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THE RELATIONSHIP BETWEEN TECHNICAL HIGH SCHOOL BRAZILIAN STUDENTS' WORKING MEMORY CAPACITY, PRE-READING ACTIVITIES, AND INFERENCE GENERATION IN READING COMPREHENSION IN L2

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Esta Tese foi julgada adequada para obtenção do Título de "Doutora em Estudos da Linguagem" e aprovada em sua forma final pelo Programa de Pós-Graduação em Inglês.

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To my family, for all their love and support.
To my son, João Augusto, who made me stronger, happier and more fulfilled than I could have ever imagined.

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I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I—
I took the one less traveled by,
And that has made all the difference.

(The Road Not Taken - Robert Frost)

ABSTRACT

This research aimed at investigating whether there is a relationship between Technical High School Brazilian students' Working Memory capacity, the use of pre-reading activities, and inference generation in reading comprehension in L2**.** A group of 36 students from the third year of the Technical High School Course (*Técnico em Agropecuária Integrado ao Ensino Médio*) at *Instituto Federal do Rio Grande do Sul (IFRS)*, *Campus Sertão*, participated in this study. Participants were mostly beginner/ pre-intermediate speakers of English as an L2. The instruments used in this study were a reading proficiency test; the Reading Span Test (RST); four pre-reading activities; two texts, being one narrative and one expository text; the Pause Protocol; two sets of comprehension questions (one for each text); a reader's profile and a retrospective questionnaire. Participants were divided into two groups, according to the pre-reading activity developed (Group I was exposed to the pre-reading activity only previous to the expository text, while Group II was exposed to the pre-reading activity only before the reading of the narrative text, but not the expository one). Participants' WMC was assessed through the RST. Participants' reports from the Pause Protocol were transcribed and their utterances were categorized in accordance with Narvaez et al.'s (1999) Inference Categorization Model. Moreover, participants' answers in the reading comprehension questions were analyzed and scored. Participants' answers from the reader profile and retrospective questionnaires were also helpful in clarifying this study's results. Data were analyzed both qualitatively and quantitatively, and the main results show that WMC positively correlates with reading comprehension, and also with explanatory inferences, which are strictly connected to reading comprehension. Furthermore, this study provides evidence to the claim that narratives are easier to comprehend than expository texts, because participants' performance was better on the reading comprehension questions related to the narrative text, when compared with the expository one. More skilled readers presented the greatest incidence of explanatory inferences, which is associated with reading comprehension. Findings also confirm the importance of the use of pre-reading activities, that in this study activated readers' schemata and increased reading comprehension. Furthermore, the use of pre-reading activities positively influenced the number and quality of the inferences generated by participants**.** It is believed that as inference generation helps students to construct meaning from texts, understanding how low and high span

readers generate inferences, and how inference generation affects comprehension can help teachers to assist their students, aiding them to become more proficient readers. Moreover, understanding the importance of pre-reading activities for reading comprehension and inference generation and also their possible effect on reducing the demands on working memory capacity during reading may help teachers to prepare classes that better fit the student's needs.

Keywords: Reading Comprehension; Working Memory Capacity; Inference Generation; Pre-reading Activities; Schema Theory.
Number of pages: 235 (470 with appendices)
Number of words: 67.635 (excluding appendices)

RESUMO

Esta pesquisa teve como objetivo investigar se existe uma relação entre a Capacidade de Memória de Trabalho de estudantes do Ensino Médio Técnico, o uso de atividades de pré-leitura e a geração de inferências na compreensão leitora em L2. Um grupo de 36 alunos do terceiro ano do Curso Técnico em Agropecuária Integrado ao Ensino Médio do Instituto Federal do Rio Grande do Sul (IFRS) - Campus Sertão participaram deste estudo. Os participantes eram, majoritariamente, falantes iniciantes / pré-intermediários de inglês como L2. Os instrumentos utilizados neste estudo foram um teste de proficiência em leitura; o Teste de Capacidade de Leitura (*Reading Span Test*); quatro atividades de pré-leitura; dois textos, sendo um narrativo e um expositivo; o Protocolo Pausa; dois conjuntos de perguntas de compreensão (um para cada texto); um perfil do leitor e um questionário retrospectivo. Os participantes foram divididos em dois grupos, de acordo com a atividade de pré-leitura desenvolvida (o Grupo I foi exposto à atividade de pré-leitura apenas antes de ler o texto expositivo, enquanto o Grupo II foi exposto à atividade de pré-leitura apenas antes de ler o texto narrativo, mas não o expositivo). A Capacidade de Memória de Trabalho dos participantes foi avaliada através do Teste de Capacidade de Leitura (*Reading Span Test*). As verbalizações realizadas pelos participantes durante o Protocolo de Pausa foram transcritas e categorizadas de acordo com o Modelo de Categorização de Inferências proposto por Narvaez et al. (1999). Além disso, as respostas dos participantes às perguntas de compreensão foram analisadas e avaliadas. As respostas fornecidas pelos participantes no perfil do leitor e no questionário retrospectivo também foram úteis para esclarecer os resultados deste estudo. Os dados foram analisados de forma qualitativa e quantitativa, e os principais resultados mostram que a Capacidade de Memória de Trabalho se correlaciona positivamente com a compreensão leitora e também com inferências explicativas, que estão diretamente ligadas à compreensão. Além disso, este estudo fornece evidências que textos narrativos são mais fáceis de compreender do que textos expositivos, visto que o desempenho dos participantes foi melhor nas perguntas de compreensão relacionadas ao texto narrativo, quando comparadas ao expositivo. Os melhores leitores apresentaram a maior incidência de inferências explicativas, que está associada à compreensão leitora. As conclusões também apontam para a importância do uso de atividades de pré-leitura, que neste estudo ativaram os esquemas dos leitores e aumentaram a compreensão. Além disso, o uso de atividades de pré-

leitura influenciou positivamente a quantidade e a qualidade das inferências geradas pelos participantes. Acredita-se que, uma vez que a geração de inferência auxilia os estudantes na construção de significado a partir de textos, entender como leitores com diferentes capacidades de memória de trabalho geram inferências e como a geração de inferências afeta a compreensão pode auxiliar os professores a tornar seus alunos leitores mais proficientes. Além disso, entender a importância das atividades de pré-leitura para a compreensão e geração de inferências, além de seu possível efeito na redução das demandas de capacidade de memória de trabalho durante a leitura, pode ajudar os professores a preparar aulas que melhor se adaptem às necessidades dos alunos.

Palavras-Chave: Compreensão Leitora; Capacidade de Memória de Trabalho; Geração de Inferências; Atividades de Pré-leitura; Teoria dos Esquemas.
Número de Páginas: 235 (470 com os anexos)
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LIST OF ACRONYMS

ASS – Association (inference kind)
EEG – Electroencephalography
EFL – English as a Foreign Language
ESP – English for Specific Purposes
ET – Expository Text
EV - Evaluation (inference kind)
EXP – Explanation (inference kind)
IFRS – Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul
IG – Inference Generation
IT – Incorrect Translation (inference kind)
KCB – Knowledge-Based Coherence Break (inference kind)
L1 – First Language; Mother Tongue
L2 – Second Language
LD – Level of Difficulty
M – Mean
N – Number of Participants
NT – Narrative Text
OSPAN – Operation-word Span Test
p level – Probability Level (_)
PF – Performance
PPGI – Programa de Pós-Graduação em Inglês UFSC
PRED – Prediction (inference kind)
r – Pearson's correlation coefficient
RCQ – Reading Comprehension Questions
RCP – Reading Comprehension Perception
RQ – Research Question
*r*s – Spearman's correlation coefficient
REP – Repetition (inference kind)
RST – Reading Span Test
TA – Translation Attempt (inference kind)
TCLE – Termo de Consentimento Livre e Esclarecido
TCB – Text-Based Coherence Break (inference kind)
UFSC – Universidade Federal de Santa Catarina
WM – Working Memory
WMC – Working Memory Capacity

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CHAPTER 1
INTRODUCTION

Research is formalized curiosity.
It is poking and prying with a purpose.
- Zora Neale Hurston -

The influence of an individual's working memory capacity (WMC) on the accomplishment of higher order cognitive tasks has been extensively researched. There has also been a considerable increase in the number of studies related to the inference generation process, especially in the past thirty years. However, studies that investigate the relationship between individuals' WMC and the generation of inferences still need research, especially because most investigations regarding WMC and inference generation were carried out concerning L1, not second (L2) or foreign languages[1](FL). Likewise, despite the fact that researchers have demonstrated interest in determining the circumstances in which particular inferences are generated, as well as the effects of readers' individual characteristics on inferential activity (Narvaez, van den Broek & Ruiz., 1999), the latter has not received the same amount of attention.

Furthermore, among inference generation research, the narrative type of text as stimuli has been much more investigated than the expository one. Moreover, a small number of studies have compared the effects of both text types on inference generation, and even fewer have investigated the effect of an individual's WMC on the generation of inferences when reading narration *vs.* exposition.

Additionally, the context of Technical High School courses, as well as the use of pre-reading activities and their influence on readers' inference generation and reading comprehension still need investigation and discussion. Therefore, there is a need for studies that verify whether the use of pre-reading activities has any influence in the inference generation and reading comprehension of Technical High School students.

Regarding the afore mentioned prospect, the need of filling these gaps is the motivation of this study, which aims at investigating how students' WMC and the use of pre-reading activities affect their

[1] Throughout this research the terms *Second Language*(L2) and *Foreign Language* are going to be used interchangeably to refer to a language that is learned by an individual after the mother tongue has already been acquired.

inference generation and reading comprehension, more specifically regarding Brazilian students enrolled in a Technical High School course.

1.1 CONTEXT OF INVESTIGATION

This research is inspired by the developments in the reading area, especially regarding the fields of inference generation, schema theory, reading comprehension and their relationship with WMC. This study is especially interested in the context of Technical High School, which is a special kind of course, that focuses on preparing High School students for the job market, or at least give them an advantage in their major. Students enrolled in Technical High School have full time classes, both from the regular curriculum (such as Mathematics, Geography, Portuguese, Chemistry and English, for example) and some special subjects related to their future career field (Agriculture and Livestock, in the case of the participants of this study).The main focus of *Institutos Federais* (Federal Institutes) - which is the institution in which participants of this research study - is, according to Vidor, Rezende, Pacheco and Caldas (2011):

> To promote social justice, equity, sustainable development with a view to social inclusion, as well as the search for technical solutions and the generation of new technologies. These institutions should respond, swiftly and effectively, to growing demands for professional training, the dissemination of scientific knowledge and support for local productive arrangements (p. 49-50, my translation).[2]

Taking into consideration the crescent growth of *Institutos Federais* in Brazil, this study intends to propose an interface between empirical research and classroom practice, with a focus on Technical High School subjects. It aims at investigating whether there is a relationship between Technical High School Brazilian students' WMC,

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[2] *O foco dos Institutos Federais é a promoção da justiça social, da equidade, do desenvolvimento sustentável com vistas à inclusão social, bem como a busca de soluções técnicas e a geração de novas tecnologias. Essas instituições devem responder, de forma ágil e eficaz, às demandas crescentes por formação profissional, por difusão de conhecimentos científicos e de suporte aos arranjos produtivos locais.*

the use of pre-reading activities, and inference generation in reading comprehension**.**

1.2 SIGNIFICANCE OF THE STUDY

As regards the significance of this research, although the correlation between WMC and reading comprehension has been extensively researched in L1, there is still a lack of studies regarding second or foreign languages, especially the ones that investigate the influence of WMC on L2 inference generation and reading comprehension. Furthermore, the use of pre-reading activities on Technical High School contexts still needs investigation. Therefore, this research intends to contribute to the understanding of the role of WMC and the use of pre-reading activities on Technical High School Brazilian students' inference generation and reading comprehension.

In addition, although there is a great number of studies that investigate inferential processes in reading comprehension and discourse processing, there are several issues which remain open to debate and further discussion (Goldman, Graesser & van den Broek, 1999), among which is the need of research using expository texts as stimuli, as opposed to narrative texts, which have been extensively investigated. For this reason, this study intends to use both expository and narrative texts as stimuli, in order to compare their effects on inference generation and reading comprehension.

Concerning pedagogical implications, as inference generation helps students to construct meaning from texts, understanding how low and high span readers generate inferences, and how inference generation affects comprehension can help teachers to assist their students, aiding them to become more proficient readers. Furthermore, understanding the importance of pre-reading activities for reading comprehension and inference generation and also their possible effect on reducing the demands on WMC during reading may help teachers to prepare classes that better fit the students' needs.

Furthermore, it is expected that this research will contribute to the existing research on individual differences in WMC and reading performance, not only in the educational area, but also areas like discourse comprehension, text and computational linguistics, and psycholinguistics, providing findings that contribute to a better understanding of the reading comprehension process.

CHAPTER 2
REVIEW OF THE LITERATURE

You don't write because you want to say something;
you write because you've got something to say.
- F. Scott Fitzgerald -

This chapter provides an overview of the theoretical framework underlying this research, which aims at verifying whether there is a relationship between Technical High School Brazilian students' WMC, the use of pre-reading activities and inference generation and reading comprehension. The first part presents the most important aspects related to reading in an L2, followed by a review regarding the most prominent reading models. Next, a discussion regarding reading comprehension and the steps involved in its achievement are going to be addressed, as well as the importance of pre-reading activities for comprehension and recall. Afterwards, schema theory is going to be presented and explained. The definition of inference and its importance for reading comprehension is going to be presented subsequently, followed by an overview of the inference taxonomies mostly encountered in the reading literature. In the sequence, the issue of working memory capacity will be discussed, with an emphasis on its relation with inference generation and reading comprehension. And finally, the most relevant studies as regards WMC, inference generation and reading comprehension are going to be reviewed.

2.1 READING IN L1 AND L2

Reading is for most people an activity carried out so easily that is sometimes taken for granted (Grabe, 2009). However, it is far from being simple. It is, in fact, a very complex cognitive activity. It involves, among other cognitive processes, the reader's ability to connect background knowledge with the information presented in the text in order to construct a coherent mental representation of its content, so that comprehension is achieved (Kintsch & van Dijk, 1978).

Reading is frequently defined as the result of an interactive process between the reader and the text, in order to construct meaning (e.g. Anderson & Pearson, 1984; Davies, 1995; Eskey, 1998; Kintsch & van Dijk, 1978; Rumelhart, 1977; Rumelhart, 1981; Tomitch, 2003; Urquhart & Weir, 1998, among others). However, this definition does not cover the complex process that happens in the readers' minds while

they are reading, that is, what happens in the readers' minds from the moment they visualize the words on the page until comprehension is achieved. Investigating these reading mechanics has been the focus of reading researchers, especially over the past thirty years. Dehaene (2009), for example, claims that proficient readers tend to believe that just by looking at a word their brain access the meaning of that word effortlessly and at a single step. However, that is not what really happens. According to him:

> The brain does not go straight from the images of words to their meaning. An entire series of mental and cerebral operations must occur before a word can be decoded. Our brain takes each string apart, then recomposes it into a hierarchy of letters, bigrams, syllables, and morphemes. Effortless reading simply serves to show that these decomposition and recomposition stages have become entirely automatic and unconscious. (p. 289)

As previously mentioned, for the purpose of the present study and in agreement with most literature in the area, reading is understood as a meaning construction process, which is the result of the interaction between a reader and a text (Anderson & Pearson, 1984; Davies, 1995; Eskey, 1998; Kintsch & van Dijk, 1978; Rumelhart, 1977; Rumelhart, 1981; Solé, 1998; Tomitch, 2003; and Urquhart & Weir, 1998). Nevertheless, as in any other life situation, some circumstances are necessary for an interaction to take place, among which is the need that participants share similar interests, space, and/or language. Regarding this matter, Davies (1995) defines reading as a cognitive or mental process where a reader - who is distant in time and space from the writer - tries to follow and react to a message originated by him/her. In this scenario, the text is the only element connecting reader and writer. However, it is well acknowledged among reading researchers (van den Broek, Rohleder & Narvaez, 1994; Halliday, 1973, as cited in Cohen, Glasman, Resenbaum-Cohen, Ferrara & Fine, 1998; Urquhart & Weir, 1998, among others) that a text is never the same for the reader and the writer (and not even for a same reader when it is approached a second or further time), due to their different world knowledge. In the case of reading in an L2, the reader and writer are also distant in relation to their language and culture, bringing one more issue to this interaction

between reader and text, which is not going to be further addressed here but is an important aspect to be reflected upon.

Having defined reading, it is important to highlight that decoding the information presented in a text is far from the same as comprehending this same text. In this sense, reading comprehension, which can sometimes be difficult in an individual's native language, tends to become even harder in an L2. When it comes to the issue of whether reading skills can be transferred from the L1 to the L2, reading specialists are divided into those who suggest that L1 and L2 poor readers' reading strategies are basically the same (Block's, 1986, as cited in Clapham, 1996) and those who argue that some reading skills are transferred automatically to the second/foreign language, and that proficient L2 readers are able to read texts just as native readers do (Coady, 1979). However, according to Coady (1979), L2 poor readers are not able to use some high level skills like inferencing and prediction, due to an inability to decode the language, which prevents them from achieving satisfactory comprehension.

Reading has been extensively researched in the past years, with studies being conducted in areas that vary from cognitive psychology to computer science. The empirical results derived from these studies have been used to build theories about what happens in people's brains from the moment they face the print on the page until comprehension is achieved. As a result, these theories have been employed by teachers in general, improving the quality of their L2 reading classes, and consequently students' proficiency level.

2.1.1 Reading models and their influence on ESL classes

Reading models try to portray what happens in the readers' minds when they are comprehending or miscomprehending a text. Devine (1998) defines reading models as "a set of assumptions about what happens when a reader approaches a text, that is, the ways a reader derives meaning from the printed material" (p. 127). Despite the obvious difficulty of the observation of the reading process, as it happens in the readers' minds[3], many studies have been trying to examine and understand it, leading to the elaboration of different reading models. The three main reading comprehension models are: the bottom-up model, the top-down model and the interactive model.

[3] Except when using brain imaging resources, which make it possible to observe what happens in the readers' brains while they are reading.

The following paragraphs are organized in order to explain these three major reading models, their reflection on the teaching of reading as an L2, as well as the importance of the selection of the best model for the reading classes' success.

2.1.1.1 The bottom-up model

Gough (1972) proposed that reading happens in a bottom-up manner, that is, from the lowest to the highest level, meaning that the reader constructs textual meaning from the smallest units (letters to words, to phrases, to sentences, and so on), adjusting previous background knowledge and current predictions based on the information presented in the text (Carrell,1998). The main criticism on this reading model is that excessive attention to a lower level source of information overloads working memory, thus compromising the higher level sources of information which are mandatory to meaning construction (Davies, 1995).

According to Carrell (1998), there are two major areas of classroom instruction designed to improve L2 readers' bottom-up decoding skills: cohesive devices of English, and their function across sentences and paragraphs (in order to make students attentive to the way ideas are unified by these cohesive elements), and vocabulary development (by means of pre-reading activities that teach key words for sets of passages to be read afterwards, among others).

The primary focus of bottom-up strategies is on the meaning of words, sentence syntax or text features associated with attending to lower level signals. Scanning, paraphrasing, looking for key words or sentences and guessing unknown words are examples of these strategies (Juan & Madrid, 2009). However, as stated by Eskey and Grabe (1998), a good classroom approach with emphasis on this reading model should encourage students to abandon the 'word-by-word approach to reading', and induce them to read in 'meaningful chunks'.

Eskey and Grabe (1998) also claim that "the major bottom-up skill that readers of a second language must acquire is the skill of reading as fast in that language as their knowledge of it will allow them to, in relation to their reading purposes" (p. 234), and it is the teacher's role to help them in this path towards reading fluency.

2.1.1.2 The top-down model

The top-down model was proposed by Goodman (1970), who describes reading as a "psycholinguistic guessing game", where readers make predictions about the text based on their previous knowledge, constructing meaning while these predictions are confirmed or refuted throughout the text. As it can be observed by the definition, reader's expectations play a very important role in the reading comprehension process in this approach. Urquhart and Weir (1998) claim that after Goodman's model, learning reading has become much more interesting, as readers started to have a more dynamic role in the reading process. Because texts are seen as incomplete, readers' background knowledge is necessary to fill them up.

It was also after the top-down model that the notion of an interaction between the reader and the text (Rumelhart, 1977; Kintsch & van Dijk, 1977; Rumelhart, 1981; Anderson & Pearson, 1984; Davies, 1995; Eskey, 1998; Urquhart & Weir, 1998; Solé, 1998; and Tomitch, 2003, among others) was brought to light. However, this model also has weaknesses, especially because although its data was collected from L1 beginners, the findings were generalized to elucidate the reading behavior of proficient readers. Furthermore, the model was also applied to L2 reading, without taking into account its particularities, such as lack of language exposure, the learners' ages, among others (Bernhardt 1991, as cited in Davies, 1995). Another criticism on the top-down model is its assumption that more skilled readers guess more than the less skilled ones. In fact, good readers are less dependent on context than the poor ones, but what distinguishes them is the ability of the former to decode in a faster and more accurate way (Urquhart & Weir, 1998).

