**	1.000	.342
		Sig. (2-tailed)	.000	.000	.001	.	.075
		N	28	28	28	28	28
	Delayed Productive	Correlation Coefficient	.620**	.603**	.443*	.342	1.000
		Sig. (2-tailed)	.000	.001	.018	.075	.
		N	28	28	28	28	28
MS	VST	Correlation Coefficient	1.000	.851**	.807**	.892**	.676**
		Sig. (2-tailed)	.	.000	.000	.000	.000
		N	27	27	27	27	27
	RT	Correlation Coefficient	.851**	1.000	.784**	.847**	.651**
		Sig. (2-tailed)	.000	.	.000	.000	.000
		N	27	27	27	27	27
	PT	Correlation Coefficient	.807**	.784**	1.000	.772**	.721**
		Sig. (2-tailed)	.000	.000	.	.000	.000

		N	27	27	27	27	27
	Delayed Receptive	Correlation Coefficient	.892**	.847**	.772**	1.000	.673**
		Sig. (2-tailed)	.000	.000	.000	.	.000
		N	27	27	27	27	27
	Delayed Productive	Correlation Coefficient	.676**	.651**	.721**	.673**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.
		N	27	27	27	27	27

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

*. Correlation is significant at the 0.05 level (2-tailed).

```
GET
DATASET NAME DataSet4 WINDOW=FRONT.
SORT CASES  BY Method.
SPLIT FILE LAYERED BY Method.
NONPAR CORR
  /VARIABLES=VST RT PT DRT DPT
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Notes

Output Created		22-JUL-2017 10:11:27
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex_2b_Adj_N_8encounters_july.sav
	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	Methodology
	N of Rows in Working Data File	52
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=VST RT PT DRT DPT /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed	393216 cases[a]

a. Based on availability of workspace memory

Correlations

Methodology				VST	RT	PT	Delayed Receptive	Delayed Productive
Spearman's rho	TB	VST	Correlation Coefficient	1.000	.875**	.711**	.844**	.752**
			Sig. (2-tailed)	.	.000	.000	.000	.000
			N	25	25	25	25	25
		RT	Correlation Coefficient	.875**	1.000	.545**	.904**	.702**
			Sig. (2-tailed)	.000	.	.005	.000	.000
			N	25	25	25	25	25
		PT	Correlation Coefficient	.711**	.545**	1.000	.651**	.398*
			Sig. (2-tailed)	.000	.005	.	.000	.049
			N	25	25	25	25	25
		Delayed Receptive	Correlation Coefficient	.844**	.904**	.651**	1.000	.552**
			Sig. (2-tailed)	.000	.000	.000	.	.004
			N	25	25	25	25	25
		Delayed Productive	Correlation Coefficient	.752**	.702**	.398*	.552**	1.000
			Sig. (2-tailed)	.000	.000	.049	.004	.
			N	25	25	25	25	25
	MS	VST	Correlation Coefficient	1.000	.858**	.702**	.881**	.812**

		Sig. (2-tailed)	.	.000	.000	.000	.000
		N	27	27	27	27	27
	RT	Correlation Coefficient	.858**	1.000	.866**	.863**	.621**
		Sig. (2-tailed)	.000	.	.000	.000	.001
		N	27	27	27	27	27
	PT	Correlation Coefficient	.702**	.866**	1.000	.738**	.433*
		Sig. (2-tailed)	.000	.000	.	.000	.024
		N	27	27	27	27	27
	Delayed Receptive	Correlation Coefficient	.881**	.863**	.738**	1.000	.652**
		Sig. (2-tailed)	.000	.000	.000	.	.000
		N	27	27	27	27	27
	Delayed Productive	Correlation Coefficient	.812**	.621**	.433*	.652**	1.000
		Sig. (2-tailed)	.000	.001	.024	.000	.
		N	27	27	27	27	27

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

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix S

```
GET
DATASET NAME DataSet1 WINDOW=FRONT.
EXAMINE VARIABLES=RPT PPT
  /PLOT BOXPLOT NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
```

```
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.
```

Explore

Notes

Output Created		19-SEP-2017 18:10:30
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex1_EG1_survey correlation_sept.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.

Syntax		EXAMINE VARIABLES=RPT PPT /PLOT BOXPLOT NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:04.23
	Elapsed Time	00:00:01.75

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
RPT	29	100.0%	0	0.0%	29	100.0%
PPT	29	100.0%	0	0.0%	29	100.0%

Descriptives

			Statistic	Std. Error
RPT	Mean		14.07	.550
		Lower Bound	12.94	

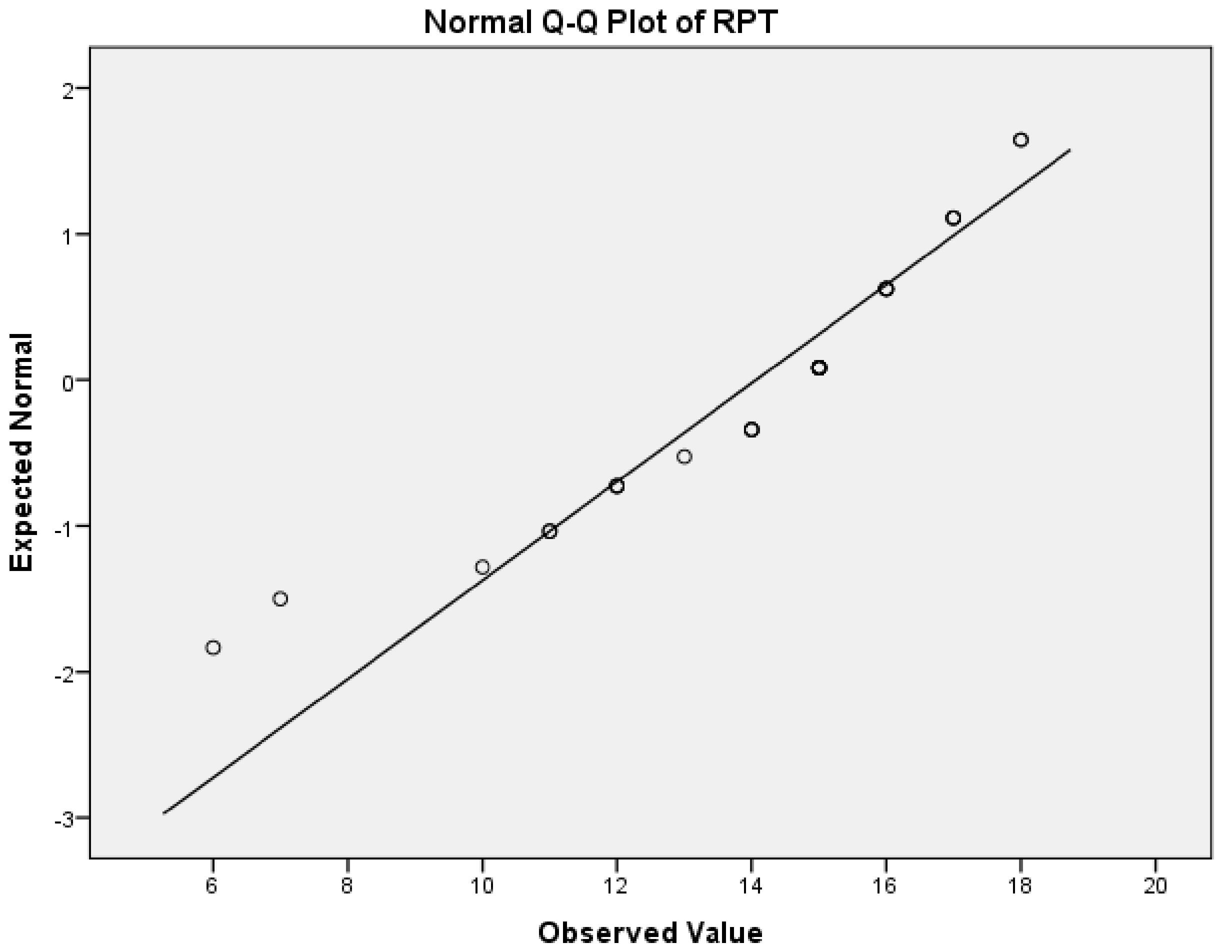