In a nutshell, bottom-up models portray reading as a mechanical decoding process, while top-down models see the reader as an active and essential part the of reading process, with emphasis on the reader's expectations about the information on the text. Grabe (2009) acknowledges, as regards the top-down models, that these models "assume that the reader actively controls the comprehension process, directed by reader goals, expectations, and strategic processing" (p.89). According to the author, a criticism of this model is that it does not account for the mechanisms used by readers to generate inferences, which are "a prominent feature of top-down models as is the importance of reader's background knowledge" (p.89).

The main focus of top-down strategies is on the text gist, schemata and discourse organization, associated with attending to

'higher level cues'. Identifying key ideas, integrating spread information, drawing on inference or recognizing text structure are examples of these strategies (Juan & Madrid, 2009).

According to Carrell (1998), the available research on the area suggests that it is possible to improve students' reading by helping them build background knowledge on the topic prior to reading, through appropriate pre-reading activities. These activities, as stated by the author, can perform a dual role, not only activating existing background knowledge, but also building new one.

A more realistic reading model, which is somehow a combination of the bottom-up and the top-down models, was proposed by Rumelhart in 1981, and was one of the first and most prominent interactive models.

2.1.1.3 The interactive model

The interactive model received this name because it assumes that the component processes of decoding, literal comprehension and inferential comprehension may occur in parallel, combining textual and background information. In addition, the information sources (visual, orthographic, lexical, semantic, syntactic and schematic) are simultaneously used, which is different from bottom-up models that proposed that the reading process was sequential, where a stage had to be completed for the next one to begin. According to Aebersold and Field (1997), the interactive model moves from bottom-up to top-down, depending on factors such as: the readers' previous knowledge, the level of language proficiency, the text type, the students' level of motivation, their ability to use strategies, and their beliefs.

Because it was able to integrate bottom-up and top-down concepts, the interactive model is still the most prominent reading model both in L1 and L2. This reading model made it possible to better comprehend the reading process of both fluent and less skilled readers. Moreover, the interactive model seems to be the most adequate for L2 reading, considering that less fluent readers may need to put the same amount of effort both in decoding and making predictions, so as to comprehend a text (Eskey, 1998).

A classroom approach based on this reading model would see the student as an indispensable and unique part of the reading comprehension process. As this model sees reading as an interaction between the reader and the text, each text would have many different interpretations, and the reader would have a more dynamic role in the process.

In addition, a classroom approach with focus on this reading model would see poor readers as word-bound, who are not able to use context, or are afraid to do so (Eskey & Grabe, 1998). The implication of such approach would be that for many texts, a reader with little linguistic knowledge or familiarity with the topic would not be able to make predictions. Also, Samuels and Kamil (1998) mention that it would be easier for a fluent reader to recognize words than to generate predictions in a text.

According to Eskey and Grabe (1998), reading classes must devote time for both bottom-up and top-down concerns. As regards the former, the authors mention "rapid and accurate identification of lexical and grammatical forms" (p.27); in relation to the latter, "reading for global meaning (as opposed to mere decoding), developing a willingness to take chances, and developing appropriate and adequate schemata for the proper interpretation of texts" (p.227) are mentioned. Also, the authors state that any kind of reading must be treated as reading for meaning construction, and no student should be required to limit him/herself to simple decoding skills.

The implication of such approach would be that when developing bottom-up and top-down skills, the successful reading comprehension of texts is going to be achieved, since both models, when working together, produce a much better output than when developed alone.

It is important to highlight that both models are equally important to the reading comprehension process, not only in L1, but also for L2 language learners, since "bottom-up processing ensures that the listeners/readers will be sensitive to information that is novel or that does not fit their ongoing hypothesis about the content or structure of the text;", while " top-down processing helps the listeners/ readers to resolve ambiguities or to select between alternative possible interpretation of the incoming data" (Carrell & Eisterhold, 1998, p. 77).

Another issue to which attention should be drawn is that good and poor readers have different approaches to texts, so while skilled readers are able to shift from bottom-up to top-down, depending on their reading purposes and text genres, less fluent readers tend to overrely in only one direction processes. This overreliance can be on bottom-up processing (text-boundedness) or top-down processing (schema interference) and can cause several difficulties for L2 readers (Carrell, 1998). The causes of such overreliance can be of many kinds, and the teacher has to be aware of them, in order to help students to become more skilled readers.

It is true that successful reading involves much more than decoding, but the importance of the bottom-up model to the understanding of the reading process as a whole cannot be neglected. According to Eskey (1998), when it comes to L2 reading teaching, not only the right background knowledge must be provided by the teacher for any text (together with the encouragement for the students to make use of that knowledge when reading), but the accurate decoding must also be part of the reading comprehension process. As affirmed by Aebersold and Field (1997), "reading teachers need to develop the ability to analyze top-down and bottom-up components of the reading process" (p.19), because understanding how their own reading process operates and how it differs among people, teachers will be able to anticipate the types of process and possible problems that students will face (Aebersold & Field, 1997).

The interactive model assumes that both lower level and higher level processes are equally important for reading comprehension to take place (Carrell, 1998). Both lower level and higher level processes are contemplated in Gagné, Yekovich and Yekovich (1993) model. According to the authors, reading comprehension involves two kinds of knowledge: (1) the *declarative knowledge*, that is the knowledge about letters, phonemes, morphemes, words, ideas, schemas and topics, that is, conceptual understanding; and (2) the *procedural knowledge*, that is related to the skills and strategies necessary for reading comprehension. The procedural knowledge is the knowledge of 'how to' read, that includes decoding and literal comprehension, which are considered low-level processes, and inferential comprehension and comprehension monitoring, which are considered high-level processes.

For the above mentioned reasons this study is going to be supported by the concepts of the interactive model, assuming that the reading comprehension process is the result of an interaction between the reader and the text and that the reader's background knowledge play as an important role in comprehension as the information presented in the text.

The following section is going to address a discussion as regards reading comprehension and how it is achieved, with emphasis on the active role of the reader.

2.2 BUILDING COMPREHENSION

When it comes to L2 learning, reading comprehension is one of the major issues, as it involves the readers' ability to read the text and to

connect the content with his/ her background knowledge.

Reading is nowadays seen as a constructive language process, as opposed to a receptive one, where meaning is built through the interaction between reader and text, as previously mentioned (Rumelhart, 1977; Kintch & van Dijk, 1977; Rumelhart, 1981; Anderson & Pearson, 1984; Davies, 1995; Eskey, 1998; Urquhart & Weir, 1998, among others). As claimed by Goodman (1998), the reading process is believed to start with the print on the page, set by the writer, and to end with meaning, which is constructed by the reader, based on his/ her background knowledge. Goodman (1998) also claims that this interaction between reader and writer is surrounded by language and thought, since "the writer encodes thought as language and the reader decodes language to thought" (p. 12). Taking this statement into consideration, it is possible to assert that each text that is read is not a single text; each text is, in fact, at least two: it is the text the writer intended to write, and it is, at the same time, the text the reader is going to understand, based on his/her previous knowledge. Therefore, not all meaning understood from a text is actually there, that is, the reader's background knowledge, through the interaction with the text, constructs meanings that sometimes were not the same the author had in mind when writing the text. Clarke and Silberstein (1977) also highlighted the role of the reader in constructing meaning from text stating that "more information is contributed by the reader than by the print on the page" (p.136-137, as cited in Carrell & Eisterhold, 1998, p.75). As regards this issue, Anderson et al., (1976, as cited in Anderson & Nagy, 1989) state that:

> A word does not have a meaning, but has, rather, a family of potential meanings. When comprehended in context, the meanings of the words in an utterance are further articulated in a process of inferential interpolation based on schemata which embody one's knowledge of the world. The effect with respect to nouns is usually to limit the scope of reference to a subset of the cases which would otherwise be denoted. If the context is rich and if the message is processed deeply, a noun may be identified with a single real or imagined thing. This process will be called instantiation ... [A] close analysis will show that a word can have a somewhat different sense in each use. (p. 667)

In the same vein, Devine (1998) claims that meaning construction depends on the interaction between the reader's background knowledge and the information presented in the text. Koda (2008) seems to share this view when she states that comprehension is "a meaning-construction process, involving integral interaction between text and reader" (p.254). Following the same direction, Halliday (1973) argues that the text itself only has 'meaning potential', which implies that readers' interpretation is probably not going to fully correspond to the one envisaged by the writer when writing the text. Moreover, different readers are going to interpret a same text distinctively, because it is not possible for two people to share the exact same previous knowledge; additionally, a same reader may also interpret a text differently when reading it a second or further time, due to his/her new experiences, which are going to bring a new light to the subject. Also regarding the possibility of numerous interpretations, Urquhart and Weir (1998) argue that:

> Texts do not have unitary meanings potentially accessible to all, they rather allow for variety in interpretations by different readers, governed by factors such as purpose, background knowledge, and the relationship established between the reader and the writer. (p.112)

Therefore, it is possible to claim that meaning is dynamic, making it virtually impossible to be predicted by the writer, because it can differ from reader to reader, and even to a same reader when reading the text a second or further time. The levels of representation involved in reading comprehension are the topic of the next sub-section.

2.2.1 Reading comprehension levels of representation

The objective of this section is to define and discuss the levels of representation that are involved in, and are responsible for reading comprehension, that is, the surface structure, the textbase and the situation model.

In order to read and comprehend a text, readers construct mental representations of its smallest units (words and sentences) and also of the situations the text represents (Zwaan, Graesser & Magliano, 1995). These representations are constructed based on the reader's previous knowledge related to the text's topic and structure. Contemporary

models of discourse comprehension propose that there are at least three levels of representation involved in the comprehension of a text: the surface structure, the textbase level and the situation model (van Dijk & Kintsch, 1983, Zwaan, 1994; Kneepkens & Zwaan, 1995, among others).

The surface structure level of representation "represents the exact form of a text, for example, its wording and syntactic structure" (Zwaan, 1994, p. 920). It comprises the grammatical aspects, the style and the rhetorical means (van Dijk & Kintsch, 1983).

Kintsch and van Dijk's (1978; 1983) *discourse comprehension model,* which is an important reference in the field, is interested in the applicability of the model from the sentence level to more global levels of discourse, rather than with more automatic levels of text processing such as decoding, recoding, matching, lexical access, and parsing.

van Dijk and Kintsch (1983) present a framework that includes two kinds of mental representations that are believed to be constructed while someone is reading a text: at the microlevel, the model discusses the textbase, which "is a mental representation of the text that a reader or listener constructs in the process of comprehension" (p.88), while at the macrolevel, the model presents the situation model, which is "a mental representation of the situation described in the text" (p.88). The textbase, according to Graesser, Millis and Zwaan (1997) "contains explicit text propositions in a strippeddown form that preserves meaning, but not the exact wording and syntax."(p.167)

Propositions are defined as "an intentional unit, corresponding to the meaning of a sentence in linguistic theory and to the conceptual representation of a sentence in a cognitive model of language comprehension (van Dijk & Kintsch, 1983, p. 112). Propositions represent the processing of the text sentences, at a local level, and their integration in order to achieve local coherence (Kintsch & van Dijk, 1978). Local coherence can be defined as "a property of discourse which is defined in terms of semantic relationships between the successive sentences of the discourse (Kintsch & van Dijk, 1978, p. 150). At a global level, propositions can relate to broader aspects of the text, that is, theme or discourse topic (Kintsch & van Dijk, 1978; van Dijk & Kintsch, 1983)

The textbase level of representation also comprises some inferences that are necessary for local coherence. Concisely, the textbase represents the meaning of the text at the microstructure level, i.e., the meaning portrayed in the individual propositions of the text.

The situation model is the representation of what the text is about, and is described as a representation of a 'state of affairs' referred to by the text (van Dijk & Kintsch, 1983). The situation model encompasses previous textbases and general experiences related to similar situations (van Dijk & Kintsch, 1983). It is related to the macrostructure level, that is, the global meaning of the text. Graesser et al. (1997) claim that "the situation model is the content or the microworld that the text is about" (p.167) and ensure that this microworld is built through the interaction of the content of the text with readers' previous knowledge. Hence, the situation model is the result of textual information and background knowledge. This interaction between textual information and previous knowledge is what allows readers to make inferences, which can be seen as links among two or more propositions.

Having briefly discussed the levels of representation involved in reading comprehension, it is important to mention that not all surface information is kept active in working memory, due to its limited capacity, which is going to be discussed more deeply on Section 2.6.

Together with WMC constraints, Kintsch and van Dijk's (1978) model also take into consideration another construct that is believed to be mandatory for reading comprehension and is important to the purpose of the present study: schemata. Schema theory is going to be further addressed in the next section (2.3), but it is important to highlight its relevance in controlling the local and global processes involved in the construction of a mental representation of the text. Processing of text information is facilitated when text information is somehow related to reader's background knowledge. In fact, there are activities which can help students to construct better mental representations of the text to be read, among which are the pre-reading activities, which are designed to activate students' relevant schemata related to the topic of the text. An overview of schema theory and the importance of pre-reading activities for comprehension are going to be addressed in the next Section.

2.3 SCHEMA THEORY

Considering that reading is a constructive process, as previously mentioned, comprehension is constructed by readers through the representations they build, based on their background knowledge, that is, the schemata stored in their memory. Rumelhart (1981) defines schemata (the plural of schema) as "the building blocks of cognition". According to this author, real world experiences are represented in an

individual's memory as schemata, and these concepts are important for information processing, linguistic input interpretation, remembering, action organization, and processing flow guiding.

Tomitch (1988) cites the example of the 'going to the supermarket' schema. Getting the products, waiting in line, paying for the items, etc., are all part of the same schema and is part of an individual's implicit knowledge. Tomitch also mentions that schemas are not the same for everyone. In this sense, a schema for having lunch, for example, is distinct for a housewife, who has to cook her food before eating it (her schema probably includes washing and preparing the ingredients, cooking, setting the table, eating and washing the dishes); for a rich person, who has his/her food prepared by someone else (his/her schema probably includes only sitting at the table and eating); for a construction worker, who brings his/her food to work (the schema probably includes cooking food on the day before, putting it in an appropriate recipient, and heating it before eating); and for someone from a culture where it is necessary to hunt his/her own food (whose schema would probably include hunting, cooking and eating), among others.

Therefore, just as we naturally activate our 'going to the supermarket' or 'having lunch' schema when we need them, it is also important that we activate, as readers, the relevant schema, in order to be able to comprehend the written material. The role of schemata in reading comprehension is referred to as 'schema theory' (Rumelhart 1981; Carrell & Eisterhold, 1983).

Figure 1, on the net page, is an example of how schemata might help readers understand a text. It is an exercise to be used with ESP (English for Specific Purposes) students. The focus of an ESP class is on students' reading skills, so that they become proficient enough to understand written material related to their field of education. The objective of Figure 1 is to show students that even though they do not know a word in German, it is possible to comprehend the text based on images, cognates and schemata.

Figure 1: *ESP Exercise as an example of the importance of schemata for reading comprehension*

Figure 1 above portrays the image of a restaurant, from which readers probably are going to deduce that *Lusiada* is the name of the business place. It is also possible to identify some cognates that facilitate the reading, such as *Berlin* and *Tel*. As regards the working hours and days, it is possible to recognize them based on previous knowledge about Brazilian working hours. The picture presents three different working hours, which are probably Monday through Thursday; Friday and Saturday, and the last one is Sunday. Such inference is only possible because of the previous knowledge that when restaurants have different opening and closing times, it relates to weekdays and weekends. This kind of exercise is interesting to be presented at the beginning of the English course so that students become aware that it is not necessary to know all the words in a text to understand the message. The importance of vocabulary knowledge is undeniable; however, background knowledge is equally important.

According to Ajideh (2006, p.5), schemata are activated in one of the following ways:

> 1. New information from the outside world can be cognitively received and related to already known information stored in memory through retrieval or remembering. In this case, new concepts are assimilated into existing schemata which can be altered or expanded;
> 2. New information can be represented by new mental structures. In this case, in absence of already existing schemata, new knowledge builds up new schemata.

In both cases the reader tries to make sense of the content by trying to relate it to previously existing knowledge (Plastina, 1997, as cited in Ajideh, 2006). Pre-reading activities, which are going to be discussed later, may help students in this task.

As regards the context of L2 classes it is important to highlight that students should obviously have some linguistic knowledge in order to be able to understand the clues and access the relevant schemata. Nevertheless, according to Carrell and Eisterhold (1983), failure to access appropriate schemata is constantly interpreted *only* as a language problem. 'Schema Theory' proposes that three factors may interfere in text comprehension:

> 1) The readers may not have the appropriate schemata. In this case he/she simply cannot understand the concept being communicated. 2) The reader may have the appropriate schemata, but the clues provided by the author may be insufficient to suggest them. Here again the reader will not understand the text, but with appropriate additional clues, may come to understand it. 3) The reader may find a consistent interpretation of the text, but may not find the one intended by the author. In this case, the reader will "understand" the text, but will misunderstand the author. (Rumelhart, 1981, p.22)

In a nutshell, if readers do not have the relevant schema to understand the text, comprehension is probably not going to take place. If readers fail to activate the relevant schema they need more clues to help them to do so. At last, if readers and writers do not share the same background knowledge, readers will probably fail to understand the message that the writer intended to convey (Tomitch, 1988).

Bransford and Johnson's (1973) study is one of the most referred as regards this matter. They used texts in which participants had the necessary schemata to understand the text, but there were not sufficient cues so as to suggest which interpretation was the most appropriate. The following is an excerpt of one of the paragraphs used in one of their studies:

> The procedure is actually quite simple. First you arrange things into different groups. Of course one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step, otherwise you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at one time than too many. In the short run this may not seem important but complications can easily arise. A mistake can be expensive as well. At first the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then one can never tell. After the procedure is completed one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will then have to be repeated. However, that is a part of life. (p.400)

They observed that the text, which seemed extremely difficult at first, turned out to be considered very easy after participants were told that it referred to the instructions to washing clothes. Therefore, it is not that participants did not have the necessary schema related to washing clothes, but that the relevant schema was not activated due to lack of textual cues. In cases like this, some students may find the text incomprehensible, while others may activate any schema and try to make sense of the text based on it, even though not all textual information confirms their initial hypothesis as regards the appropriateness of the schema. At last, an example of "understanding the story but misunderstanding the author" is also mentioned by the authors: one of their participants was sure that the text was a description of his job (pushing papers) and was even surprised when he found out that the text was about washing clothes.

Therefore, language proficiency is not sufficient to comprehend a text. Knowledge regarding the grammar, structure and lexicon is not enough if the reader fails to grasp the meaning due to lack of relevant schemata or even lack of schemata activation, as stated by Tomitch (1988).

As previously discussed, in order to make sense out of texts readers need to be able to connect the content with their previous background knowledge. In this sense, Anderson and Pearson (1984) claim that "to say that one has comprehended a text is to say that she has found a mental 'home' for the information in the text, or else that she has modified existing mental home in order to accommodate that new information" (p.37). In order to be able to really comprehend a text, to find a 'mental home' for the information presented in a text, readers have to relate it to something they already know. Readers' background knowledge play a very important role in this process, because "what readers know essentially determines how much information can be extracted from the text" (Koda, 2008, p.188), which implies that the more a reader knows and is able to remember about the topic and structure of a text, the more inferences she/she is going to make, consequently improving comprehension and recall, the reason why the activation of the relevant schemata is so important. In the same way, Carrell and Eisterhold (1983) claim that the more a reader is able to rely on his/her background knowledge, the less he/she is going to need textual information to confirm his/her hypotheses.

2.3.1 The role of pre-reading activities in reading comprehension

According to Tomitch (2009), scholars in the area of reading recommend dividing the reading class in three phases: pre-reading, during reading and post-reading. In the *pre-reading phase*, students' previous knowledge about the topic of the text must be activated, so that students can connect what they already know with some of the additional information provided by the teacher, getting more prepared to read the text. The *during reading phase* involves the setting of objectives to guide the reading, and activities to check comprehension. At last, the *post-reading phase* is focused on connecting what has been learnt back to the students' context in order to strengthen learning, making it meaningful to their lives (Tomitch, 2009). Although it is possible to teach a reading class without following these steps, it is believed that this is the most effective way (Carrell & Eisterhold, 1998; Aebersold & Field, 1997; Grabe & Stoller, 2001; Tomitch, 2009).

One of the greatest challenges of an L2 teacher is to create a classroom environment that motivates students to read texts because they are interested in doing so, not because they have to. According to Williams (1987), providing students with texts and simply asking them to read is probably not going to generate the necessary level of motivation. The pre-reading phase plays an important role in engaging students into the reading task, making them interested on the topic and motivating them to read. Williams (1987) affirms that "the reading phase tries (i) to introduce and arouse interest in the topic; (ii) to motivate students by providing reasons for reading or helping them to specify their own reasons; (iii) to provide when necessary some language preparation for the text" (p.2).

It is common for an L2 teacher to listen to students complaining that they 'do not know anything', that they 'are not able to understand the text', among others. However, it is important that the teacher is aware that this feeling may not be related to language proficiency, but to knowledge related to the subject of the text, or even failure to activate the relevant background knowledge in order to understand the text. Pre-reading activities help students to activate or acquire the knowledge necessary for text comprehension, what facilitates the reading flow and is likely to elevate their level of motivation.

It is possible to encounter in the reading literature a great variety of pre-reading activities, which were developed so as to facilitate the activation of readers' relevant schemata. Among the most researched pre-reading activities are vocabulary pre-teaching, pre-questioning, and pictorial context. Taglieber, Johnson, and Yarbrough (1988) conducted a study which aimed at investigating the effects of these three pre-reading activities on the reading comprehension of L2 Brazilian students. Taglieber et al. (1988) affirm that the main objective of these activities is "to help EFL students overcome three major problems that interfere with their comprehension (a) lack of vocabulary knowledge, (b) difficulty in using language cues to meaning, and (c) lack of conceptual knowledge." (p.457). Results showed that the students that were submitted to the three pre-reading activities produced higher multiple choice scores than the ones in the control condition. In addition, despite the fact that vocabulary pre-teaching resulted in increased comprehension when compared with the control group, it was significantly less effective than the other two strategies.

Mihara's (2011) study questions the assumption that vocabulary teaching is less effective than pre-questioning and pictorial context. He investigated the effect of two pre-reading activities (vocabulary pre-

teaching and comprehension question presentation) on EFL Japanese students' reading comprehension. According to him "the use of the internet is one of the reasons why results from the 1980s should now be challenged" (p.52), because participants in his study were allowed to use the internet while using the pre-questioning strategy, differently to what happened in earlier studies. Despite the fact that Mihara questioned Taglieber et al.'s (1988) results, their findings were very similar. Results showed that "vocabulary pre-teaching is less effective for Japanese students, although students with higher English proficiency outperformed lower-level students regardless of which pre-reading strategy they used" (p.51). However, it is important to highlight that although vocabulary pre-teaching was less effective, it was the strategy mostly used by students (Mihara, 2011), which brings evidence to the importance of teaching students different reading strategies, so that they are able to select the most relevant ones according to the text type and reading purpose.

It is important to emphasize that the pre-reading phase is strictly connected with the reading phase, which, as previously mentioned, has as main objective "to enable the reader to extract relevant information from the text" (Williams, 1987, p.2), and the post-reading phase, that intends "to consolidate or reflect upon what has been read, and to relate the text to the learner's own language, or opinions" (p.2). Therefore, in order to motivate students and enable them to comprehend and critically analyze the texts they read, it is imperative that the teacher follows these three steps.

Pre-reading activities are pointed by Tierney and Cunningham (1984, as cited in Tomitch, 1988) as a means to access reader's prior knowledge and "provide a bridge between his knowledge and the text" (p.610). Therefore, it is the teacher's role to provide students with the necessary material to construct this bridge.

Because pre-reading activities help readers to activate prior knowledge, it is possible that they reduce the demands on working memory capacity during reading. Just and Carpenter (1992) claim that differences in processing efficiency are likely to be manifested regardless the demand of the task. However, differences in the total capacity or activation are likely to be more apparent in case of more demanding tasks. Texts preceded by pre-reading activities, for instance, can be considered less demanding for WMC than texts read without pre-reading activities to activate the relevant schemata.

As previously stated, pre-reading activities are believed to increase reading comprehension. Another factor that may contribute for

reading comprehension is the generation of inferences, which is going to be addressed in the following topic.

2.4 INFERENCE GENERATION

For the purpose of the present study the term inference refers to "any information about events, relations, and so on that the reader adds to the information that is explicitly presented in the text" (van den Broek et al., 1995, p.353). Koda (2008) complements this definition asserting that inference generation is a part of the reading process and is crucial for 'text-meaning construction'. When reading the sentence '*John fell on the floor. He stayed a whole week at home'* (Caldart, 2012), most readers are able to infer that John had to stay home because he got hurt when falling on the floor, and even that his accident was relatively serious, due to the period he had to stay home in order to get better. Baretta (2008) claims that the ability to generate inferences is "a constructive cognitive process in which the reader strives for meaning and expands knowledge by formulating and evaluating hypotheses about the information in the text"(p. 138).

An individual's life experience is always surrounding his/her thoughts and actions, even when one is not aware of that, and it is not different when it comes to reading. Grabe (2009) claims that humans' ability to generate inferences is part of their 'evolutionary survival skills', because in order to live in society it is necessary that individuals infer each other's actions, feelings, body expressions and even intentions. Therefore, inferencing is necessary in order to comprehend and interpret society. As regards reading, it is possible to assert that the ability to make inferences is also indispensable for comprehending and interpreting written texts. Narvaez (2002) acknowledges that a reader is not a *tabula rasa*, a "passive recipient of textual input" (p.158). On the contrary, readers connect everything that they read with their previous experiences, in order to make sense of the texts. A great amount of the inferences generated during reading reveal what is not on the text but is part of the readers' lives, which reflects their approach to and expectations about the text (Grabe, 2009).

As stated by van Dijk and Kintsch (1983) for reading comprehension to take place, the reader needs to construct an adequate mental representation of the message, connecting the information at both the local level[4] (microstructure), and the global level[5]

[4] The local level refers to the level of the sentences.

(macrostructure). Therefore, meaning construction is connected to the inferences generated by the readers, provided that these inferences prove the connections that integrate textual information, helping them to construct a solid mental model, which can lead to a better comprehension, retention and recall of the information previously read (Gerber & Tomitch, 2008). As texts are made of isolated pieces of information, the ability to make inferences is crucial for reading comprehension. In the inference generation process the reader relies on his/her memory of the previous sentences as well as on his/her background knowledge related to the content to establish a relationship among the sentences being read and the previous ones (van den Broek et al., 1994).

2.4.1 Inference categorizations

Discourse comprehension researchers have been developing taxonomies of inference types, accompanied by an attempt to define their roles in comprehension (see for example Graesser, Singer & Trabasso, 1994; van den Broek et al., 1994; Narvaez et al., 1999). It is currently possible to classify inferences according to their kind of function in discourse, i.e., whether their role is to establish local or global coherence (Graesser & Kreuz, 1993; van den Broek, Risden & Husebye-Hartmann, 1995, among others). Inferences can also be classified regarding whether they are generated *on-line* (during reading), or *off-line* (after reading).The first are called bridging inferences, and are mandatory for comprehension. The latter are called elaborative inferences, and are considered optional for understanding (O'Brien, 1995; McKoon & Ratcliff, 1992; Iza & Ezquerro, 2000, among others).Some of the basic distinctions between bridging and elaborative inferences are addressed below.

2.4.1.1 Bridging inferences

Bridging inferences are crucial for understanding, as they demand the sustaining of 'coherent text models' during comprehension. Koda (2008) states that it is mandatory that the reader identifies the semantic connection between items that seem unrelated, in order to successfully generate bridging inferences. Therefore, in order to understand the sequence:

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[5] The global level refers to the paragraphs or sections of the text.

a. Beverly ate a lot of candy.
b. The dentist found that she had five cavities.

(from Singer, 1995, as cited in Baretta, 2008) the reader needs to be able to see the connection between the two seemingly unrelated sentences. Albeit the word sugar is not cited, the reader needs to infer that candies are made of sugar, and sugar is the cause of teeth cavities. These connections are only possible because the reader makes use of his/her background knowledge in order to comprehend the text. Zwaan and Singer (2003) claim that "by identifying the links between the current and prior text, bridging inferences preserve text coherence" (p.101). If the reader is unsuccessful in connecting the two sentences by means of the 'bridge', the text is going to seem incoherent and disconnected.

2.4.1.2. Elaborative inferences

Elaborative inferences, conversely, are considered optional for comprehension, because they add pieces of information that are used for situation model construction, aiding the reader to go beyond what is explicitly stated (Koda, 2008). Even though elaborative inferences are not mandatorily made, they cannot be considered unimportant, because their generation "contribute[s] much to the global semantic coherence and are integral in discourse comprehension" (Koda, 2008, p.133). Likewise, elaborative inferences allow readers to go beyond what is explicitly stated in the text, being able to have a better understanding of the written material (Durgunoglu & Jehng, 1991).

When reading sentences *a* and *b* above, some readers may conclude that because she ate a lot of candy, Beverly is an overweight child, although this inference was not essential to understand the above-mentioned sentences, and may or may not be useful for comprehending the following ones. As elaborative inferences are based on individuals' previous knowledge, even though not all people that eat too many sweets are overweight, the world of the reader from the example is likely to include some who are. However, it is important to highlight that readers should always be cautious with the inferences they make, which have to be validated (meaning confirmed or refuted) in order to avoid miscomprehension.

Bridging and elaborative are among the most referred types of inferences, but there are many other categorizations proposed by reading researchers. An additional regularly addressed inference categorization

model proposes three kinds of inferences, based on textual causal relations. According to this model, associations are *backward inferences*, explanations are *concurrent inferences*, and predictions are *forward inferences* (Trabasso & Suh, 1993; Zwaan & Brown, 1996; Trabasso & Magliano, 1996; Narvaez et al., 1999; Magliano, Graesser & Trabasso, 1999; and Linderholm, 2002). A categorization model based on this taxonomy, which is the one employed in this study, is going to be addressed below.

2.4.1.3 Narvaez et al.'s (1999) inference categorization model

The Inference Categorization Model proposed by Narvaez et al. (1999) was based on two previous studies, carried out by Zwaan and Brown (1996), and Trabasso and Magliano (1996). Their Model includes but is not limited to the backward, forward and current inferences, previously mentioned. Therefore, besides *Associations*, *Predictions* and *Explanations* Narvaez et al.'s (1999) classification model also covers other kinds of statements readers can make during a think-aloud task, i.e., *Repetitions*, *Evaluations*, and two kinds of coherence breaks: *Text-based* and *Knowledge-based*. For the purpose of this study Narvaez et al.'s (1999) Inference Categorization Model is going to be adopted, as it has been used extensively in the literature of reading and inference generation (Trabasso & Suh, 1993; Zwaan & Brown, 1996; Trabasso & Magliano, 1996; Narvaez et al., 1999; Magliano et al., 1999; and Linderholm, 2002), and seems to cover most of participants utterances during a think aloud Protocol, as observed in this researcher's MA Thesis (Caldart, 2012).

Narvaez et al.'s (1999) Inference Categorization Model is presented in Table 1:

Table 1. Narvaez et al.'s (1999) inference categorization model

Inference Kind	Features
Explanations	Are related to the reasons why something happens, and include explanations based on background knowledge ("I think that is the cause of the ice age") and text-based explanations ("This must be what they meant by

	ash");
Associations	Provide information about characteristics and functions of people, objects and events in the text, including background associations ("This reminds me of a planetarium show I saw") and text-based associations ("Okay, this is in the spa");
Predictions	Refer to inferences about future consequences of a specific event ("Okay, the gases will lead them to the actual object");
Evaluations	Regard comments about the text content ("I think that's such a strong assertation"), the text writing ("That sentence was difficult to say"), or the reader's state ("I'm kind of losing track here, being distracted");
Text-based Coherence Breaks:	Relate to statements about the coherence of the text content ("That doesn't make any sense");
Knowledge-based Coherence Breaks:	Include statements regarding the readers' inability to understand as a result of knowledge or experience lack ("It's kind of hard to imagine, I mean, in space");
Repetitions	Regard repetitions of words or phrases in the text.

SOURCE: Narvaez et al. (1999, p.490)

Inference generation helps readers to comprehend written material, by connecting the information presented in the text to their background knowledge. If readers fail to make these connections, they may fail to remember and even to understand the text (Baretta, 2008;

Horiba, 2000; Linderholm & van den Broek, 2002; Trabasso Suh, Payton & Jain, 1995; Trabasso & Suh, 1993).

Among the major contributions of inference generation for reading comprehension are, according to Grabe (2009):

> (a) the ability to incorporate new information by connecting it with previous knowledge;
> (b) the capacity of making sense of decontextualized information;
> (c) the ability of synthesizing several pieces of information from many distinct sources;
> (d) being able to evaluate information, based on the reader's purpose; and
> (e) being able to understand information, even when it is not in accordance with previous expectations.

In a nutshell, inferencing is important because it helps to integrate diverse skills that are necessary to comprehend a text. However, there are some factors that affect inference generation during text processing, among which is text type, which is the topic of the next section, where the main features of narrative and expository texts are going to be presented.

2.5 NARRATIVE *VS.* EXPOSITORY TEXTS

Text type is used to "designate a kind of sequence that is theoretically defined by its composition linguistic nature (lexical aspects, syntactic aspects, verbal tenses, logic relations)" (Marcuschi, 2010, p.23 – my translation). Text types include narration, argumentation, exposition, description and injunction and cannot be confused with genres, which are much more numerically expressive and include novels, telephone calls, notes, spontaneous talks, shopping lists, manuals, among many others.

It is important to mention that the rhetorical structure of texts may change among languages and cultures. Grabe (2009) claims that distinct societies have different ways of carrying out social rules through texts, and therefore have distinct concepts of what counts as evidence, argument, and 'persuasive emphasis', the reason why "genres and their uses will vary between L1 and L2" (p.139).The same is believed to happen regarding text types, the reason why reading a narrative text in Portuguese is different when compared to other languages.

Koda (2008) also claims that "inasmuch as content information is differentially organized into distinct text types, text-structure knowledge heavily contributes to comprehension" (p.259). This claim is also true regarding the knowledge of the text structure in an L2, which means that the greater the knowledge regarding the L2, the greater is going to be one's knowledge about its linguistic features, what increases the probability of comprehension. Also according to Koda (2008) "it is likely that both L1 and L2 text-structure knowledge play a distinct, but equally important role in L2 text comprehension" (p.172), meaning that in order to comprehend a text readers rely both on their L1 and L2 rhetorical knowledge.

As previously stated, the specific linguistic features that make it possible to at least try to catalog genres are referred to as text types. For the purpose of this dissertation, only the narrative and expository text types are going to be approached and compared, because there is a need, in the field of reading comprehension, of studies that investigate and compare narrative and expository text types' influence on inference generation and reading comprehension.

Narratives are part of people's everyday lives in such a way that even preschool children are familiar with the sequence of events of stories. Narratives are necessary for social communication and share characteristics of real interaction, appealing to readers' common world, the reason why they are considered easier to be understood than other text types, not only in relation to comprehension, but also regarding readers' ability to recall textual information (Koda, 2008).

Koda (2008) argues that due to individuals' familiarity with the structure of narratives, no training is necessary for identifying them, which is not the case of non-literary text types as exposition and argumentation. Furthermore, adults' recall of narratives is generally much better, when compared to expository texts (Graesser, 1981; Koda, 2008).

The main characteristic of narratives is that they are stories which contain beginning, middle and ending, with the main objective of transmitting 'event-based experiences' from a speaker/ writer to his/her audience (Koda, 2008). Among the central components of narratives is the plot (the sequence of events within the story), the characters (those who perform the actions in the story), and the setting (the space and time in which events occur) (Thorndyke, 1977).

Expository texts, on the other hand, are not so intrinsically connected to individuals' everyday lives. While narratives are generally read for entertainment, with the intention of telling a story, expository

texts are unified texts that follow a logical sequence and are written to present facts and induce new insights on a specific topic (Koda, 2008).

The reason why expository texts are considered more difficult to comprehend and recall, when compared to narratives, is that most readers only have contact with this text type when they start going to school, and their contact with it is generally limited to a small number of texts read for study purpose. According to Koda (2008), learning from expository texts "entails reconstructing the message intended by the author and the necessary restructuring of existing knowledge bases" (p.178), once this text type hardly allows subjectivity.

As regards the subjectivity matter, expository texts are more explicit and do not allow as many possible interpretations as narrative texts. Schallert (1980) also addresses the subjectivity matter when he states that since an expository text "is designed to explain and elucidate a particular topic, the writer's job is to use the right words in the right way to constrain the readers' interpretive and constructive processes so that they will understand what the author intends" (p. 504). Thus, both writer and reader have very specific tasks when reading expository texts: the writer needs to be explicit and avoid subjectivity and ambiguity, while the reader needs to be aware of the features of the text type and genre, try not to make inappropriate interpretations, and always keep the reading purpose in mind.

Grabe (2008) presents a very interesting example on the issue of text interpretation: a manual for shutting down a nuclear reactor in case of overheating is the kind of genre that has very specific and objective instructions, so that readers interpret it equally. The single possible interpretation should be the one intended by the writer, in order to avoid any safety problems. On the other hand, when it comes to literary texts, as a poem or a novel, many distinct interpretations are allowed, due to the ambiguous and vague language used. In these cases, the interpretations might be similar or even very different from the writer's, but still valid, due to the nature of the genre.

Narvaez (2002) points out some reasons why different comprehension process should be expected when reading narrative and expository texts:

(a) Narrative texts tend to elicit more interest, the reason why the incidence of predictive and elaborative inferences is greater for narrative texts, when compared to expository ones;

(b) "Narratives activate schema and script structures that support inference generation" (p.166);

(c) Narrative texts elicit more inferencing (nine times as many inferences when reading a narrative when compared to exposition);

(d) Because they are part of people's everyday life since childhood, and because daily life is constructed similarly to a story, readers generally have more practice reading and making inferences about narratives (with characters, plot, among others);

(e) The structure of narrative texts is less variable than the structure of expository texts;

(f) "Narratives may rely more on familiar forms of causality than do expository texts, thus prompting more explanations and predictive inferences" (p.166).

Some of the most relevant studies that present evidence that narrative and expository texts are differentially processed are going to be detailed in Section 2.7.

Koda (2008) claims that the structure of the text (which is closely related to the text type) influences the generation of inferences, because "the specific ways text information is presented instigate particular processing procedures, requiring qualitatively different inferences" (Singer, 1994, as cited in Koda, 2008, p.133-134). According to this author, due to the fact that working memory is responsible for segmental information storage, the propositions to be joined need to be in close proximity to each other. Therefore, the text type seems to have a close relation not only with inference generation but also with the demands on working memory capacity, which is the topic of the next section.

2.6 WORKING MEMORY

Memory can be defined as "the relatively permanent record of the experience that underlies learning" (Anderson, 1995, p.5). The importance of memory for any cognitive task, especially for language is irrefutable (Baddeley & Hitch, 1974; Daneman & Carpenter, 1980, 1983; Turner & Engle, 1989; Baddeley, 1990; Shah & Miyake, 1999; Engle, 2002; Tomitch, 2003; Baretta, 2008, among others). As regards this matter, Baretta (2008) highlights that "without memory there would

be no records of words, sentences could not be produced, conversations could not take place" (p.46). She goes further claiming that "the act of reading would not be possible either, once there would be no records of written input, letters would not be recognized and texts could not be interpreted" (p.46). Therefore, the importance of memory to any human activity, especially the language-related ones, is easily deduced.

The role played by working memory in human cognition is equally undeniable (Daneman & Carpenter, 1980; Baddeley, 1990; Just & Carpenter, 1992; Tomitch, 2003; among others); from reading a book to solving complex mathematical problems, there is a need that not only the information presented is temporarily retained but that these pieces of information are processed at the same time, and that is where working memory comes to play.

Working memory is a concept originally proposed by Baddeley and Hitch, in 1974, and has been used since then to refer to individuals' capacity of not only storing information, as the short-term memory[6], but also processing the pieces of information that come from several sources. Working memory is defined as 'an arena of computation' (Just & Carpenter, 1992) where processing and storage functions compete for the system's capacity (Baddeley & Hitch, 1974; Daneman & Carpenter, 1980, 1983; Just and Carpenter, 1992). It is a multi-component system responsible for storage and manipulation of information during the performance of tasks considered cognitively complex, such as learning, comprehension and reasoning (Baddeley & Hitch, 1974; Daneman & Carpenter, 1980; Baddeley & Logie, 1999).

Baddeley and Logie (1999) mention that working memory allows people

> to comprehend and mentally represent their immediate environment, to retain information about their immediate past experience, to support the acquisition of new knowledge, to solve problems, and to formulate, relate, and act on current goals. (p.28)

Working memory is undoubtedly involved in L2 learning. Several pieces of research have shown that WMC is closely connected to one's ability to perform cognitive and language-related tasks (Juffs &

[6] For the purpose of this study, short-term memory and working memory are considered distinct constructs, although some researchers still equate both terms.