	95% Confidence Interval for Mean	Upper Bound	15.20	
	5% Trimmed Mean		14.28	
	Median		15.00	
	Variance		8.781	
	Std. Deviation		2.963	
	Minimum		6	
	Maximum		18	
	Range		12	
	Interquartile Range		4	
	Skewness		-1.169	.434
	Kurtosis		1.252	.845
PPT	Mean		9.72	.435
	95% Confidence Interval for Mean	Lower Bound	8.83	
		Upper Bound	10.62	
	5% Trimmed Mean		9.83	
	Median		10.00	
	Variance		5.493	
	Std. Deviation		2.344	
	Minimum		3	
	Maximum		14	
	Range		11	
	Interquartile Range		3	
	Skewness		-.787	.434
	Kurtosis		1.207	.845

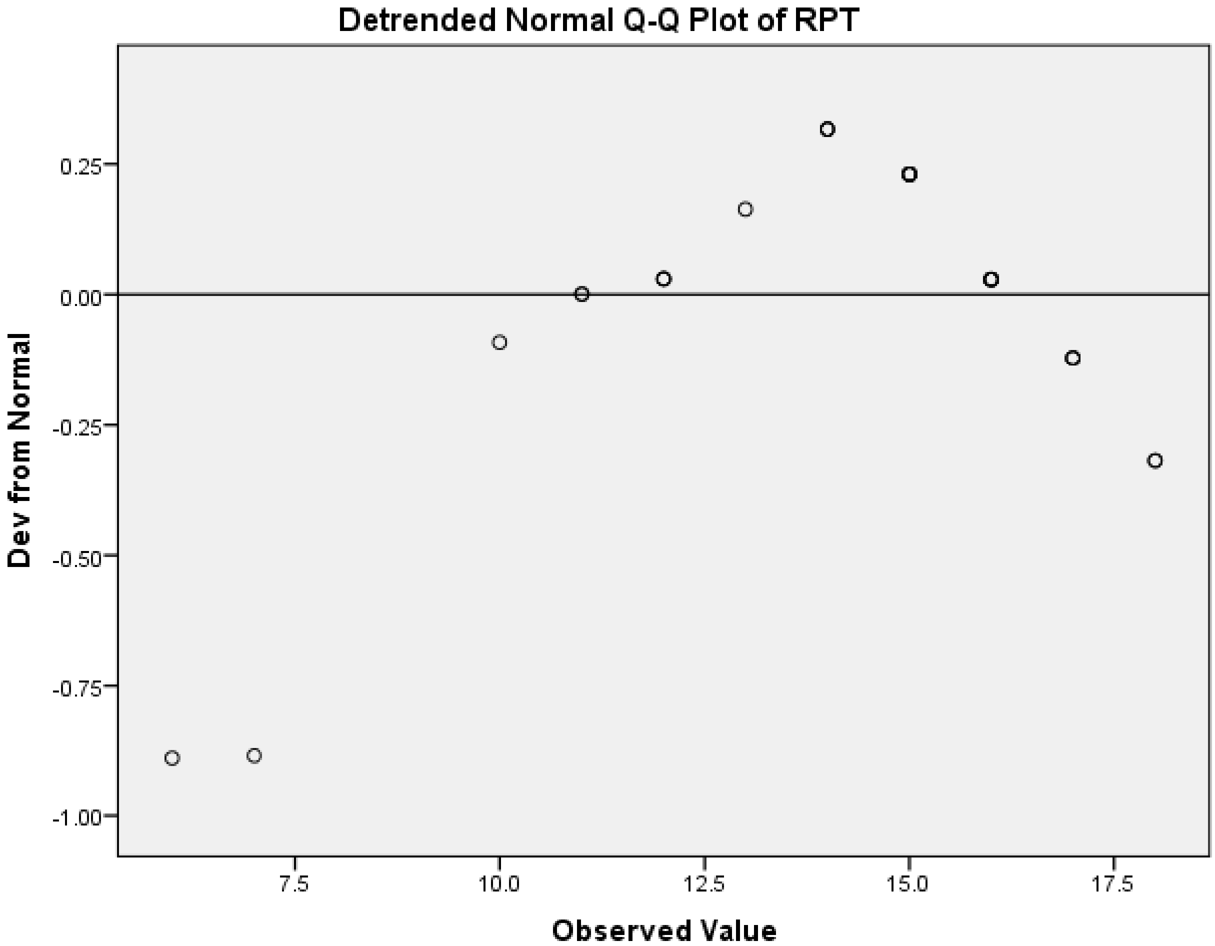
Tests of Normality

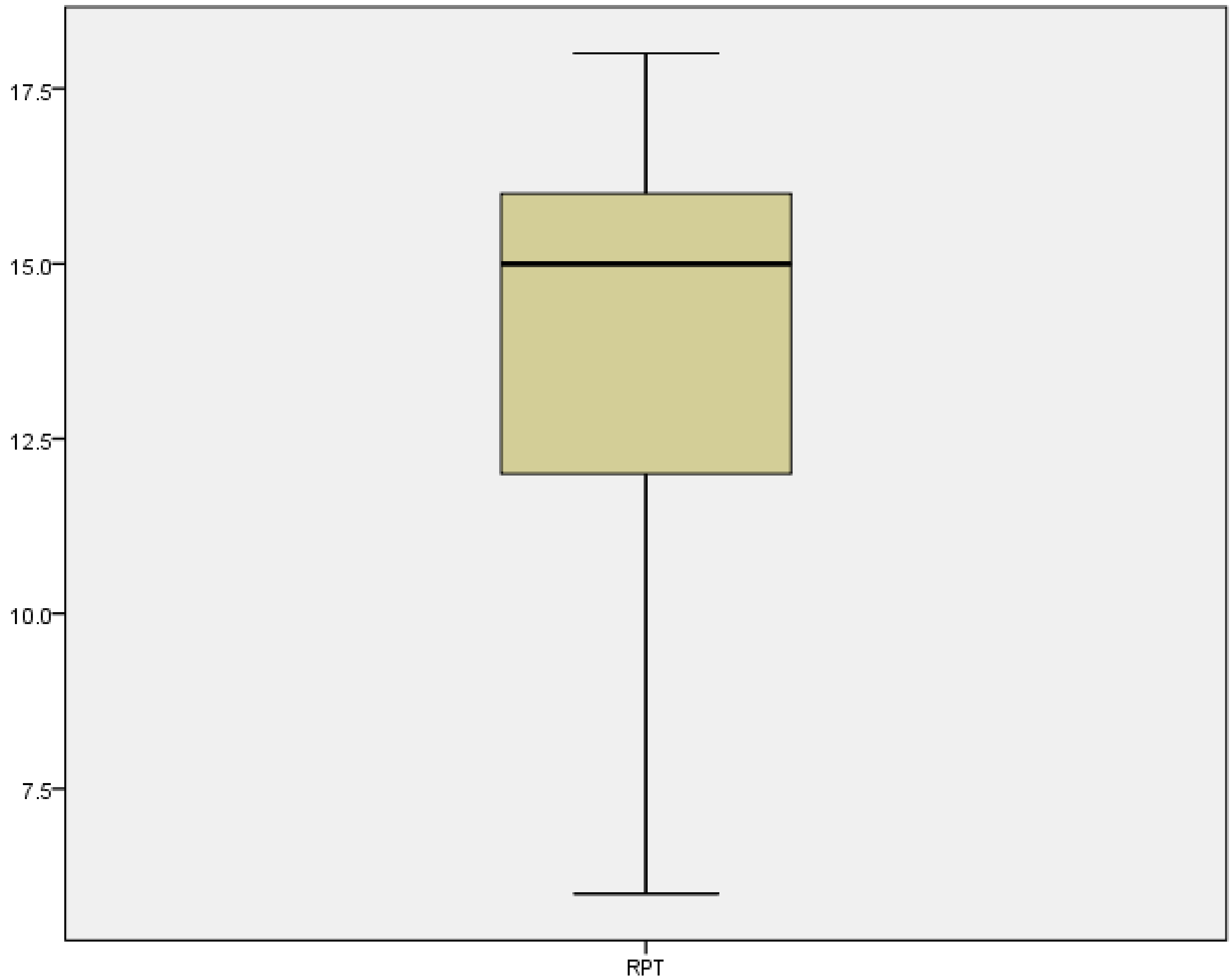
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
RPT	.210	29	.002	.896	29	.008