Harrington, 2011). There is also empirical evidence that individuals' ability to process and recall information is associated to their working memory capacity.

Claiming that individuals' capacity is a predictor of their performance in a task implicates affirming that WM is limited, and it is, in fact. It is important to highlight that although it may be difficult to come to a consensus as regards what limits WM, ancient and recent theories agree that it is transient and that its capacity is limited (Tomitch, 2003). Former theories claim that the limitation resides in the number of items that can be held at once. More recent theories believe that what is limited in working memory are the attentional resources available for information storage and processing. Ashcraft (1994, as cited in Tomitch, 2003) presents a very clear disambiguation of the two constructs (short-term memory and working memory) and their limited capacity; according to him short-term memory, as the name suggests, is too short, meaning that it does not last very long. Departing from the same reasoning, working memory implies, by the use of the active verb 'work' that it is dynamic and that all mental activity happens there. The limitation in the case of the WM regards "how much work can be done at one time, how much working memory capacity there is to share among several simultaneous processes" (Ashcraft, 1994, p.146, as cited in Tomitch, 2003, p.24).

The original model proposed by Baddeley and his colleagues (Baddeley & Hitch, 1974, 1994; Baddeley 1992; Baddeley & Logie, 1999) is a multicomponent model of working memory and is comprised of a control system of limited attentional capacity: the *central executive*, which is assisted by two 'slave' systems: the *phonological loop*, that processes verbal and phonological information; and the *visuospatial sketchpad*, which handles visual and spatial information. A fourth component was included in the model later on: the *episodic buffer*, which is where information is temporarily stored to be later reintegrated. (Baddeley, 2000)

Almost 40 years, and many pieces of research after Baddeley and Hitch first proposed their model, and it is still the most prominent and consistent model in the literature. Nevertheless, although the definition of working memory may be a consensus - that it refers to the system in charge of the temporary storage and processing of information necessary for the performance of cognitively complex tasks (Baddeley & Hitch, 1974; Cantor & Engle, 1993; Daneman & Carpenter, 1980, 1983; Masson & Miller, 1983; among others) - the perspectives under which it

is investigated differs, as well as the evidence provided by these studies (Baretta, 2008).

Baddeley (1992) states that WM research can be divided into two types: the first is based on the psychometric correlational approach, while the second is based on dual-task methodology and neuropsychological cases. The psychometric approach "concentrates on devising tasks which involve the processing and storage of information in working memory" (Tomitch, 2003, p.33). One example of these kinds of tasks is the Reading Span Test (RST) created by Daneman and Carpenter (1980), to be explained later. The other approach "makes use of dual-task methodology and evidence from neuropsychological cases, with the objective of analyzing the structure of the working memory system (Tomitch, 2003, p.33). Baddeley's research is included in this kind of study, which consists on the performance of tasks that involve simultaneous processing and storage of information.

As regards individual differences in WMC, the psychometric correlational approach claims that working memory capacity diverges among individuals and that these differences are good predictors of performance in cognitive tasks. According to this approach, individuals with larger WMC perform better on cognitive tasks than individuals with smaller WMC. The reason for such differences is that individuals with greater WMC are able to hold and process greater quantities of information which are significant for completing complex tasks, consequently being able to perform better at them (Whitney, Ritchie & Clark, 1991; McNamara & Scott, 2001).

2.7 WORKING MEMORY, INFERENCE GENERATION AND READING COMPREHENSION IN L2: RELATED STUDIES

Research on individual differences in WMC has found positive correlations with a wide range of higher order cognitive tasks, such as reading and listening comprehension (Daneman & Merikle, 1996); and enumeration (Tuholski, Engle & Baylis, 2001), learning to spell, following directions, notetaking, writing, and reasoning (Engle, Kane and Tuholski, 1999). Furthermore, Engle, Tuholski, Laughlin and Conway (1999), and Unsworth and Spillers (2010) observed high correlations between WMC and general fluid intelligence.

As regards the reading area, studies have found correlations between WMC and vocabulary learning from context (Daneman & Green, 1986); inference generation (Mason & Miller, 1983; Daneman & Carpenter, 1983; Whitney, Ritchie & Clark, 1991; Singer, Andrusiak,

Reisdorf & Black, 1992); resolution of lexical ambiguities (Miyake, Just & Carpenter, 1994); adjusting processing and strategies to fit reading purposes (Linderholm & van den Broek, 2002); strategy implementation for reading expository text (Whitney, Ritchie & Clark, 1991; Budd, Whitney & Turley, 1995); and text structure (Tomitch, 2003). The above-mentioned studies were all conducted in participants' L1.

On the other hand, studies conducted in L2 which presented WMC capacity correlations are found in much smaller quantity in the literature. These studies include correlation with: reading comprehension (Fontanini, 2007; Alptekin & Erçetin, 2009); main idea construction in L1 and L2 (Torres, 2003); reading inferential comprehension (Alptekin & Erçetin, 2010); writing performance (Bergsleithner, 2010); speech production (Fortkamp, 2000; Xhafaj, 2006; Prebianca, 2009; Finardi, 2009); and speech development (Weissheimer & Mota, 2009).

Reading, as already mentioned, is a very complex process. In order to read any piece of information many steps are involved: from lexical access, to ambiguity resolution (Miyake, Just & Carpenter, 1994) and inference generation (Singer & Ritchot, 1996), and working memory plays a vital role in any of these cognitively complex reading steps. Tomitch (2003) mentions some of the demands of WM storage, which include pragmatic, semantic and syntactic information, and propositions. The processing demands, on the other hand, include decoding, lexical access, parsing, inference generation and integration. Hence, in order for comprehension to take place it is necessary that a mental representation of the information previously read is kept in the reader's mind, at the same time that he/she processes the information currently being read (Just & Carpenter, 1992; Tomitch, 2003).

As regards text representation, Tomitch (2003) brings the issue of how difficult it is for a reader, considering storage and processing demands, to construct a meaningful textual representation during the reading process. Concerning this matter, Daneman and Carpenter (1980, p.450) explain that, while reading,

> the reader stores pragmatic, semantic and syntactic information from the preceding text and use it in disambiguating, parsing and integrating the subsequent text. Information can become part of working memory through several routes: it may be perceptually encoded from the text; it may be sufficiently activated so that it's retrieved from long-term memory; finally, it may be the output of a comprehension process. Information can be also lost from working memory, since its capacity is assumed to be limited.

Working memory capacity enables readers to maintain global themes, integrate text information, and derive the text main points (Daneman & Carpenter, 1980; Cantor & Eagle, 1993; Linderholm, 2002), the reason why individual differences in WMC play an important role in reading comprehension achievement (Just & Carpenter, 1992).

As inference making depends on the integration of different sources of information (from the text itself and from readers' background knowledge), WM storage and processing requirements of language comprehension are essential for the generation of inferences (Baretta, 2008). Of special interest for this research are the studies carried out concerning the relationship between WMC and individuals' ability to generate inferences, which can be bridging inferences (Singer et al., 1992; Singer & Ritchot, 1996; Linderholm & van den Broek, 2002; Virtue, van den Broek & Linderholm, 2006a; Baretta, 2008); elaborative inferences (Whitney, Ritchie & Clark, 1991); and inferences in general (Daneman & Green, 1986; Cain, Oakhill & Lemmon, 2004).

In Masson and Miller's (1983) study, they observed a great relationship between participants' ability to infer information not explicitly stated and their Reading Spans. Daneman and Green (1986) found out that high spans were more successful in making use of textual cues to infer the meaning of new words in the text. Whitney, Ritchie and Clark's (1991) findings provide evidence that WMC positively correlated with the kind of inference participants made while processing difficult narratives. Singer et al. (1992) observed that participants WMC correlated with their ability to provide bridging inferences in demanding contexts, especially when the sentences were distant in the text. In a subsequent study, Singer and Ritchot (1996) found out that higher spans

showed quantitatively distinct process as regards the generation of bridging inferences, and that their inference generation process was more automatic than their lower counterparts'. Baretta's (2008) study, at last, demonstrated that higher spans outperformed their lower counterparts in drawing bridging inferences while reading exposition, but that lower spans were better at generating bridging inferences while reading narrative texts. The explanation for such results may be that narrative reading is not as demanding as exposition reading, therefore, the expected performance differences did not arise.

Another issue that is important for the purpose of this study is the relationship between WMC and L2 reading. As regards the correlation between WM in L1 and L2, Osaka and Osaka (1992) investigated this issue with Japanese college students majoring in English. Using Japanese and English versions of RSTs they concluded that a great part of working-memory resources are shared across languages and its capacity is somewhat dependent of linguistic knowledge. Miyake and Friedman (1998), who also studied Japanese learners of English, also found a positive correlation between L1 and L2 working memory capacity, and concluded that WMC has an impact on complex sentence comprehension. As regards this matter Koda (2008) argues that "working memory provides a shared cognitive resource across languages" (p.202), making it possible to claim that individual differences in L2 reading can be accounted for both language-specific competences and skills that are not limited to just one of the reader's languages.

Regarding the role of WM in Second Language Acquisition, Wen and Skehan (2011) bring arguments that reinforce the important role WM plays in SLA:

> First, unlike first language acquisition which depends more on universal grammar (UG), SLA is generally considered to be constrained by general learning mechanisms (WM being one of these), so it is likely that WM plays an equal, if not more important role in SLA. Second, unlike the process of first language acquisition which is dominated by automatic processing, SLA is characterized by controlled processing, which naturally demands more cognitive resources, thus relying more on WM. (p.24)

Juffs and Harrington (2011), on the other hand, diminish the role of WM in L2 learning claiming that "although WM may indeed be a factor in explaining SOME variability among learners, other factors such as L1 and motivation may turn out in the end to be much more powerful explanatory variables in L2 learning" (p.146 – authors emphasis). In fact, it is well acknowledged that background knowledge and motivation are very important factors in L2 learning, but more studies are necessary before one can affirm that they are more important than WMC for the development of L2 proficiency.

Despite the fact that studies regarding the relationship between WMC and inference generation abound in the literature, they were mostly carried out in participants' L1. Therefore, there is still need of studies that investigate the correlation between WMC and inference generation taking into account the peculiarities of the participants' L2. Furthermore, as Koda (2008) points out, there is still a critical question unanswered as regards WM, which is "whether the construct alludes to differences in the working-memory resources themselves or to differences in the ability to use them efficiently" (p.203). Therefore, more studies are needed in order to help to answer that question, especially as regards Second or Foreign Languages.

A seminal study conducted by Trabasso and Magliano (1996) investigated the kinds of information available to consciousness during a reading comprehension task, and how they are used inferentially to build meaning from text. A conscious understanding model was proposed by the researchers, by means of a think-aloud method during the comprehension of narrative texts, assuming that "inference and memory processes function together in order to construct a coherent mental representation of a text" (p.255). Participants' verbalizations from the think-aloud protocol were transcribed, analyzed and categorized as *Paraphrases, Explanations* (concurrent inferences), *Association*s (backward inferences), *Prediction*s (forward inferences), or *Metacomments*. The clauses were also categorized in accordance with the WM operations involved: "(1) activation of relevant knowledge in working memory, (2) maintenance of information in working memory, and (3) retrieval of text prior thoughts from a long-term memory store" (Trabasso & Magliano, 1996, p.255). Findings indicated that *Explanations* are the basis of understanding. Besides, the less frequent incidence of *Predictions* supported the claim that "understanding is also expectation driven" (Schank & Abelson, 1977, as cited in Trabasso & Magliano, 1996, p.273).

Another referential study was conducted by Zwaan and Brown (1996), who investigated language proficiency (L1 and L2) and comprehension skill (L1) which are two factors that might influence situation-model construction. Twelve college students, native speakers of English and non-fluent speakers of French as a Second Language[7] participated in their study. Participants were instructed to think aloud while reading narratives in their L1 and L2, followed by a verb-clustering task. Zwaan and Brown assumed that four kinds of thoughts occur during thinking aloud, and categorized participants' reports according to these categories, which are *Paraphrases, Explanations*, *Association*s, and *Prediction*s. They predicted that the total number of inferences generated would be greater for L1 when compared with the L2, due to the fact that lower level processing would be more resource consuming for L2 comprehension. Additionally, they hypothesized that more *Paraphrases* would be observed in L2 comprehension than in L1. Their findings showed that a stronger situation model was built for the L1 texts than for the L2 texts. Furthermore, more *Explanations* were made for the L1 text than for the L2 text. In addition to that, a greater incidence of *Explanations* was made by skilled participants, who also constructed stronger situation models than their less skilled counterparts. According to Zwaan and Brown (1996):

> These results strongly indicate that a certain level of L2 knowledge and skill is necessary for L2 inference generation and situation-model construction so that L2 comprehension performance is not solely a function of general language-independent comprehension skill. (p.322)

The third seminal study in which the present research was inspired is Narvaez et al.'s (1999). They conducted a study on how inference generation and comprehension in reading was influenced by reading purpose (namely study and entertainment). Twenty undergraduate students, all native speakers of English randomly assigned to one of the two conditions (narrative or expository) participated in their study. Participants were instructed to read four texts, two aloud (one narrative text and one expository text) and two for comprehension measures (one narrative text and one expository text).

[7] None of the participants had more than 2 years of French classes, or had any relatives who spoke the language, and they had never lived in a French-speaking country.

The inferences generated during the think aloud protocol of the two first texts were evaluated and categorized according to a model based on Zwaan and Brown's (1996), and Trabasso and Magliano's (1996) studies. Participants also answered to comprehension questions about the other two texts. Results showed no correlation between reading purpose and comprehension. Think-aloud, on the other hand, was influenced by the reading purpose. Also, the study purpose increased the number of *Repetitions*, *Knowledge-Based Coherence Breaks* and *Evaluations*, which were less observed in the entertainment purpose condition. According to Zwaan and Brown (1996), "this pattern was stronger for the expository text than for the narrative text" (p.488), which probably indicates that not only the reading purpose, but also the text type influenced readers' inference generation process.

DuBravac and Dalle (2002) conducted a study regarding narrative and expository textual inferences in L2 reading. According to the researchers, it was clear that readers process narrative and expository texts differently in their L1 but the differences in L2 inference generation still needed research. Forty-seven undergraduate students, speakers of English as a Second Language, participated in the study. They were instructed to read two narrative and two expository texts and generate questions at specific points of each text. Afterwards, participants' questions were categorized under six types of questions. Results showed that more inferences were generated when reading the narrative texts, probably due to the nature of the texts, which are less explicit, leaving more gaps to be filled by the reader, in order to comprehend them. Fewer inferences were observed for the expository text, probably because they are generally written in an objective way, and then the responses for readers' questions are likely to be found in the text itself. Also, results showed that participants' comprehension of the narrative text was greater when compared with the expository one, probably due to the nature of the text type. Narrative texts tend to be easier to understand because they maintain a single tone through the text, while expository texts tend to shift from description, to definition, to analysis or commentaries on each paragraph, what may help readers to lose the track and miscomprehend the text (Graesser et al., 1994). In the case of L2 readers, it is more likely that global comprehension issues arise in narrative than in expository ones, while expository texts are more likely to create linguistic difficulties than the narrative ones (Bensoussan,1990, as cited in DuBravac & Dalle, 2002). Furthermore, according to DuBravac and Dalle (2002), "the fact that as miscomprehension increased textual questions increased suggests local

coherence to be a more significant problem in the expository texts than in the narrative texts" (p.227).

Baretta (2008) also carried out a study that investigated inference making while reading different text types (namely narrative and expository). She conducted an ERP (Event-Related Brain Potential) study, in order to check whether narrative and expository texts reading would lead to different inference generation. The participants of the study were fourteen male, undergraduate students, native speakers of English. Participants were instructed to read narrative and expository paragraphs and judge whether their final sentences were plausible considering the previous sentences. The findings include evidence that regarding semantic processing, exposition was more demanding than narration, whereas behavioral data showed that more inferences were generated when reading expository texts than when reading narrative ones. Results also showed that participants judged the last sentence suitability more accurately when reading expository paragraphs than when reading narrative ones. These findings do not corroborate previous ones, such as Graesser and Kreuz's (1993) and Trabasso and Magliano's (1996), that presented evidence that readers are more likely to generate inferences when reading narrative texts, due to the subjective nature of this text type. Baretta's (2008) findings were supported by Horiba (2000), who also observed that readers generated more bridging inferences when reading expository texts than when reading narrative texts. A suitable explanation for the results of Baretta's and Horiba's studies is the less demanding text type used in their experiments, when compared to the ones used in previous studies. According to Baretta (2008), the reading flow of narrative and of expository texts was probably very similar due to the fact that her research was conducted with undergraduate students, already familiarized with academic demanding material, and that the expository texts were adapted to the study purpose. Another relevant finding of this study was that narrative and expository texts were processed differently by the brain, as suggested by the data from the EEG (Electroencephalography).

In a nutshell, the above mentioned pieces of research were selected as a means of offering an overview of the most relevant studies that have investigated WMC, inference generation, and reading comprehension, both in L1, and L2. Among the studies reviewed are the seminal studies conducted by Zwaan and Brown (1996), Trabasso and Magliano (1996), and Narvaez et al. (1999), which investigated issues related to inference generation, and proposed the Inference Categorization Model adopted in the present study.

Many attempts to understand the correlation among WMC, inference generation and reading comprehension have been made, as it can be observed by the studies reviewed in this section, which are all extremely relevant for the present investigation, as they helped to clarify the results. In Chapter III the method adopted in this study is presented and detailed.

CHAPTER 3
METHOD

I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.
- Isaac Newton –

This chapter details the methodological procedures employed in this research. The *Objectives* are outlined in Section 3.1, followed by the *Research Questions* (Section 3.2). Section 3.3 presents the *Hypotheses* which were created based on the research questions. Section 3.4, *Research Design,* presents an overview of the design of the present study. Section 3.5 addresses the information regarding *Research Ethics,* such as the steps involved in collecting data with human beings in Brazil. Section 3.6 presents an overview of the *Participants* that were invited to take part in this research. The *Materials* used for data collection are detailed in Section 3.7 (being 3.7.1 *The Reading Proficiency Test*; 3.7.2 *The Stimuli;* 3.7.3 *The Pre-Reading Activities;* 3.7.4 *The Pause Protocol;* 3.7.5 *The Reading Span Test;* 3.7.6 *The Reading Comprehension Questions*; 3.7.7 *The Retrospective Questionnaire* and 3.7.8 *The Readers' Profile*). The *Procedures for Data Collection* are explained in Section 3.8. Section 3.9 focuses on the *Scoring and Statistical Procedures* as regards the tests used for data collection, with sub-divisions on the *Scoring of the Reading Proficiency Test* (3.9.1); the *Scoring of the RST* (3.9.2); *Inference Categorization* (3.9.3); and the *Scoring of the Reading Comprehension Questions* (3.9.4). At last, Section 3.10 presents the information as regards the *Pilot Study* that was conducted previous to the main study, with emphasis on the importance of piloting in order to try to avoid any greater problems during the conduction of the main study.

3.1 OBJECTIVES

The main objective of this research is to investigate, through the analyses of pause protocol verbalizations, RST scores and reading comprehension questions, whether there is a relationship between

Technical High School Brazilian students' WMC, the use of pre-reading activities, and inference generation in reading comprehension in L2**.**

In terms of specific objectives, the study intends to verify the influence of text type (exposition *vs.* narration) on inference generation and reading comprehension, the importance of pre-reading activities for reading comprehension and inferencing, and the influence of WMC and reading proficiency on inference generation and reading comprehension.

3.2 RESEARCH QUESTIONS

In order to pursue the aforementioned objectives, the following Research Questions (RQs) are proposed:

> **RQ1:** What is the influence of individual differences, namely reading proficiency and WMC, on Technical High School Brazilian students' inference generation process and reading comprehension?
>
> **RQ2:** Does the text type (narrative or expository) have any influence in students' inference generation? If so, what kinds of inferences are most frequently generated by these students when reading expository *versus* narrative texts?
>
> **RQ3:** Does the text type (narrative or expository) have any influence in students' reading comprehension?
>
> **RQ4:** Does the use of pre-reading activities have any influence on students' inference generation, that is, did the activities performed during the pre-reading phase influence the number and quality of the inferences generated by the participants?
>
> **RQ5:** Does the use of pre-reading activities have any influence on students' reading comprehension, that is, do students who experienced some kind of pre-reading activities performed better in the reading comprehension questions related to the text?
>
> **RQ6:** Is there a correlation between participants' reading comprehension and the number and quality of the inferences generated?

3.3 HYPOTHESES

Considering the above mentioned objectives and Research Questions, and based on previous studies and on the literature on the area, the following hypotheses are formulated:

→**Hypothesis 1a:** Participants' WMC is going to correlate positively with their scores in the reading proficiency test and in the reading comprehension questions.