PPT	.137	29	.172	.951	29	.196

a. Lilliefors Significance Correction

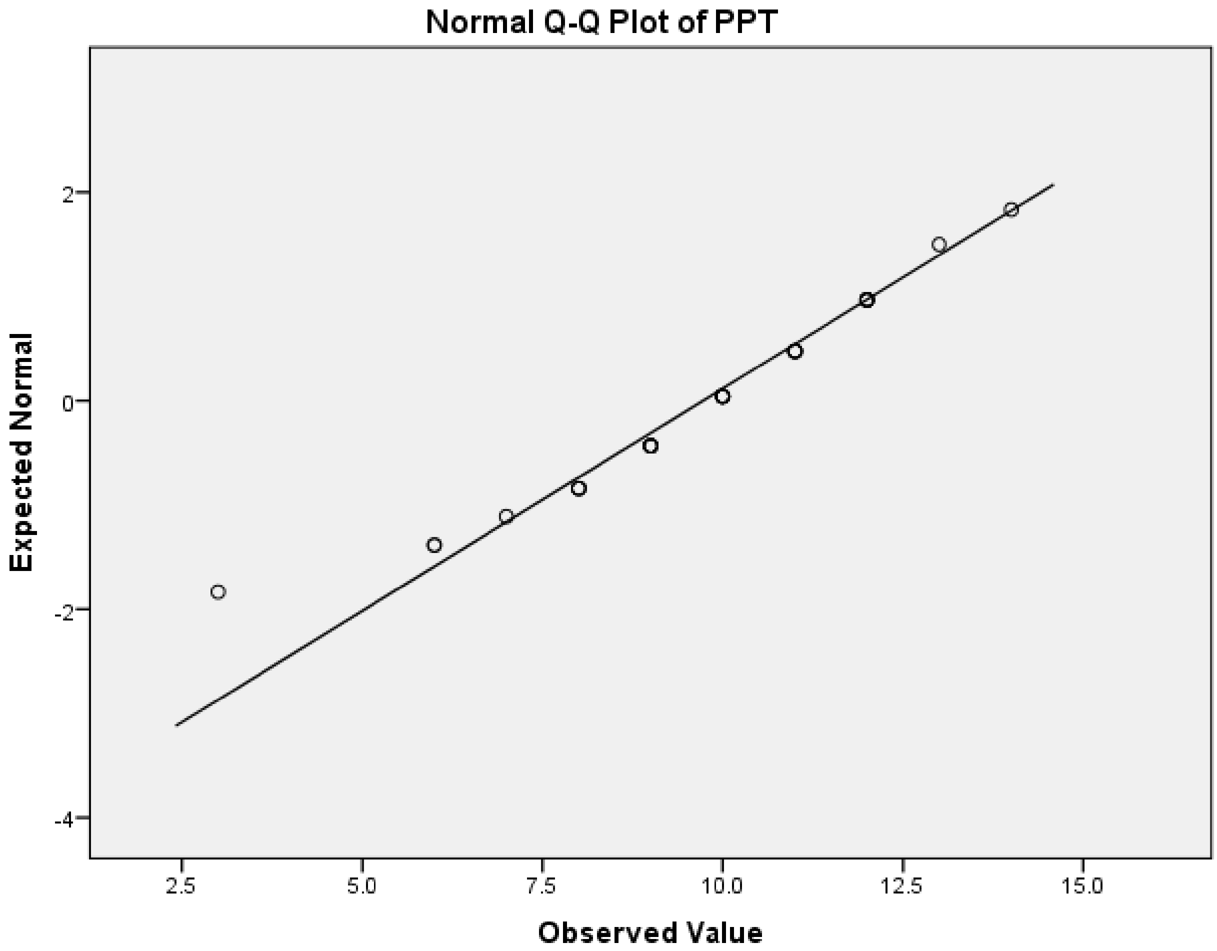
RPT

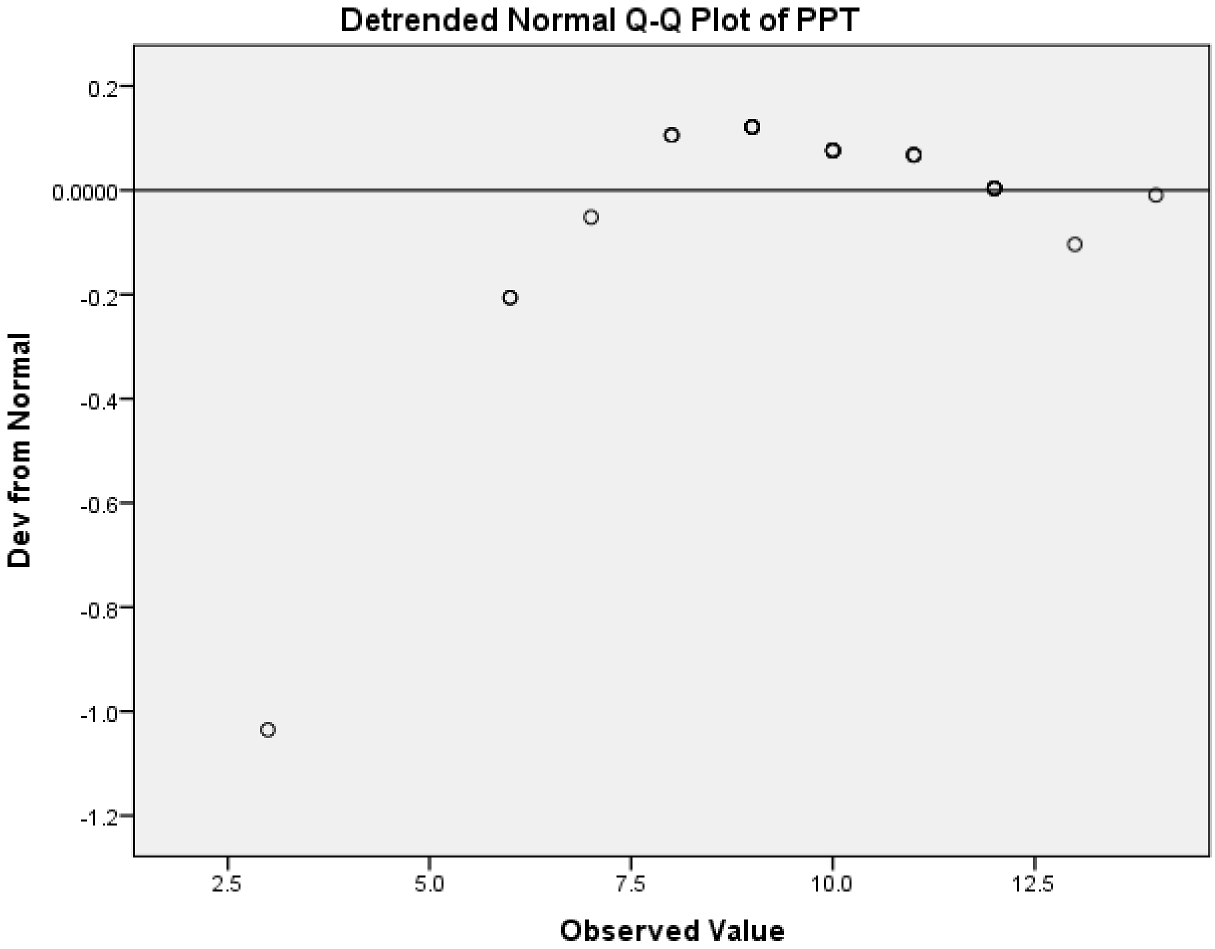

Normal Q-Q Plot of RPT
Expected Normal
Observed Value
2
1
0
-1
-2
-3
6
8
10
12
14
16
18
20

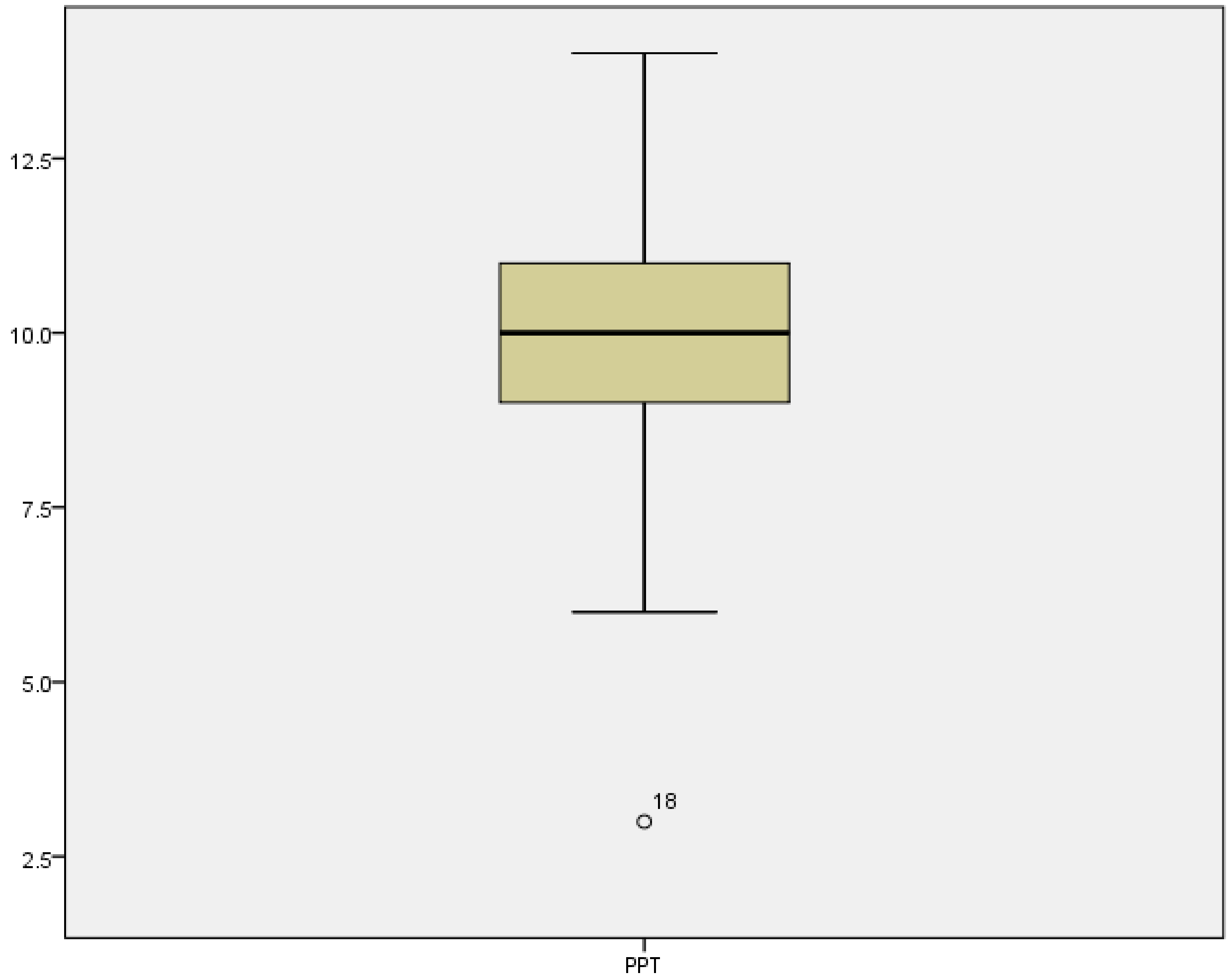

Detrended Normal Q-Q Plot of RPT
Dev from Normal
0.25
0.00
-0.25
-0.50
-0.75
-1.00
7.5
10.0
12.5
15.0
17.5
Observed Value



PPT


Normal Q-Q Plot of PPT
Expected Normal
Observed Value
2
0
-2
-4
2.5
5.0
7.5
10.0
12.5
15.0


Detrended Normal Q-Q Plot of PPT
Dev from Normal
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
2.5
5.0
7.5
10.0
12.5
Observed Value




```
GET
DATASET NAME DataSet2 WINDOW=FRONT.
DATASET ACTIVATE DataSet1.
RELIABILITY
  /VARIABLES=CM PE IPRO IPRE AT EA
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE CORR
  /SUMMARY=TOTAL.
```

Reliability

Notes

Output Created		19-SEP-2017 19:04:31
Comments		
Input	Data	C:\Users\abdelbasset\Documents\viewer files for data Bristol\Ex1_EG1_survey correlation_sept.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.

Syntax		RELIABILITY /VARIABLES=CM PE IPRO IPRE AT EA /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE CORR /SUMMARY=TOTAL.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.326	.296	6

Item Statistics

	Mean	Std. Deviation	N
CM	14.07	3.150	29
PE	15.59	2.982	29
IPRO	13.00	2.521	29
IPRE	13.90	2.144	29
AT	13.59	2.009	29
EA	10.93	2.282	29

Inter-Item Correlation Matrix

	CM	PE	IPRO	IPRE	AT	EA
CM	1.000	.300	.279	.165	.185	-.208
PE	.300	1.000	.185	.373	.179	-.513
IPRO	.279	.185	1.000	.211	.092	-.155
IPRE	.165	.373	.211	1.000	.156	-.199
AT	.185	.179	.092	.156	1.000	-.069
EA	-.208	-.513	-.155	-.199	-.069	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CM	67.00	32.000	.327	.159	.114
PE	65.48	36.330	.232	.373	.214
IPRO	68.07	38.567	.276	.112	.191
IPRE	67.17	40.291	.319	.167	.182
AT	67.48	43.401	.231	.060	.243
EA	70.14	62.695	-.397	.270	.576

```
DATASET ACTIVATE DataSet2.
RELIABILITY
  /VARIABLES=Q1 Q2 Q3 Q4 R1 R2 R3 R4 S1 S2 S3 S4 T1 T2 T3 T4 U1 U2 U3 U4 V1
V2 V3 V4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created	19-SEP-2017 19:17:55

Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Survey Reliability\survey reliabilit_EG1_29_sts_r_8_26.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1 Q2 Q3 Q4 R1 R2 R3 R4 S1 S2 S3 S4 T1 T2 T3 T4 U1 U2 U3 U4 V1 V2 V3 V4 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.03

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.826	24

```
RELIABILITY
  /VARIABLES=Q1 Q2 Q3 Q4 R1 R2 R3 R4 S1 S2 S3 S4 T1 T2 T3 T4 U1 U2 U3 U4 V1
V2 V3 V4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		19-SEP-2017 19:19:06
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Survey Reliability\survey reliabilit_EG1_29_sts_r_8_26.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.

Syntax		RELIABILITY /VARIABLES=Q1 Q2 Q3 Q4 R1 R2 R3 R4 S1 S2 S3 S4 T1 T2 T3 T4 U1 U2 U3 U4 V1 V2 V3 V4 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.802	24

/COMPRESSED.
RELIABILITY
/VARIABLES=Q1 Q2 Q3 Q4
/SCALE('ALL VARIABLES') ALL
/MODEL=ALPHA.

Reliability

Notes

Output Created		19-SEP-2017 19:33:34
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Survey Reliability\survey reliabilit_EG1_29_sts_r_8_06.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>

	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1 Q2 Q3 Q4 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Scale: ALL VARIABLES

Case Processing Summary

	N	%

Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.799	4

```
RELIABILITY
  /VARIABLES=R1 R2 R3 R4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created	19-SEP-2017 19:34:01
Comments	

Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Survey Reliability\survey reliabilit_EG1_29_sts_r_8_06.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=R1 R2 R3 R4 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.691	4

```
RELIABILITY
  /VARIABLES=S1 S2 S3 S4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		19-SEP-2017 19:34:23
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Survey Reliability\survey reliabilit_EG1_29_sts_r_8_06.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=S1 S2 S3 S4 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.802	4

```
RELIABILITY
  /VARIABLES=T1 T2 T3 T4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		19-SEP-2017 19:34:50
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Survey Reliability\survey reliabilit_EG1_29_sts_r_8_06.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=T1 T2 T3 T4 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.697	4

```
RELIABILITY
  /VARIABLES=U1 U2 U3 U4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		19-SEP-2017 19:35:11
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Survey Reliability\survey reliabilit_EG1_29_sts_r_8_06.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=U1 U2 U3 U4 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.

Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.806	4

```
RELIABILITY
  /VARIABLES=V1 V2 V3 V4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		19-SEP-2017 19:35:40
Comments		
Input	Data	C:\Users\abdelbasset\Desktop\New Data Analysis_All\Survey Reliability\survey reliabilit_EG1_29_sts_r_8_06.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	29
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.

Syntax		RELIABILITY /VARIABLES=V1 V2 V3 V4 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.736	4