→**Hypothesis 1b:** Participants' with higher WMC and better scores in the reading proficiency test are going to generate more inferences, especially *Explanations*, because according to Zwaan and Brown (1996), good and poor readers are distinguished by their ability to generate explanatory inferences during reading. As WMC and L2 proficiency are intrinsically connect with skilled reading, it is believed that these factors are going to play a role in the number and kind of inferences generated by the participants.

→**Hypothesis 2:** Taking into account that narrative texts are easier to understand than expository ones, according to evidence provided in the literature, readers are going to generate more inferences in general when reading the narration. As regards the types of inferences, it is expected that more *Explanations* and *Evaluation*s are generated when reading the expository text; and that *Association*s and *Prediction*s have the greatest incidence when reading the narrative text.

→**Hypothesis 3:** Also considering the evidence that narration is easier to comprehend than exposition, participants' scores in the reading comprehension questions are expected to be greater for the narrative text when compared with the expository one.

→**Hypothesis 4:** It is expected that the group that performed the pre-reading activity previous to the reading of the narrative text or the expository text generate more *Explanations* when reading the text type in question. Conversely, it is expected that the group that did not perform any pre-reading activity generate more *Evaluation*s, *Incorrect Translation*s, *Text-Based Coherence Breaks* and *Knowledge-Based Coherence Breaks* on the text they read with no pre-reading activity.

→**Hypothesis 5:** It is expected that the group that performed the pre-reading activity previous to the reading of the narrative text or the expository text have a greater performance in the reading comprehension questions related to that text, when compared to the other one. Conversely, it is expected that the group that did not perform any pre-reading activity have worse scores in the reading comprehension questions of the text they read with no pre-reading task.

→**Hypothesis 6:** It is expected that the students who generated more *Explanations* have better results when answering the reading comprehension questions. Also, it is expected that the greater the incidence of *Evaluation*s, *Incorrect Translation*s, *Text-Based Coherence Breaks* and *Knowledge-Based Coherence Breaks* the worse are going to be participants' scores in the reading comprehension questions.

In order to pursue the main objective of this study, which is to investigate whether there is a relationship between the Technical High School Brazilian students' WMC, the use of pre-reading activities, and inference generation in reading comprehension in L2**,** the following method is going to be employed and will be described below.

3.4 RESEARCH DESIGN

The present study is of mixed a design nature (Dörnyei, 2003), comprising both qualitative and quantitative aspects. Table 2 below presents an overview of the study design, which was defined after a pilot study, to be described in Section 3.10. There were 4 participants in the pilot study, and 36 participants in the study per se (which is the one addressed in Table 2 below). The data collection phase of the main study was carried out from August 1st to October 31st, 2016, at *Instituto Federal de Educação Ciência e Tecnologia do Rio Grande do Sul (IFRS) – Câmpus Sertão,* during three encounters, as described in Table 2, on the next page.

Table 2. Research Design

FIRST ENCOUNTER (GROUP)	SECOND ENCOUNTER (INDIVIDUAL)	THIRD ENCOUNTER (INDIVIDUAL)
✓ Study Presentation	✓ Instructions	✓ Instructions
✓ Consent Forms	✓ WMC Test	✓ Pre-Reading Activity (First Text)
✓ Reader Profile	✓ Recording of the RST	✓ Text 1 Reading
✓ Instructions		✓ Pause Protocol (Recording)
✓ Reading Proficiency Test		✓ Reading Comprehension Questions (Text 1)
		✓ Text 2 Reading (Without Pre-Reading Activity)
		✓ Pause Protocol (Recording)
		✓ Reading Comprehension Questions (Text 2)
		✓ Retrospective Questionnaire

The present research followed all the ethical procedures for data collection involving human beings, which is going to be explained in the following Section on Research Ethics.

3.5 RESEARCH ETHICS

This study was planned and executed taking into consideration the ethical principles, complying with the regulation established by the

Comissão Nacional de Ética em Pesquisa (CONEP) (National Research Ethics Committee) regarding research involving human beings, safeguarding research participants' rights, safety, health, and well-being, according to the guidelines presented in Resolution 466 (http://cep.ufsc.br/files/2010/06/Reso466.pdf).

The present study was analyzed and approved by the *Comitê de Ética em Pesquisa com Seres Humanos da Universidade Federal de Santa Catarina* (Ethics Committee for Research in Human Beings at *Universidade Federal de Santa Catarina),* under number 1.599.459, prior to the beginning of the data collection phase. The submission was carried through the online platform *Plataforma Brasil*[8], in accordance with the recommendations of *Conselho Nacional de Saúde* (National Board of Health).

The procedures for getting the authorization from the National Research Ethics Committee included the elaboration of Consent Forms to be explained to and signed by the institution representative, the participants and their legal representatives (when applicable). The Consent Forms aimed at explaining for the participants the objectives of the research, what they would be asked to do, confidentiality information, as well as the risks and benefits of the research, so that participants could make an informed decision about whether to participate in the study or not. The Consent Forms are available in the Appendices A1, A2 and A3.

Moreover, as regards research ethics and the importance of providing feedback to participants of studies, Dörnyei (2003, p.90) states that "[…] surveyors typically exploit their participants without offering anything in return - as soon as the data have been gathered, they disappear". Therefore, providing feedback is, besides a nice gesture, a way of preparing the ground for possible future research, according to the author. For this reason, after this dissertation is defended, participants are going to receive individual feedback as regards their performance on the tasks, as well as an electronic copy of the final version of the dissertation.

3.6 PARTICIPANTS

Originally, a group of 62 Technical High School students, from the *Técnico em Agropecuária Integrado ao Ensino Médio* course at *Instituto Federal do Rio Grande do Sul (IFRS)*, *Campus Sertão*, was

[8]Available at *http://aplicacao.saude.gov.br/plataformabrasil/login.jsf*

invited to participate in this study. They corresponded to the totality of students enrolled in the third (and last) year of the course, coming from three distinct groups (31, 32 and 33). Although 53 students initially showed interest in participating in the study (signing the Consent Form and providing their contact information), 13 ended up not being included in the study either because they were underage and repeatedly forgot to bring the Consent Form signed by their parents, or because they missed at least one of the encounters.

A total of 40 students agreed to take part in the research, from which 4 were designated for the Pilot Study (Section 3.10) and 36 for the Main Study. The criterion for the selection of students for the Pilot Study was that the first four participants who scheduled a meeting with this researcher were automatically part of the Pilot group.

Participants are all native speakers of Portuguese, 28 are male and 8 are female, between 16 and 19 years old. They were, in their great majority, beginner/ pre-intermediate speakers of English as a Foreign Language[9]. However, as the Reading Proficiency Test applied in this research (Sub-section 3.7.1) only measured reading skills, it is not possible to evaluate their other language abilities.

The choice for the above mentioned participants was due to the fact that they had already been enrolled in EFL classes for at least a year, as part of the Technical High School program. *Instituto Federal do Rio Grande do Sul (IFRS) - Campus Sertão* was chosen because I am a regular teacher there, making it easier to contact the students and collect data, besides being able to provide valuable findings to the institution.

Each participant received and read a copy of the *Termo de Consentimento Livre e Esclarecido* (Appendix A3), where all the objectives and steps of the research were detailed and explained. Participants who were underage received two documents, i.e., the *Termo de Assentimento Livre e Esclarecido* (Appendix A2) and the *Termo de Consentimento Livre e Esclarecido* (Appendix A3), which was signed by their legal guardians. These documents contained all information related to data collection and were approved by Brazilian Human Research Ethics Committee previous to the data collection, as previously mentioned in Section 3.5. The documents were read and doubts were clarified in the first meeting with this researcher.

[9] [9] The assumption that most participants were beginners and pre-intermediates is done based in how long and where they have been studying English, as well as in this researcher's experience as a teacher of the group.

The 36 participants for the main study were randomly assigned to one of the following two groups: Group I: Expository Pre-reading (ExpositoryPR), with 19 participants; and Group II: Narrative Pre-reading (NarrativePR), with 17 participants. Group I was exposed to the pre-reading activities previous to the reading of the expository text, but not to the narrative one; Group II was exposed to the pre-reading activities before the reading of the narrative text, but read the expository text without any activity. The reason why Group II (NarrativePR) has 17 participants and Group I (ExpositoryPR) has 19, instead of having 18 students in each group, as it would be expected, is that one of the participants from Group II participated on the three encounters, but had to leave in the last encounter before finishing the activities, saying that he would re-schedule to finish them. In fact, he scheduled and canceled some times, and until the end of the data collection phase he was unable to finish the remaining tests. If that participant had been able to participate, one of the groups would have 19 participants and the other one, 18. If I had known before that the participant would not come to finish the remaining tests, I would have separated the participants evenly.

3.7 INSTRUMENTS

According to Tomitch (2007), data triangulation using more than one methodology for data collection brings better results in research conduction, giving the researcher more confidence and providing more evidence to support conclusions. Dörnyei (2003, p.130-131) corroborates, stating that "the combination of qualitative-quantitative methodology designs can bring out the best of both approaches while neutralizing the shortcomings and biases inherent in each paradigm", the reason why this research uses more than one methodology for data collection, including both quantitative and qualitative material.

The instruments which were used in this study were a reading proficiency test, the Pause Protocol (Cavalcanti, 1989, adapted by Tomitch, 2003); two texts, being one narrative and one expository text, besides a practice text; a set of pre-reading activities; the Reading Span Test; two sets of comprehension questions (one for each text); a reader profile and a retrospective questionnaire, which will be described below.

3.7.1 The reading proficiency test

The reading proficiency test that was employed in this study (Appendix C1) was a compilation of reading exercises from two well-known EFL books, namely *Interchange* and *New English File*. As the objective of the test was to verify students' proficiency in *reading* in English, three criteria were employed in the selection of the texts that composed the Proficiency Test: (1) the texts were of general interest, concerning topics that students supposedly had some previous knowledge about; (2) as most students were supposedly beginner and pre-intermediate students of English as an L2, the texts should be in a level considered adequate for high school students, so that they could read them without many problems; (3) the reading comprehension questions were all objective (multiple choice or true or false) and were written in Portuguese, as the aim of this test was to check students' *reading* proficiency, and because, as previously mentioned, most participants were believed to be beginner and pre-intermediate students of English as an L2.

The texts chosen (Appendix C1) were *A Daily Grind*, which described the reasons why three students worked (to save money, go to parties and to buy a car, for instance), to which participants' were asked to check which reason corresponded to each person described. The second text was an e-mail, where a girl described her new neighborhood to a friend, and where students were supposed to check four things she could do in her new neighborhood. In the third text the writer described all advice people gave him regarding his health, and participants were asked to check which ones were mentioned in the text. The fourth and last text was entitled *The best public transport system in the world*, and described the public transportation system employed in Curitiba and modeled all around the world. The questions for this text were of the True (T), False (F) or Not Mentioned (N) kind.

3.7.2 The stimuli

The stimuli consisted of a narrative practice text (Appendix F1), and two texts for the data collection per se, being one narrative text (Appendix H1), and one expository text (Appendix K1). All texts were taken from the EFL High School book *Inglês: Série Brasil* (Marques, A., 2005). The criteria for the selection of the texts were the following:

(i) They should be texts from an English textbook that could be encountered in public schools in Brazil;
(ii) all texts should be from the same book, so that they supposedly have an approximate level of difficulty;
(iii) the texts for the data collection should be one narrative and one expository text;
(iv) the practice text could be of any genre; I selected a narration;
(v) the length of the texts should be similar, or it should be possible to shorten one of the texts without loss in terms of the content;
(vi) the texts should approach topics of general interest;
(vii) the texts should include topics that the students supposedly have some previous knowledge about;
(viii) the level of difficulty should be adequate for the participants of the study, that is, high school students, mostly beginners and pre-intermediate learners of English as an L2;

The practice text was a narration, and was entitled *A Day to Remember* (Appendix F1). It described an unusual day in a man's life, in which he got home from work to find a complete mess at his house, and ended up knowing that it only happened because his wife decided to do nothing that day. The inferences generated during the reading of the practice text were not categorized, because its purpose was to make participants familiar with the verbalization procedure, which was necessary for the Pause Protocol.

The texts used for data collection were a narrative text and an expository one, having an average of 250 words each. They had a language level considered adequate for the participants, who were, as previously mentioned, mostly beginner and pre-intermediate students of English as an L2. The topics of the texts were of general interest, involving subjects participants supposedly had some background knowledge about, but were not discussed in our English classes before[10], so that it was possible to check whether the pre-reading activity really helped to activate relevant schemata.

[10] The participants of this study were my students during the year previous to the data collection, and after selecting the texts which were going to be used as stimuli, I talked to the current English teacher, in order to make sure he had not presented the texts during his classes. As the majority of the participants only have English classes at IFRS, the chance that some of them would have read the texts outside school were really small.

The narrative text was entitled *Making a Difference* (Appendix H1), and described a dialogue between the narrator and a fisherman, who was curiously picking up starfish from the sand and throwing them back to the ocean. The man asked the fisherman why he was doing that if there are thousands of starfish in other beaches, so he would not be able to save them all and make a difference. The fisherman replied that it would be enough if he could make a difference to at least one starfish. The text has a message, that even the small attitudes can change the world, so if each person makes a small act like the fisherman's, all acts together could become something big.

The expository text was entitled *To Build a Bridge* (Appendix K1), and was about the gap that exists between the countries from the North and from the South, like if there was a hypothetical river dividing these two sides. It argues about the urge in building a bridge that could permanently connect these two sides, because the world has become much more interdependent and it is important that the rich countries help the poor ones, what would not make those countries much poorer and would really help the ones in need. It also points out that the decision to build such a bridge is political, and could be taken by selfless politicians.

As previously mentioned, the three texts were taken from the EFL High School book *Inglês: Série Brasil* (Marques, A., 2005). Although the texts were not adapted for the purpose of this study, the expository text had one of its paragraphs suppressed in order to have a similar number of words as the narration. The omitted paragraph was the following:

> The richer nations should not just send emergency aid: that is sending the boat across the river. If America, Japan or Germany, for example, established permanent research centers in the poor countries of Africa or Asia, these nations would be able to develop their own economic and social programs. Western know-how could be used to build up weak economies to enable them to become self-sufficient.

As the suppressed paragraph included another example of how the rich countries could help the ones in need (for the full text see Appendix K1), it is believed that the omitted information did not influence participants' understanding of the text.

3.7.3 The pre-reading activities

Pre-reading activities are an important part of a reading class, because they provide students with the knowledge they supposedly lack, but need, in order to understand a text. As regards L2 contexts, Ajideh (2006) claims that:

> Pre-reading activities may not just offer compensation for second language reader's supposed linguistic or socio-cultural inadequacies; they may also remind readers of what they already know and think – in other words to activate existing schematic knowledge (p.6).

In this sense, it is the teacher's role to provide students with the appropriate pre-reading activities to help them activate the schemata necessary for text comprehension. However, attention must be drawn to the fact that not all pre-reading activities may be beneficial for all reading students. Pre-reading vocabulary exercises for nonnative speakers, for instance, do not improve overall comprehension, according to the studies carried out by Hudson (1982) and Johnson (1982), the reason why the reading purpose must always be kept in mind when preparing the activities. Therefore, the pre-reading activities used in this study did not include vocabulary pre-teaching, because this kind of activity has been proven the least beneficial for comprehension, when compared to other pre-reading activities like pictorial context and pre-questioning (Hudson, 1982; Johnson, 1982; Taglieber, Johnson & Yarbrough, 1988; Mihara, 2011; Azizifar, Roshani, Gowhary & Jamalinesari, 2015).

The pre-reading activities employed in this study were developed based in Moore, Readence e Rickelman (1983), including activities that intended to make participants curious about the texts, activate their previous knowledge related to the topic being discussed, and elaborate hypotheses regarding the texts to be read.

The pre-reading activities (see Appendices G1 and J1) included a visual activity for each text. For the narrative text two videos from *Youtube* were presented, that were somehow linked to the topic of the text: *how important it is to do good*, even if it does not seem to make a big change in the world. For the expository text, five cartoons related to its topic were presented, intending to start paving the ground to a further debate about the importance of building bridges between countries and

people. The selection of the cartoon was done through a search on key-words related to the topic, such as 'building a bridge', 'rich and poor countries cartoons', etc. The first pre-reading activity asked participants to watch the videos or analyze the pictures and explain their content with their own words.

The second activity for each text was related to its title, and intended to make sure students paid attention to and understood the meaning of the expressions portrayed. In the third activity participants were asked to pay attention to the words highlighted in the texts, and based on them and on the title, tell what they thought that the topic of the text was going to be. The words and expressions highlighted in the texts were the ones believed to be useful for activating relevant schemata during this pre-reading activity, and that would help students to understand the content of the texts during the careful reading, such as *beach, fisherman, throwing, starfish* and *make a difference* in the narrative text; and *rich countries, poor countries, bridge* and *river* in the expository text (for all highlighted words see Appendices H1 and K1). In the fourth activity, participants were asked to explain what the possible relation was between the text subject and the videos/ cartoons previously seen.

Because the pre-reading activities used in this study did not include vocabulary pre-teaching, participants received a list with the key words and were allowed to ask the meanings of the words they thought were mandatory for comprehension (for more information regarding the procedures for Data Collection, see Section 3.8).

3.7.4 The pause protocol

Verbal protocols, or think-aloud protocols are tasks in which the participant is required to think aloud while performing an activity, and trying to solve a problem. The Pause Protocol technique is an adaptation of the verbal protocols, made by Cavalcanti (1987), in which participants were instructed to read the texts silently, thinking aloud only when they noticed a pause in their reading flow. The use of Pause Protocols could be described as a "breaching procedure", according to Garfinkel (as cited in Cavalcanti, 1987), because "the subjects were requested to face a familiar task (reading) in an unfamiliar way (thinking aloud when they detected the occurrence of a pause" (p.238). Therefore, the task could be considered easier for the students to perform.

The Pause Protocol (Cavalcanti, 1989) in the version adapted by Tomitch (2003) was used in this study because it seems to have less

interference in the reading process. In this 'think aloud' method, readers are instructed to read the text and stop whenever they find a problem or something that catches their attention, reporting it. Also, a red sign is posed at the end of each paragraph, in order to remind participants that at that moment they have to stop and verbalize about what they have just read. Participants are also instructed to summarize the text after they finish reading it.

Following Tomitch's (2007) advice, the instructions given to participants as regards the verbalization procedures were intended to be clear and objective (Appendix E1). Also, the instructions were given in a written format and read aloud with each participant, in order to make sure he/she understood the instructions. Furthermore, taking into consideration that piloting the instruments is mandatory in order to avoid undesired outcomes, as highlighted by Tomitch (2007), a Pilot Study was conducted previous to the main data collection (see Section 3.10 for details as regards the Pilot Study).

Tomitch (2007) also mentions the importance of recording and taking notes during the data collection procedure, because these pieces of information might help the researcher to complement the analysis of the results. In this study, all verbalizations were recorded by two different recording devices (cell phone and computer), in order to avoid technological problems that might lead to the exclusion of participants' data, as happened in Caldart (2012).

Prior to the reading of the main texts (one narrative and one expository text), a practice text was used, so that participants could get acquainted with the procedures of thinking aloud, as instructed by Tomitch (2007). During this training phase participants practiced the thinking-aloud method, trying to become more aware of the pauses that naturally occur during the reading process.

As regards the criticism to the think-aloud procedures, Seliger and Shohamy (2004) point out that some participants may fail to verbalize relevant information, because of the difficulty in performing two tasks at the same time. Other participants, on the contrary, as an attempt to please the researcher, may over-verbalize, meaning that they would provide more elaborations than they generally do, or would say things that do not correspond to their feelings, but that they believe the researcher is expecting them to say. A possible way to minimize these issues, also according to Seliger and Shohamy (2004), is to collect secondary data, through questionnaires or written responses to questions, to train the participants to use the procedures, or to obtain

inter or intra-rater reliability. This research has followed all these recommendations, in order to increase its validity.

Pause protocols are very useful for accessing data as regards the reading processes that occur on-line (during reading) "while they are still in working memory, and therefore with less chance of reconstruction by the reader." (Tomitch, 2007, p.50, my translation). However, some readers might verbalize verbatim parts of the text, or not say much during the pause protocol. For this reason, Tomitch (2007) claims that ideally, the researcher should use both concurrent and retrospective methodologies/ self-observations, for instance, because chances are that they are going to bring much more relevant information to the data collected, allowing more grounded generalizations.

In this study, besides being asked to verbalize their thoughts after the end of each paragraph, participants were asked to recall the text as a whole when they finished reading it. Besides, a question regarding the verbalization procedure and whether it helped or not was included in the retrospective questionnaire, so as to allow data triangulation.

As regards the pros and cons of report protocols in general, Hayes and Flower (1983, as cited in Cohen (1987), point out that:

> Whereas report protocols are incomplete because many important psychological processes are completely unconscious, the collecting of verbal report data is still beneficial in that it provides direct evidence about processes that are otherwise invisible, yields rich data and thus promotes exploration of cognitive processes. (p.91)

Therefore, although the reading process takes place in the readers' minds making it impossible to be fully accessed through verbal reports, the Pause Protocol is a great option for unveiling the reading process, especially when used in combination with other methodological procedures that allow data triangulation, such as self-observation or retrospective verbalization (Tomitch, 2007).

3.7.5 The reading span test

The Reading Span Test (RST) was developed by Daneman and Carpenter, in 1980, and "was devised to simultaneously draw on the processing and storage resources of working memory" (Just & Carpenter, 1992, p.125). More specifically, their objective was to

investigate the correlation between individual differences in WMC and comprehension of sentences, in addition to recalling a group of words. Tomitch (1999) points out that Daneman and Carpenter's RST has been used, with little modifications, in order to find correlations between WMC and many other cognitive skills, such as reading comprehension. Even though it was first proposed in 1980, it is still the most prominent means to access individuals' WMC.

The assumption that underlies the Reading Span Test is that WMC reveals individuals' ability to store and process information at the same time, while performing a cognitively complex task, such as reading. In this sense, the larger the individual's WMC, the better his/her performance on the RST. Consequently, RST results can be used in order to predict performance on reading comprehension tasks. In fact, empirical evidence has shown that the RST is a reliable predictor of WM, since it is "successful in taxing the processing and storage capacity of working memory" (Daneman & Carpenter, 1980, p.457; Daneman & Merikle, 1996).

The digit span test and the word span test, which are both used to access short-term memory, can be considered the inspiration for the Reading Span Test. In these tests, participants were instructed to read and recall a small amount of information. It was only in 1980 that Daneman and Carpenter created a task which was supposed to have access to both the processing and storage functions of WM: the RST. The Reading Span Test involves the comprehension of sentences in addition to the recall of the last words of each sentence in the group. As Tomitch (2003) points out, the results obtained "are then used to predict performance on other cognitive skills such as reading, comprehension and reasoning" (p.33). According to Daneman and Carpenter (1980), the RST presents hard processing requirements, which may decrease the amount of additional information that can be maintained.

The RST employed in this study was a Portuguese version of the test developed by Daneman and Carpenter (1980). Linck, Osthus, Koeth and Bunting (2013) recommend the use of the RST in participants' L1 so as to avoid variables related to proficiency when analyzing the data. The version used here was created by Tomitch (2003) and partially adapted by Bailer (2011), in order to include more appropriate sentences for the target audience (High School students), and so as the last words of each sentence maintained a 3-4 syllable pattern. This version was chosen because of the low L2 proficiency level of the participants of the present research, which are mostly beginners and pre-intermediate high school students, the reason why it would be hard for them to understand

the sentences and record the last word if they were presented in English, and also in order to avoid floor effects (scoring too low) in the RST due to task difficulty.

The test consisted of 60 unrelated sentences, having from 13 to 17 words, ending in a different word, besides 9 additional practice sentences. The sentences were presented in a Power Point presentation, and were arranged in sets of threes, in increasing order, that is, three sets of two sentences, three sets of three sentences, three sets of four, five and six sentences. The following sentence was shown right after the participant read the last word of the sentence on the screen, following the experimenter-administered condition proposed by Daneman and Carpenter (1980), in which the time necessary to read the sentences aloud was the only time allowed to the participants. According to Friedman and Miyake (2005) this condition "was determined to be more valid as a predictor of complex cognition than was a participant-administered condition, in which the participants could take as much time as they wanted to read the sentences" (p.583).

A white screen with question marks indicated the end of the set. Participants were asked to read the sentences aloud, trying to comprehend them, and memorize the last word of each sentence. When the screen with the quotation marks was shown, participants had to try to recall the final words of all the sentences in the set, in the order they appeared. The number of question marks presented on the screen was correspondent to the number of words that should be recalled. For example, the end of a set of two sentences was indicated by two question marks (??), the end of the three sentences sets by three question marks (???), and so on. The question marks remained on the screen until the participant signalized that he/she was finished. The following is an example of a set of four sentences:

- Se o Brasil pretende ir ao espaço sem pedir licença, não pode dispensar um programa de **foguetes**.
- O médico deve levar em conta a idade, número de filhos e saúde do **paciente**.
- Soube que o marido não ganhou o direito de protestar contra o abandono em momento tão **delicado**.
- Nós pedimos para o mundo falar e a mensagem soou alta, clara e extraordinariamente **perfeita**.

Words to be recalled: *foguetes/ paciente/ delicado/ perfeita.*

Participants received written instructions in Portuguese for the RST procedures (Appendix D4), and the doubts were clarified before the beginning of the procedure, or after the training session.

The training and testing sessions were recorded using two recording apps, one in the computer and one in a cell phone. The recordings were intended for later transcription and scoring, because note taking during the procedure could make participants anxious or distracted, as observed in the Pilot Study (Section 3.10) compromising the quality of the data collected.

Although the procedure for the RST in this study followed Daneman and Carpenter (1980), two different scoring methods were employed, which are going to be explained here.

Strict Score (Higher-Level Measure): In Daneman and Carpenter's (1980) scoring method the test would finish when the participant failed the three sets at two subsequent levels. In the strict score, the reading span was determined by the level at which he/she was able to remember at least two sets. Some researchers give credit for passing one set after a certain level (Masson & Miller, 1983; Tomitch, 2003). In this case, if a participant correctly recalled all words in the three sets of 2 sentences in the correct order, for example, but in the three sets of 3 sentences correctly recalled only one set, this participant would receive half credit for the set of 3 sentences he/she correctly recalled, and therefore his/her span would be 2,5. This scoring method is known as strict scoring because participants need to recall the exact words (plurals/ class, etc.) in the exact order to score. The choice of using a strict scoring is justified by the assumption that limitations of WMC can also arise from differences in the ability to control attention. Therefore, the ability to do a cognitively demanding task (processing new information) while trying to recall the last word of each sentence is believed to require attention, and therefore the strict scoring method would show the limitations of WMC.

Tomitch (2003) acknowledges that "[...] there is not much agreement in terms of what constitutes high and low working memory spans" (p.54). Daneman and Carpenter (1980) classify readers with a reading span of 2 as low, and readers with spans 4 and 5 as high, but do not classify spans of 3 words. Daneman and Carpenter (1983) included the term 'intermediate spans' for readers with span ranging from 3 to 3.5. For the purpose of this study, and in order to be able to compare the results of this research with previous ones, participants are going to be

categorized as high, intermediate and low spans, although this dichotomization is not going to be employed in the statistical analysis (the reasons are going to be better explained in the lenient score sub-topic). Following this classification method, 11 participants were categorized as intermediate spans, while 25 were considered low span readers. No participant achieved a span of 4 or 5, and therefore this scoring method did not have any high span individuals.

Lenient Score (Total Words): This method considered the total number of words recalled in all sets. For example, if a participant recalled two words in a five words group, he/she would receive two points for that group. If that same participant recalled only one word in each of the following groups of the five words set, the final score of that set would be 4. The final score would be the total number of correct words recalled. (Linderholm & van den Broek, 2002; Friedman & Miyake, 2000; Tirre & Peña, 1992; Turner & Engle, 1989). As stated by Friedman and Miyake (2005) "because this score included words recalled from a set even if the other words in that set were not recalled, it picked up differences between individuals who could recall some words from each set and individuals who forgot most of the words in the set" (p. 582). The maximum possible score was 60.

In the scoring method proposed by Daneman and Carpenter (1980) when the participant failed the three sets at two subsequent levels the test would be finished. In the lenient score, however, as the total number of words recalled was taken into consideration, all trials were administered to all participants (e.g., Shah & Miyake, 1996). Friedman and Miyake (2005) argue that, although this procedure allows the use of more scoring methods, participants might become frustrated at the end of the test, when they become unable to recall the majority of words in a set. In order to try to minimize this disadvantage, during the RST instructions, it was explained that participants were not expected to remember all the words in all the trials, and that the test would become increasingly difficult, so they should not become frustrated for not being able to remember all the words, they should just try to do their best.

In the lenient score, the total number of words correctly recalled was considered and "the upper and lower third of the frequency distribution of total words recalled by each participant was used to distinguish low- from high-WMC readers."(Linderholm & van den Broek, 2002, p. 779). Of a total of 60 words, eleven participants recalled from 31 to 38 words, and were categorized as high spans. Fifteen participants were considered intermediate spans, with a range between

26 and 30 words. Ten participants were categorized as low span readers, who recalled from 19 to 25 words.

It is important to emphasize that the categorization of high, intermediate and low spans is mentioned just for a future qualitative analysis, because this study does not use the practice of dichotomization of scale variables, which according to MacCallum, Zhang, Preacher and Rucker (2002), might have the following consequences:

> . . . loss of information about individual differences; loss of effect size and power in the case of bivariate relationships; loss of effect size and power, or spurious statistical significance and overestimation of effect size in the case of analyses with two independent variables; the potential to overlook non-linear relationships; and, . . . loss of measurement reliability. (p. 38)

In order to avoid these issues, this researcher decided not to dichotomize scale variables, even though the comparison of the findings with previous research might be jeopardized. Whenever possible, qualitative analyses are going to be employed, so as to allow comparisons with other studies.

According to Friedman and Miyake (2005) "little has been said in the literature about different scoring methods, except to note that they often correlate highly and usually show the same patterns of results"(p. 581) (e.g., Klein & Fiss, 1999;Turner & Engle, 1989; Waters & Caplan, 1996). However, it is believed that differences may arise even among highly correlated scoring methods, the reason why this study uses two distinct scoring methods. The decision to include the total word scoring method is supported by Friedman and Miyake's (2005) statement that "more continuous scoring methods would have better distribution and reliability characteristics because they provide more discrimination in terms of individual differences" (Miyake, Emerson, & Friedman, 1999, p. 582).

As regards the choice for the RST for the objectives of this research, it is also important to emphasize that although it has been more extensively used in research investigating the correlation between WMC and complex cognitive skills in L1, Juffs and Harrington (2011) point out that the RST "is the most appropriate type of measure of WM in the case of L2 processing research" (p.147), as well, the reason why it was employed in this study.

3.7.6 The reading comprehension questions

After reading each text, participants were asked to answer a written questionnaire containing comprehension questions related to it. The questionnaire comprehended both objective and open-ended questions as regards the text just read. It is important to highlight that, as participants were mostly beginners and pre-intermediates (with a limited vocabulary in English), and as the main objective of the questions was to verify their reading comprehension, not writing skills, all reading comprehension questions related to the texts were designed and answered in students' L1, i.e., Portuguese.

The questions were created based on Gagné et al.'s (1993) subdivision of the Component Processes, which includes decoding, literal comprehension, inferential comprehension and comprehension monitoring. The questions elaboration was also supported by Pearson and Johnson's (1978) taxonomy, which divided questions in three categories: *textually explicit* (literal questions, to which answers can be found on the page), *textually implicit* (although the answers can still be found on the page, verbatim knowledge is not necessary, that is, in order to answer the question the reader needs to use his/her background knowledge, generating inferences), and *scriptally implicit* (the answer is derived from the reader's background knowledge, not from the text). This study included the three previously mentioned question categories in the reading comprehension task, as follows.

3.7.6.1 Narrative text questions

The following sub-section aims at presenting and classifying the reading comprehension questions used in this study for the narrative text, according to Pearson and Johnson's (1978) taxonomy, as *textually explicit, textually implicit* or *scriptally implicit,* including the reasons why each question was classified in the corresponding category.

1 - Onde se passa o evento narrado no texto?

Question Category: *Textually Explicit,* because the answer can be found in the text; the reader can actually point to the answer in the first sentence of the first paragraph: "While I was walking down the beach, I began to see a man in the distance." Additional information can be provided, but all necessary information can be encountered in the sentence.

2 - O que o pescador estava fazendo"?
( ) armando sua rede para pescar ( ) jogando estrelas do mar no oceano ( ) passeando

Question Category: *Textually Explicit,* because the answer can be found in the text, in the following excerpt: "As I came even closer, I saw that he was a fisherman. He was picking up starfish that had been washed up on the beach and, one at a time, he was throwing them back into the water."

3 - Ao observar o pescador o narrador ficou:
( ) aborrecido com a situação ( ) curioso a respeito do ato ( ) feliz com o ocorrido

Question Category: *Textually Explicit,* because the answer can be found in the text, in the following excerpt: "I was curious. I approached the fisherman and said: 'Good morning, friend. I was wondering what you are doing.'"

4 - Qual o motivo que levou o pescador a praticar o ato descrito no texto?

Question Category: *Textually Implicit,* because although it is possible to find the answer in the text, it is not explicitly stated, it is necessary to infer the response from the following excerpt: "I'm throwing these starfish back into the ocean. You see, it's low tide right now and all of these starfish are up here on the sand. If I don't throw them back into the water, they'll die up here from lack of oxygen."

5 - De acordo com o narrador, a atitude do pescador foi válida? Por quê?

Question Category: It is *Textually Implicit*, because although the answer for the question can be found in the text, it needs the reader to make some inferences in order to elaborate the answer from the following excerpt:
"I understand", I said, "but there are thousands of starfish on this beach. You can't possibly get to all of them. There are simply too many. And don't you realize that at this time this is probably happening on hundreds

of beaches all up down this coast? Can't you see that you can't possibly make a difference?"

It is necessary to pay attention to the clues provided by the text, but mainly to rely on knowledge related to similar situations, from previous readings or other sources.

6 - "Você não percebe que simplesmente não pode fazer a diferença?" Por qual motivo o narrador pronunciou esta frase ao pescador?

Question Category: *Textually Implicit* because although it is possible to find the answer in the text, it is not explicitly stated, it is necessary to read the following paragraph, and infer that the fact that the same scenario is happening in other beaches and that it would not be possible to the fisherman to get to all of them is the reason why he would not be able to make a real difference:
"But there are thousands of starfish on this beach. You can't possibly get to all of them. There are simply too many. And don't you realize that at this time this is probably happening on hundreds of beaches all up down this coast? Can't you see that you can't possibly make a difference?"

7 - De que forma o pescador acreditava estar fazendo a diferença?

Question Category: It can be considered *Textually Implicit* because the answer can be partially found in the text, and needs reader's background knowledge to fill the gaps. It is necessary to infer the response from the text as whole, mainly from the following excerpt: *"*The man smiled, bent down one more time and picked up another starfish. He threw it back into the sea and answered, 'I made a difference to that one!'"

8 - Você acredita que a atitude do pescador seja válida? Comente.

Question Category: *Scriptally Implicit,* because the answer needs to be drawn based on previous knowledge related to the particular situation addressed by the answer of the question first part, i.e., whether the participant believes that the fisherman's act could really make a difference or not.

9 - Você acredita que pequenos gestos são capazes de mudar o mundo? Explique e exemplifique.

Question Category: *Scriptally Implicit,* because the answer needs to be drawn based on previous knowledge related to the particular situation addressed by the answer of the question first part, i.e., whether the participant believes that small acts like the fisherman's can really change the world.

3.7.6.2 Expository text questions

The aim of the following sub-section is to present and classify the reading comprehension questions used in this study for the expository text, according to Pearson and Johnson's (1978) taxonomy, as *textually explicit, textually implicit* or *scriptally implicit,* including the reasons why each question was classified in the corresponding category.

1 - De acordo com o autor do texto, qual é uma das maiores contradições atuais?

Question Category: *Textually Implicit,* because although it is possible to find the answer in the first sentence of the first paragraph, it is necessary to read the whole paragraph in order to elaborate on the explanation, making inferences based on textual evidence and background knowledge.
"One of the great contradictions of our time is the fact that, while the world's most prosperous nations are living in the era of interactive television, faxes and satellite communication, there are still 600,000 villages without electricity and over 800 million illiterate people in the world. For more than 1 billion human beings the daily reality continues to be hunger and poverty."

2 – É possível que as nações ricas consigam se isolar das mais pobres? Por quê?

Question Category: *Textually Implicit,* because although it is possible to find the answer in the last sentence of the second paragraph, it is necessary to consider the whole paragraph in order to elaborate on the explanation, making inferences based on textual evidence and background knowledge.
"In a world where interdependence becomes stronger each day and where exchanges – trade, communications, population movements and epidemics – are taking a global dimension, it would be foolish to

suppose that the rich countries can isolate themselves from the poor ones."

3 - De acordo com o texto o Norte e o Sul representam, respectivamente:
( ) Nações industriais e nações em desenvolvimento ( ) Nações em ascensão e nações pobres ( ) Nações ricas e nações industriais

Question Category: *Textually Explicit,* because the answer can be found in the text, in the beginning of the third paragraph:
"We all know there is a gap between the North and the South, the industrial and the developing nations."

4 - A que o autor compara os países do Norte e do Sul?
( ) duas faces de uma moeda ( ) dois lados de um rio ( ) duas metades de uma laranja

Question Category: *Textually Explicit,* because the answer can be integrally found in the text, in the third paragraph:
"We all know there is a gap between the North and the South, the industrial and the developing nations. They are like two sides of a river, a poor side and a rich one."

5 - Os países ricos auxiliam, de alguma forma, os países em desenvolvimento? Isso é suficiente? Explique.

Question Category: *Textually Implicit,* because although it is possible to find the answer in the third paragraph, it is necessary to read the whole paragraph in order to elaborate on the explanation, making inferences based on textual evidence and background knowledge.
"Sometimes the rich nations send boats across this river with different types of aid. But we need more than that. We need global vision for the future, not just in case of an emergency. What is needed is a permanent connection, a bridge between those two sides of the river."

6 - Qual a relação do título com o conteúdo do texto? A que se refere essa "ponte"?

Question Category: *Textually Implicit,* because although it is possible to find the answer reading the text as a whole, the answer is based on the

inferences generated by the reader, supported by textual evidence and background knowledge.

7 - O que aconteceria se os EUA investissem 10% de seu orçamento militar para alimentar a população da Rwanda, de acordo com o texto?

Question Category: *Textually Explicit,* because the answer can be found integrally in the text, in the second sentence of the fourth paragraph. Additional information can be provided, but all necessary information can be encountered in the sentence:"America would not be much poorer and Rwanda (to take just one example) would be less poor."

8 – "Tudo o que precisamos é de decisões políticas e políticos altruístas o suficiente para construir esta ponte." Você concorda com esta afirmação? Comente.

Question Category: *Scriptally Implicit* because the answer needs to be drawn based on previous knowledge related to the particular affirmation addressed by the question. It is necessary to pay attention to the clues provided by the text, but mainly to rely on knowledge related to similar situations, from previous readings or other sources.

9 - De que outras formas você acredita que esta "ponte" possa ser construída? Explique e exemplifique.

Question Category: *Scriptally Implicit* because the answer needs to be drawn based on previous knowledge related to the particular situation addressed by the question. It is necessary to pay attention to the clues provided by the text, but mainly to rely on knowledge related to similar situations, from previous readings or other sources.

According to Bell (2005, p.137) "The more structured a question, the easier it will be to analyze", the reason why the reading comprehension questions were piloted previous to the main data collection (see Section 3.10 for details about the Pilot Study). It was also intended that the number of textually explicit, textually implicit and scriptally implicit questions was the same for each text, so as to provide the same conditions for both of them, making it possible to assume that any differences in reading comprehension were not due to the type of question used. Therefore, each reading comprehension set had three

textually explicit questions, four textually implicit and two scriptally implicit ones, which were randomly distributed through the set.

3.7.7 The retrospective questionnaire

According to Dörnyei (2003), questionnaires yield factual, behavioral and attitudinal data about the participants. The retrospective questionnaire (Appendix M1) included in this study used mostly open-ended questions, which are believed to provide richer responses, including elements that were not anticipated by the researcher. The only two questions which were objective were regarding the level of difficulty of the texts, ranging from "very easy" to "very difficult". The decision to include these questions in the mentioned format was due to the fact that it makes it easier to categorize the responses, because it limits the number of possible categories used to answer.

The first two questions were answered after the RST, in the second encounter, and intended to observe participants' perception of the test, as well as if they used any strategies in order to memorize the words.

The other six questions were answered at the end of the third and last encounter, after participants had read both texts and answered the comprehension questions related to them. These questions included participants' perception of the level of difficulty of the texts; and whether they believed that the pre-reading activities helped them to better understated the texts or not. A question regarding their perception of the experience of verbalizing their thoughts during reading, that is, whether it helped, jeopardized or had no influence in comprehension was also included. In the last two questions students were encouraged to highlight any other difficulties they might have had during the procedures for data collection and were asked if they wanted to make any comment or suggestion as regards the experiment.

The answers provided in the Retrospective Questionnaire (Appendix M1) are going to be used for exemplifying and clarifying purposes, in the *Discussion of the Results*, in order to provide data triangulation and allow the elucidation of the results.

3.7.8 The readers profile

The Reader Profile (Appendix B1) was included in this research as a means of getting extra information regarding participants' reading habits and frequency, participants' perception of their own reading

behavior (whether they read critically or not), their awareness regarding the reading strategies they use in Portuguese and English, among others. A question concerning how participants manage to stay focused and concentrated during reading was included in order to verify any possible variables necessary for participants concentration that might have been missing in this study condition (as the use of highlighters, or the need to listen to music in order to concentrate, according to some of the participants). Furthermore, participants were asked to provide information about their ages, their parent's reading habits, whether they have studied in public or private schools, and how long they have been studying English and where (at school or language courses).

The reasoning in this study is that the information provided in the readers' profile may be useful for a qualitative analysis of the results, as a means to try to find patterns among participants, as in 'students whose parents have good reading habits also consider themselves good and critical readers', for example.

It is important to highlight that participants' answers in the readers' profile, as well as in all the other tests, were provided in Portuguese, which is their L1. All instances of participants' statements in English throughout this dissertation are translations.

Sixteen participants consider themselves critical readers; Participant 14 stated that *"Yes. When I read something, I look for other references on the subject",* while Participant 3 said that *"Yes. I like to ask myself about the reading and reflect upon it".* Ten participants claimed that they read critically only in some specific circumstances, such as: (1) if they are instructed to do so, (2) only when they are interested in the subject of the text, and (3) depending on the genre of the text. Participant 12 claimed that *"Only if I read a book/article or something that is related to my interests",* while Participant 31 stated that *"It depends on the text and its content. If it is a comic text, I do not emit an opinion; if it is more formal, however, I try to understand and observe other people's opinions".* Ten participants said that they do not consider themselves critical readers, such as Participant 35, who said that *"I believe that a critical reader is someone who reads, interprets and has an opinion about what was read. I do not consider myself a critical reader, because I do not think about having an opinion regarding what I have just read"* and Participant 33 *"No, because I do not read seriously when I read".*

Table 3 below presents the frequency participants of this study read each genre, namely newspapers, magazines, science journals and literary books.

Table 3. Participants' reading frequency by genre

	Frequently	Sometimes	Rarely	Never
Newspapers	12	8	12	4
Magazines	3	9	14	10
Science Journals	12	11	8	5
Literary Books	6	7	13	10
Internet Texts	33	2	1	0

Results in Table 3 demonstrate that participants' general reading habits include all selected genres, with emphasis on internet material, newspaper and science journals, which are the ones most frequently read. According to participants' answers on the Reader Profile, the topics of interest in most of their readings are the ones related to their field, that is, Agriculture in general. Besides the genres included in Table 3, participants also claimed to read non-fiction books, cartoons, poetry, songs' lyrics, television shows' subtitles and messages on cell phone apps. As regards their favorite genres, 16 participants prefer to read fiction books, 15 enjoy reading papers, 8 like to read magazines, while 7 participants prefer to read newspapers and 7 find it more interesting to read texts on the internet.

In the question about their parents' reading habits, 24 participants claimed that either their mother or their father read with certain frequency, especially the newspaper and books, looking for texts and news related to the Agriculture area. Twelve participants said that their parents read very little, or do not read at all. Even the participants who claimed to have parents that do not read frequently said that they motivate their children to do so. However, most participants have answered that they do not really enjoy reading, they only read because it is necessary to stay updated or to complete some credits at school.

For the question concerning how participants manage to stay focused during a reading that demands attention, 26 students answered

that they look for a quiet and lonely place to read, while 4 participants answered that they need to be either in a silent place, or in a place with music playing in order to stay concentrated. One participant said that re-reading is the strategy he uses to stay focused, 1 participant prefers to summarize the text, 3 participants try to interpret/ relate the text to other readings, and just 1 student reads the text aloud. These answers show that the conditions offered during the reading of the texts of this study were (at least in theory) adequate, because data were collected in a quiet and calm room. Although they were not alone, this researcher tried not to interfere during the activities.

A question about participants' reading habits in English was also included, to which 28 students answered that they do not read texts in English very often, while only 8 claimed that reading in English is a frequent habit.

As regards the reading strategies employed when reading texts in Portuguese (L1) *versus* English (L2), 12 participants claimed that reading in a calm place is enough in Portuguese, and that in English they only need to pay more attention to the text. The other reading strategies mentioned for the Portuguese texts were: rereading (10 participants), reading aloud (2 students), interpreting (4 participants), using the dictionary (4 students), summarizing and underlining (4 participants). The strategies employed when reading texts in English, according to participants' answers were reading more carefully (12 students), translating (10 participants), and trying to guess the meaning of the words in the context (8 students). Six participants did not mention any strategy, because they said they do not read in English at all.

Participants' answers related to the strategies they use when reading texts, both in Portuguese and in English, are important to understand the results of this study, because most participants (30 students) either do not use any reading strategies besides staying in a calm place, or are not aware of them. No participant mentioned reading the title or skimming (even if they do not know the term for taking a quick look at the content of the text). No participant mentioned looking for other sources about the same content. Only four participants said that they summarize and/or underline the texts, and no one mentioned paying attention to key words or cognates when reading texts in English.

3.8 PROCEDURES FOR DATA COLLECTION

All data was collected in three sections, being one with the whole group and two individual meetings. The first meeting lasted about

1h30min, the second one approximately 30 minutes, while the last one took about 1h30min.The first meeting was with the whole group of students from the third year of Technical High School (one for each group: 31, 32 and 33), where the researcher explained the procedures for data collection and gave the TCLE (see Appendices A2 and A3) for the students to sign or to take to their legal representatives to sign, when applicable.

It is important to highlight that all students from the 3 groups (31, 32 and 33) performed the activities of the first meeting. In fact, the class counted as a regular English Class, in which I substituted their regular English teacher. However, even though all students performed all the activities during the first meeting, the results reported in this study only include the data from the participants who signed the Consent Forms and had the TCLE signed by their parents (when applicable).

After explaining the objectives of the study, participants received a Reading Proficiency Test, which intended to measure their reading skills when reading in English. The test was answered individually, without the use of a dictionary. In this same meeting participants answered the Reader Profile, which contained questions as regards their reading habits, as previously mentioned.

After that, two other meetings were booked with the students, in extracurricular time, according to their available time. In the first individual meeting, the RST was explained and applied. The procedure for the RST was an adaptation of the ones proposed by Daneman and Carpenter (1980), and Harrington and Sawyer (1992), created by Tomitch (2003) and adapted by Bailer (2011). Participants read unrelated sentences aloud, trying to recall the last word of each sentence. The sentences were visually presented in a laptop screen, and participants responses were recorded for later transcription and scoring.

In the second individual encounter, participants read three texts in English, being a practice text and two texts (one narration and one exposition) for the data collection per se, (following the Pause Protocol procedure). In order to get familiar with the verbalization procedure, students read a practice text, which was also useful for this researcher to check whether participants had understood the task, providing them with further explanations if not. After the practice task, participants received the narrative and the expository text, one at a time, to be read and verbalized. One of the texts was preceded by the pre-reading activities, while the other one was not. Group I (ExpositoryPR, with 17 participants) performed pre-reading activities previous to the reading of the expository text and not the narrative one, while Group II

(NarrativePR, with 19 participants[11]) did the opposite, that is, performed pre-reading activities previous to the reading of the narrative text and not the expository one. Following the procedure just described, each group was the control group for the other, and reading conditions could be counterbalanced, so that it was possible to check whether the pre-reading activities really influenced participants' inference generation and reading comprehension, without any disadvantage for the groups, that could experience both situations.

Previous to the texts reading, participants received instructions about the Pause Protocol (see Appendix E1). Participants were instructed to read the texts silently, as if they were alone, and stop whenever any pause happened in their reading flow or any thought came to their mind. As reading proficiency was already measured by means of the reading proficiency test, the verbalizations of the texts were performed in Portuguese, in order to avoid participants' inability to express their thoughts during the activity. The verbalization of both texts was recorded in two sources (computer and cell phone) for later transcription and inference categorization.

After reading each text, participants answered nine comprehension questions about them, containing seven open-ended and two objective questions (see Appendices I1 and L1) , in order to check their understanding of the texts. When performing this task, participants were allowed to look back at the texts, because the intention was to check their reading comprehension, not their memory skills.

In the last part of the experiment, participants were asked to answer a retrospective questionnaire (see Appendix M1), where they were instructed to evaluate the level of difficulty of the texts, their performance on the comprehension questions, as well as any other problems they might have faced during the tasks.

3.9 SCORING AND STATISTICAL PROCEDURES

The aim of the following Section is to present the criteria employed in the scoring of the tests used in this study, as well as to describe the statistical procedures here applied.

[11]As previously explained in Section 3.6 - Participants, the reason why Group II (NarrativePR) had 17 participants and Group I (ExpositoryPR) had 19 is that one of the participants from Group II almost finished all the activities from all the encounters, but had to leave in the last encounter before finishing the activities, and was not able to re-schedule later

3.9.1 Scoring of the reading proficiency test

The Reading Proficiency Test (see Appendix C1) was corrected and scored by this researcher, based on the answers provided in the *Interchange* and *New English File* books. For texts 1, 2 and 4 the maximum score was 2 points (0,3 for each correct question for Text 1 and 0,5 for each correct question for Texts 2 and 4), while for Text 3 the maximum score was 4 points (0,4 points for each correct question). Participants who marked more items than instructed on the questions had their scores decreased.

This study's quantitative analysis included tests of normality regarding reading proficiency (with and without outliers). Tests of normality are important in identifying whether the population of the study is approximately normally distributed or not (whether it includes participants who scored low, medium and high in a given test) in order to determine which types of statistical tests - parametric or non-parametric - are to be used.

Table 4 below presents the results of the tests of normality regarding reading proficiency for both groups (ExpositoryPR and NarrativePR), with the outlier (Participant 13).

Table 4. Tests of normality: reading proficiency – with outlier

Groups	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
ExpositoryPR	.170	17	.200*	.960	17	.632
NarrativePR	.141	19	.200*	.961	19	.598

As it can be observed in Table 4 above, with the results obtained from the Shapiro-Wilk's test ($p > .05$), it is possible to assume that the data are approximately normally distributed for both groups – ExpositoryPR and NarrativePR – for the variable Reading Proficiency. Also, visual inspections of the histograms, Q-Q plots, and boxplots (Appendix O1) confirm that the data for this variable are approximately normally distributed for both groups. However, by inspecting the boxplots it is possible to spot an outlier in the ExpositoryPR group (Participant 13). Nonetheless, normality tests were run without the participant and similar results were obtained. Hence, given the sample size, the nature of the dependent variable – Reading Proficiency –, and the fact that this participant was not masking the existence of other

outliers, the researcher thus decided to keep the participant in the sample.

Table 5 below presents the results of the tests of normality regarding reading proficiency for both groups (ExpositoryPR and NarrativePR), this time without the outlier (Participant 13).

Table 5. Tests of normality: reading proficiency – without outlier

Groups	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
ExpositoryPR	.210	16	.059	.924	16	.198
NarrativePR	.141	19	.200*	.961	19	.598

By removing Participant 13 from the sample, the results obtained from the Shapiro-Wilk's test ($p > .05$) indicate that the data are approximately normally distributed for both groups – ExpositoryPR and NarrativePR – for the variable Reading Proficiency. Also, visual inspections of the histograms, Q-Q plots, and boxplots (Appendix O2) confirm that the data for this variable are approximately normally distributed for both groups.

The following Sub-section presents and describes the scoring methods used for the Reading Span Test, that is, the Strict scoring method (Daneman & Carpenter, 1980) and the Lenient one (Linderholm & van den Broek, 2002). In addition, the tests of normality regarding both scoring methods are also explained.

3.9.2 Scoring of the RST

The RST was scored both strictly and leniently (See Section 3.7.5 for more details). For the Strict scoring of RST test, the reading span was determined by the level at which the participant was able to remember at least two trials of a given set of unrelated sentences (Daneman& Carpenter, 1980). A half point was given when the participant passed one trial at a certain level (Masson & Miller, 1983; Tomitch, 2003). For example, if a participant recalled correctly all the words in the right order in the three sets of 2 sentences and in the three sets of 3 sentences recalled correctly just one group, this participant

would receive half point, and his/her span would be 2,5. The test would end when the participant failed the three sets at two subsequent levels.[12]

Participants' answers on the RST test were also scored leniently. This method considered the total number of words recalled in all sets, irrespective of the order. In the lenient score, the total number of words correctly recalled was considered and "the upper and lower third of the frequency distribution of total words recalled by each participant was used to distinguish low- from high-WMC readers" (Linderholm & van den Broek, 2002, p. 779).

Table 6 below presents the results of the tests of normality for both groups (ExpositoryPR and NarrativePR) regarding WMC, which was measured strictly and leniently.

Table 6 . Tests of normality: working memory

Groups	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ExpositoryPR – Strict Score	.234	17	.014	.889	17	.044
NarrativePR – Strict Score	.310	19	.000	.767	19	.000
ExpositoryPR – Lenient Score	.156	17	.200*	.930	17	.214
NarrativePR – Lenient Score	.153	19	.200*	.951	19	.403

With the results obtained from the Shapiro-Wilk's test ($p < .05$), presented in Table 6 above, it is possible to assume that the data are not approximately normally distributed for both groups for the variable working memory – Strict Score, which means that participants are not heterogeneous as regards their scores on the RST test. This was also confirmed with visual inspections of the histograms, Q-Q plots, and boxplots (Appendix Q1). As for the variable working memory – Lenient Score, the results obtained from the Shapiro-Wilk's test ($p > .05$) suggest that the data are approximately normally distributed for both groups, which was confirmed with visual inspections of the histograms, Q-Q plots, and boxplots of this variable.

[12] All participants performed the RST as a whole, that is, up to the three sets of six sentences; however, for the strict scoring method the answers were only considered until the point they were able to remember at least one set at a certain level.

However, by inspecting the boxplots, it is possible to spot two outliers in the ExpositoryPR group (Participants 1 and 6) in the working memory – Lenient Score variable. Nonetheless, normality tests were run again without those participants and similar results were obtained for the normality tests, though new outliers emerged in the data set. Following Larson-Hall (2010), removal of outliers from the data set may cause the appearance of new outliers that might be masking further outliers, which may, in turn, compromise the number of participants of the sample considerably and therefore makes correlational tests and analyses unfeasible. Hence, due to the sample size of this study, the researcher thus decided to keep the outliers in the sample for this variable and the results of the statistical tests (correlations) – as any other statistical test, in fact, – shall be interpreted with caution.

3.9.3 Inference categorization

The procedure for inference categorization adopted in this study was based on a study conducted by Narvaez et al. (1999). Their research was based on two previous studies proposed by Zwaan and Brown (1996) and Trabasso and Magliano (1996). Therefore, it is important to highlight that although this study is using the Inference Categorization Model proposed by Narvaez et al. (1999), some explanations and examples were taken from the three seminal (and somehow complementary) studies mentioned above.

In order to categorize readers' inferences, participants' utterances were divided into ideas chunks (Gerber & Tomitch's, 2008, Caldart, 2012), because the Pause Protocol adopted in this research (Tomitch, 2003) differs from the one proposed by Zwaan and Brown (1996), and Trabasso and Magliano (1996), where sentences were displayed one at a time, followed by participants' comments about them. The ideas chunks varied from three word sentences to whole paragraphs. Besides, new inference categories would also indicate a new chunk, thus a single idea could be divided in two or more parts, if a new inference type was observed (Caldart, 2012).

After that, participants' sentences were categorized by this researcher, according to Narvaez et al.'s (1999) Inference Categorization Model, as *Repetitions*, *Explanations*, *Association*s, *Evaluation*s, *Prediction*s, *Knowledge-Based Coherence Break*s, or *Text-Based Coherence Breaks*. Zwaan and Brown's (1996), and Trabasso and Magliano's (1996) studies were also consulted in order to have a better understanding about the process of inference categorization, because the

participants of Narvaez et al.'s (1999) study were L1 readers, not L2 readers, as in the case of this study, and also because their article provides very few examples and instructions on how to categorize utterances into inference types.

In order to clarify the procedures used for categorizing the inferences, a summary of Narvaez et al.'s (1999) Inference Categorization Model, containing the categories proposed by them, and their respective categories in Zwaan and Brown's (1996) and Trabasso and Magliano's (1996) studies is going to be provided hereafter, followed by some examples from this study's participants' data (translated from Portuguese to English). It also includes the types of sentences that are expected to be inserted in each category, based on examples from the three above mentioned studies. Additionally, some adaptations were made by this researcher, according to the needs of the study, based on Caldart (2012), which are going to be explained in the present section.

***Repetitions*:** they correspond to Zwaan and Brown's (1996) and Trabasso and Magliano's (1996) paraphrases. A repetition is a sentence that preserves the meaning of the original text, which can be either a paraphrase or a reproduction of the original sentence.

Participant 6: This first paragraph talks about a man who is walking on the beach and sees another man in the distance.

Participant 23: Here it says that there is a gap between North and South, the industrial and developing nations, the poor side and the rich side.

Explanations: this category was also mentioned in Zwaan and Brown's (1996) research. *Explanations* are concomitant inferences that present answers to why questions, and explain the reason or cause of an event or action mentioned in the text.

Participant 14: The text suggests the idea that we should build this bridge to minimize the impact of these differences [between rich and poor countries].

Participant 7: With one act from the fisherman he can make a difference, so he is teaching the man that he can do something as well.

Participant 13: These bridges are not real bridges, but figurative ones, aiming at destroying embargos or conflicts that end up causing misery and poverty.

***Association*s:** they are backward inferences based on textual clues or background knowledge, including generalizations. These elaborative inferences were also mentioned in Zwaan and Brown (1996) and Trabasso and Magliano's (1996) experiments. *Association*s participants made in order to recognize a word based on the context were included in this category by this researcher. One example this kind of inference is "*I think liner is a kind of ship, because the text mentions that it is sailing from one place to another*" (Caldart, 2012). Textual *Association*s that referred back to previous sentences were also incorporated in this category, following Caldart (2012).

Participant 32: I understood that he was curious and another person came closer, the one that was distant in the first paragraph.

Participant 20: While I was reading, I was thinking about the time I went to the beach, and that it was a new experience for me, and I also saw starfish there.

***Evaluation*s:** this category was also present in Zwaan and Brown's (1996) and Trabasso and Magliano's (1996) studies and include comments about the text content and writing, and the reader's state during reading.

Participant 4: The USA invests too much in the military area, which is bad, because they use this money basically to kill people instead of helping them.

Participant 36: This was kind of weird [throwing starfish back into the ocean], because who does that, actually?

Participant 30: When I was reading, it was kind of confusing to define the idea of the text until the end, because it was only after reading the final words that it is possible to understand the text's idea, otherwise it was just a vague idea.

Participant 13: The previous text had more words related to economics, so I was able to associate more with the things I read. This one [text] has...I understand too little English!

***Predictions*:** *Predictions* were also cited in Zwaan and Brown's (1996) and Trabasso and Magliano's (1996) studies. *Prediction*s are forward inferences which correspond to expectations about future consequences of a current event or action in the text.

Participant 32: Then he bended down to pick up a starfish, to throw it into the sea. To save it? Who knows...maybe...

Participant 34: What I understood is that there was someone throwing garbage into the sea. I think it might be garbage.

Participant 36: And in the end he asks whether he [the fisherman] believes he is making a difference. Let's see what he answers.

***Text-Based Coherence Breaks*:** this category is a ramification of Zwaan and Brown's (1996) *Metacomments*, which comprised coherence breaks of any kind. It includes readers' comments about their inability to understand the text due to textual issues, as the structure of the text, for instance. Caldart (2012) included in this category words that created a coherence break, but should not have, as names of characters presented for the first time.

Participant 4: Now I'm in doubt, because if he was picking up the starfish from the low tide and throwing them back into the water it makes sense, but if he was fishing starfish from the water…hmmm....now I'm in doubt.

Participant 34: He saw a tiny starfish and he was curious. Then he said 'good morning'....to the starfish? Even though it does not speak?! Haha

***Knowledge-Based Coherence Break*:** this category is another ramification of Zwaan and Brown's (1996) *Metacomments.* It includes readers' comments regarding their incapacity to build a coherent textual representation due to lack of knowledge or experience. As this study's participants were L2 speakers, I included word problems in this category, as their inability to understand was due to lack of lexical knowledge.

Participant 36: Uili,Uili [while] in the beginning of the text, would it be a name?

Participant 6: What's the meaning of this 'throwing things out'?

Participant 31: Therefore some countries are creating sand boats [send boats] to cross the river, to help some people. What is something pointless, these sand boats, because they wouldn't help at all.

Zwaan and Brown (1996) also mention other categories like '*Word Problem'*, *'Word Recognition'* and other ramifications of *Metacomments*. For the purpose of this study the only further categories used were *Incorrect Translations,* and *Translation Attempts* (Zwaan & Brown, 1996) which corresponds to readers' translation attempt, or attempt and failure, which seemed to compromise comprehension. The difference between these two categories is the product of the inference, because a *Translation Attempt* is characterized by participants' reflection regarding the translation of a word or sentence that results in satisfactory translation. An *Incorrect Translation*, on the other hand, may or may not include the reflection as regards the meaning of the word, but the result is an incorrect translation. The two following examples from participants' protocols were maintained in Portuguese, because the intention is to show the translation issues and attempts.

Participant 6: Quanto mais ele chegava perto, ele via que o cara era um...era um peixeiro? É, né? Ah, um pescador. O cara era um pescador.

Participant 11: Starfish é começar a pescar? Starfish, starfish, estrela do mar. Ah, ta. Starfish. Star, estrela. Não é start. Ok. Throwing starfish, jogando.

Table 7 on the next page presents the tests of normality for both groups (ExpositoryPR and NarrativePR), as regards inference generation for the expository text.

Table 7. Tests of normality: inference generation for the expository text

Groups	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
REP – ExpositoryPR	.167	17	.200*	.950	17	.460
REP – NarrativePR	.151	19	.200*	.889	19	.031
EXP – ExpositoryPR	.335	17	.000	.609	17	.000
EXP – NarrativePR	.163	19	.200	.918	19	.104
ASS – ExpositoryPR	.248	17	.007	.786	17	.001
ASS – NarrativePR	.258	19	.002	.775	19	.001
PRED - ExpositoryPR	.302	17	.000	.581	17	.000
PRED – NarrativePR	.314	19	.000	.673	19	.000
EV – ExpositoryPR	.193	17	.091	.843	17	.008
EV – NarrativePR	.311	19	.000	.732	19	.000
KBCB – ExpositoryPR	.222	17	.026	.792	17	.002
KBCB – NarrativePR	.214	19	.022	.911	19	.078
TBCB – ExpositoryPR	.455	17	.000	.554	17	.000
TBCB – NarrativePR	.427	19	.000	.584	19	.000
TA – ExpositoryPR	.298	17	.000	.615	17	.000
TA – NarrativePR	.223	19	.014	.858	19	.009
IT – ExpositoryPR	.193	17	.091	.888	17	.042
IT – NarrativePR	.149	19	.200*	.944	19	.315
TOTAL – ExpositoryPR	.229	17	.018	.870	17	.022
TOTAL – NarrativePR	.124	19	.200*	.965	19	.665

With the results obtained from the Shapiro-Wilk's test in relation to the normality test for the inference generation of the expository text, it is possible to state that most of the data does not follow an approximate normal distribution ($p < .05$), which was confirmed with visual inspections of the histograms, Q-Q plots, and boxplots (Appendix R1). Thus, the only variables that do follow an approximate distribution for Inference Generation are: *Repetitions* – ExpositoryPR; *Explanations* – NarrativePR; *Knowledge-Based Coherence Breaks* – NarrativePR;

Incorrect Translations – NarrativePR; *Total of Inferences* – NarrativePR, as indicated by the results obtained from the Shapiro-Wilk's test ($p > .05$).

Moreover, by inspecting the boxplots (Appendix R1), it is possible to spot the presence of a few outliers in some of the variables: *Repetitions* – NarrativePR (Participant 28); *Explanations* – ExpositoryPR (Participant 1); *Associations* – ExpositoryPR (Participants 1 and 11); *Associations* – NarrativePR (Participants 35 and 36); *Predictions* – ExpositoryPR (Participant 1); *Explanations* – NarrativePR (Participants 33 and 34); *Evaluations* – ExpositoryPR (Participant 2); *Evaluations* – NarrativePR (Participants 20, 35, and 36); *Knowledge-Based Coherence Breaks* – NarrativePR (Participants 28 and 29); *Text-Based Coherence Breaks* – ExpositoryPR (Participants 2, 3, 7, and 11); *Text-Based Coherence Breaks* – NarrativePR (Participants 20, 24 32, and 35); *Translation Attempts* – ExpositoryPR (Participants 3 and 11); *Translation Attempts* – NarrativePR (Participant 28). As previously stated for the working memory variables, following Larson-Hall (2010), removal of outliers from the data set may cause the appearance of new outliers that might be masking further outliers, which may, in turn, compromise the number of participants of the sample considerably and therefore makes correlational tests and analyses unfeasible. This was the case for the variables of Inference Generation – expository text. Therefore, due to the sample size of this study, the researcher decided to keep the outliers in the sample for these variables and the results of the statistical tests (correlations) – as any other statistical test, in fact, – shall be interpreted with caution.

Table 8 on the next page presents the tests of normality for both groups (ExpositoryPR and NarrativePR), as regards inference generation for the narrative text.

Table 8. Tests of normality: inference generation for the narrative text

Groups	**Kolmogorov-Smirnov**			**Shapiro-Wilk**		
	Statistic	df	Sig.	Statistic	df	Sig.
REP – ExpositoryPR	.153	17	.200*	.914	17	.118
REP – NarrativePR	.108	19	.200*	.958	19	.540
EXP – ExpositoryPR	.255	17	.005	.683	17	.000
EXP NarrativePR	.183	19	.093	.936	19	.227
ASS – ExpositoryPR	.188	17	.112	.824	17	.004
ASS – NarrativePR	.271	19	.001	.804	19	.001
PRED – ExpositoryPR	.225	17	.022	.845	17	.009
PRED – NarrativePR	.214	19	.022	.897	19	.043
EV – ExpositoryPR	.306	17	.000	.742	17	.000
EV – NarrativePR	.135	19	.200*	.914	19	.088
KBCB – ExpositoryPR	.204	17	.059	.835	17	.006
KBCB – NarrativePR	.232	19	.009	.887	19	.028
TBCB – ExpositoryPR	.367	17	.000	.659	17	.000
TBCB – NarrativePR	.264	19	.001	.690	19	.000
TA – ExpositoryPR	.308	17	.000	.667	17	.000
TA – NarrativePR	.315	19	.000	.739	19	.000
IT – ExpositoryPR	.253	17	.005	.780	17	.001
IT – NarrativePR	.212	19	.025	.805	19	.001
TOTAL – ExpositoryPR	.265	17	.002	.787	17	.001
TOTAL – NarrativePR	.147	19	.200*	.966	19	.686

With the results obtained from the Shapiro-Wilk's test for the Inference Generation variables of the narrative text, it is possible to state that most of the data does not follow an approximate normal distribution ($p < .05$), which was confirmed with visual inspections of the

histograms, Q-Q plots, and boxplots (Appendix R2). Thus, the only variables that do follow an approximate distribution for Inference Generation are: *Repetitions* – ExpositoryPR, *Repetitions* – NarrativePR, *Explanations*– NarrativePR, *Total of Inferences* – NarrativePR, as the results obtained from the Shapiro-Wilk's test ($p > .05$) revealed.

Just like the Inference Generation variables for expository text, the same variables for the narrative text also presented several outliers, which were spotted by inspecting the boxplots (Appendix R2) in the following variables: *Explanations* – ExpositoryPR (Participant 1); *Associations* – NarrativePR (Participants 20, 34, and 35); *Evaluations*– ExpositoryPR (Participants 4 and 13); *Text-Based Coherence Breaks* – ExpositoryPR (4 and 11); *Text-Based Coherence Breaks* – NarrativePR (Participant 21); *Translation Attempts* – ExpositoryPR (Participants 3, 4, and 11); *Incorrect Translations* – ExpositoryPR (Participants 4 and 8); *Incorrect Translations* – NarrativePR (Participant 34); *Total of Inferences*– ExpositoryPR (Participants 4, 11, and 13).

As previously stated for the WM variables and the Inference Generation variables of the expository text, outliers were maintained because they were masking other outliers and their removal would compromise the number of participants of the sample, making correlational tests and analyses unfeasible.

The following section presents the scoring procedures adopted for the reading comprehension questions, as well as the tests of normality and inter-rater reliability tests.

3.9.4 Scoring of the reading comprehension questions

The reading comprehension questions were corrected and scored by three raters and results from both groups were compared. The raters have similar educational and professional backgrounds, and were selected to assist in this research based on their relevance to the study. They are all experienced English teachers, holding an MA in Applied Linguistics. One of the raters has finished his PhD in Applied Linguistics, while the other two are PhD candidates in the second half of the same course. The raters agreed to correct the open-ended questions following the criteria they usually employ with their students. The objective questions were not corrected by the raters due to the fact that they only allowed one possible correct answer. The raters received the texts and the answers of all the participants either by mail or by e-mail (according to their preference) and were instructed to correct the answers as follows: 1 point if the answer was completely correct; 0,5

point if the answer was partially correct; 0 points if the answer was incorrect. They should only judge the content of the answers, that is, grammatical mistakes should be disregarded.

Cronbach's alpha tests were run in order to check for the internal consistency of the scores on the answers to the comprehension questions of both expository and narrative texts. Cronbach's alpha is a coefficient of reliability that can range from 0 to 1, since it is a ratio of variances (among items and the participants' totals). Despite the lack of agreement among scholars and statisticians, an instrument or test is deemed reliable when alpha is at least .70, but an alpha .60 might also be acceptable as long as the results are interpreted cautiously (Maroco & Garcia-Marques, 2006). In the data set of this study, results obtained with inter-rater reliability tests showed a Cronbach's alpha that was slightly below 0.70 for both expository and narrative texts. Even though these results are somewhat considered to be the most commonly acceptable coefficient by some scholars (George and Mallery, 2003; Larson-Hall, 2010), this researcher decided to rate the tests of both groups, and her rating was then included into the data set in order to run inter-rater reliability tests again.

Table 9 below presents the inter-rater reliability test as regards the expository text, while Table 10 presents the inter-rater reliability test regarding the narrative text.

Table 9. Inter-rater reliability for the expository text

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Raters
.80	.81	4

Table 10. Inter-rater reliability for the narrative text

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Raters
.88	.90	4

As it can be visualized in Tables 9 and 10, above, with a fourth rater, Cronbach's alpha obtained for the expository text was highly reliable (α =.80), as well as for the narrative text (α = .88).

Table 11 below presents the tests of normality for both groups (ExpositoryPR and NarrativePR), as regards reading comprehension for both the narrative and the expository text. The results presented below include the outliers.

Table 11. Tests of normality: reading comprehension – with outliers

Groups	**Kolmogorov-Smirnov**			**Shapiro-Wilk**		
	Statistic	Df	Sig.	Statistic	df	Sig.
RCNarrative – ExpositoryPR	.280	17	.001	.772	17	.001
RCNarrative – NarrativePR	.183	19	.092	.911	19	.078
RCExpository – ExpositoryPR	.154	17	.200*	.929	17	.210
RCExpository – NarrativePR	.168	19	.167	.929	19	.169

With the results obtained from the Shapiro-Wilk's test ($p < .05$), it is possible to assume that only the data for the variable Reading Comprehension of the narrative text – ExpositoryPR group – are not approximately normally distributed. This was also confirmed with visual inspections of the histograms, Q-Q plots, and boxplots (Appendix P1). As for the NarrativePR group, in relation to the same variable, the results obtained from the Shapiro-Wilk's test ($p > .05$) suggest that the data are approximately normally distributed, which was confirmed with visual inspections of the histograms, Q-Q plots, and boxplots of this group for this variable. As regards the variable Reading Comprehension of the expository text, both groups do not differ from an approximately normal distribution, as shown in the results obtained with the Shapiro-Wilk's test ($p > .05$).

When carefully inspecting the boxplots (Appendix P1), it is possible to spot three outliers in the data set: Participants 8 and 9 from the ExpositoryPR group in the variable Reading Comprehension of the narrative text, and Participant 32 in the NarrativePR group in the variable Reading Comprehension of the expository text. Due to the sample size, the nature of these variables, and the fact that such outliers were not in fact masking the existence of further outliers, the researcher decided to keep the participants in the sample. Nonetheless, group

comparisons and correlations tests were run with and without these participants for further comparisons of the results.

Table 12 below presents the tests of normality for both groups (ExpositoryPR and NarrativePR), as regards reading comprehension for both the narrative and the expository text, without the outliers.

Table 12. Tests of normality: reading comprehension – without outliers

Groups	**Kolmogorov-Smirnov**			**Shapiro-Wilk**		
	Statistic	Df	Sig.	Statistic	df	Sig.
RCNarrative – ExpositoryPR	.122	15	.200*	.965	15	.777
RCNarrative – NarrativePR	.198	18	.059	.897	18	.051
RCExpository – ExpositoryPR	.165	15	.200*	.948	15	.488
RCExpository – NarrativePR	.156	18	.200*	.951	18	.434

With the results obtained from the Shapiro-Wilk's test ($p > .05$) run without the outliers, it is possible to verify that all the data in both variables for both groups follow an approximate normal distribution, which was also confirmed with visual inspections of the histograms, Q-Q plots, and boxplots (Appendix P2).

The following section presents the procedures adopted in the Pilot Study, as well as the main contributions for the main study, which was only carried out after all issues were resolved.

3.10 THE PILOT STUDY

According to Bell (2005), the purpose of a pilot study is:

> […] to get the bugs out of the instrument so that respondants in your main study will experience no difficulties in completing it. It also enables you to carry out a preliminary analysis to see whether the wording and format of questions will present any difficulties when the main data are analyzed. (p.147)

The Pilot study described in this section was carried out in order to check whether the texts, instruments and procedures for data collection were adequate for the objectives of the present research. The Pilot Study was carried out with four students, from the same groups of the participants of the main study. The criteria employed to select the participants for the pilot study, as previously mentioned on Section 3.6, was that the first four students that scheduled the individual sessions were automatically participating in the Pilot, and the other ones would be participating in the main study. This method was employed so that the participants of the Pilot Study would be a sample very similar to the ones participating in the main study, regarding age, language proficiency and reading ability.

The Pilot Study was carried out after preparing all instruments. The participants of the Pilot Study performed the proficiency test and the reader profile together with their colleagues, in the first group meeting (see Section 3.8 for details about the meetings). The decision not to pilot these two tests individually was done because the questions of the reading proficiency test were selected from two well-known EFL books, as previously mentioned. As for the Reader Profile, in case any other information was needed, it would be possible to ask them in the following encounters. The remaining tasks were applied to four students from the Technical High School Course at *IFRS Campus Sertão*, as previously mentioned. It is important to emphasize that although they belonged to the same group, they were not the same students who participated in the main study.

The following meetings were conducted individually, being the RST in the second one and the texts, the reading comprehension questions and the retrospective questionnaire in the third. The sections were scheduled according to participants' availability.

The objective of this Pilot Study was to check whether the texts would be adequate to the level of proficiency of the students, as well as whether the questions were clear and relevant for the purpose of this research. It was also important for organization purposes and for maintaining this researcher confident about the instruments and instructions, which is very important to try to make sure that all steps were properly followed.

It was also very helpful in verifying the average time participants would need to perform all tasks. In the Pilot Study it took students from ten to twenty minutes to perform the RST in the second meeting; and from fifty minutes to one hour and forty minutes to read the texts, answer the comprehension questions and the retrospective questionnaire

in the third meeting, so for the main study we scheduled two individual meetings, being a 30-minutes and a 2-hours session.

One important methodological change as regards the RST procedure was done after piloting. Initially, the last words from the sentences were written in the answer sheet while participants were remembering them, but as one of the participants demonstrated that he was feeling anxious, and another one was waiting this researcher to finish writing down one word before starting saying the next, and that could implicate in the results, it was decided that all words would be later transcribed to the answer sheet, from the recordings.

Regarding the Pause Protocol, Ericsson and Simon (1984/1993, as cited in Tomitch, 2007) state that some participants verbalize more than others and even feel more comfortable performing the task, the reason why it is important to take individual differences into consideration. With that purpose in mind, the reader's profile was adapted so as to include questions about how long and in what ways participants have been studying English, as well as the differences between their reading strategies in Portuguese and English.

As regards the reading comprehension questions, one question was excluded because it intended to unveil the extent to which participants though the pre-reading activities helped them to comprehend or even change their minds about the content of the texts, and this kind of question suited better in the retrospective questionnaire. Another question was modified after the Pilot Study, because it was possible to observe that it allowed ambiguity. The reading comprehension questions were also useful to verify whether students really comprehended the texts.

Participants were informed that as they were the first ones performing the tasks, they could suggest improvements, so as to make the experience more comfortable. One of the participants mentioned that he could not concentrate properly because he was feeling hungry, so for the next sessions some snacks and water were available for the participants.

Three out of the four participants claimed that the texts had some key words to which they were not familiar, so this researcher provided a list with the key words of each text, so as to help participants to better comprehend them. Also, because no dictionary or translator was provided, participants were allowed to ask any other words they might find important. The decision of not letting participants use the dictionary was done because classroom experience with the groups showed that some students look word by word in the dictionary and do not try to

understand their meaning by the context. Otherwise, as they had to ask the meaning of the words they did not know, this researcher could have a greater control of the *Knowledge-Based Coherence Break*s, which was one of the inferences categories, according to the Inference Categorization Model proposed by Narvaez et al. (1999).

Although the data from the Pilot Study were not included in the analysis, the participants are also going to receive feedback on their performance, as soon as this PhD dissertation is defended.

It is important to emphasize that the main study was conducted only after considering and solving the issues from the Pilot Study. Chapter IV, subsequently, provides the results from the main study data collection, in order to answer this dissertation's Research Questions.

CHAPTER 4
RESULTS AND DISCUSSION

Race made a slight grimace. 'I'm not used to that. It often seems to me that's all detective work is, wiping out your false starts and beginning again.' 'Yes, it is very true that. And it is just what some people will not do. They conceive a certain theory, and everything has to fit into that theory. If one little fact will not fit it, they throw it aside. But it is always the facts that will not fit in that are significant…" (Agatha Christie, Death on the Nile, 1983)

The main objective of the present research was to investigate whether there was a relationship between Technical High School Brazilian students' WMC, the use of pre-reading activities, and inference generation in reading comprehension in L2**.** This chapter reports the results of the descriptive and statistical tests, as well as the qualitative data analysis, addressing the research questions and hypotheses of the present study, pursuing to achieve the previously mentioned main objective.

This chapter is subdivided into seven sections, following the order in which the tests were applied and the data was collected, and also following the line of reasoning proposed in the Method section. The first section (4.1) presents the results and discussion as regards the proficiency test. The second section (4.2) reports the results of the WM test, followed by a discussion of the data. The third section (4.3) presents the results and discussion as regards the inferences generated by the participants. The fourth section (4.4) addresses the reading comprehension results and discussion. The fifth section (4.5) presents the statistical correlations, that is, the correlations between reading proficiency and working memory (4.5.1), reading proficiency and inference generation (4.5.2) and reading proficiency and reading comprehension (4.5.3). After, the correlations between the two RST scoring methods (4.5.4) are presented, followed by the correlations between working memory and inference generation (4.5.5), and working memory and reading comprehension (4.5.6). At last, the correlations between inference generation and reading comprehension (4.5.7) are addressed. The sixth section (4.6) comprises the insights from the research retrospective questionnaire. At last, in section 4.7 the research questions are readdressed, and the hypotheses are either confirmed, partially confirmed, or refuted, according to the results and discussion presented in this section.

Considering the answers from the reader profile questionnaire, the participants of this research are from 16 to 19 years old, with an average age of 17 years old. Thirty three out of the 36 participants have always studied in public schools, one participant came from a private institution, and two participants have studied at both private and public schools during Elementary School. As regards the length of time they have been studying English, 19 participants have only studied English at school, during the Elementary Course (from the 5th to the 8th grade) and during High School at IFRS (during two semesters in the 2nd year and one semester in the 3rd year). Six students did not have English classes previous to the ones in High School, that is, their schools did not offer the English subject during Elementary School. Two students studied English both at regular school (Elementary and High School) and at a private language course, with the duration ranging from 2 to 4 semesters. At last, 6 participants had English classes both at regular school (Elementary and High School) and at a private language course, with the duration ranging from 5 to 9 semesters.

4.1 READING PROFICIENCY

Participants' reading proficiency was verified through a test that included multiple-choice and true or false questions. Results from participants' tests are presented in Table 13 below.[13]

Table 13. Participants' Scores on the Reading Proficiency Test– from the highest to the lowest scores

Participant	Group	Proficiency Test Score
14	ExpositoryPR	9
6	ExpositoryPR	8,7
1	ExpositoryPR	8,1
26	NarrativePR	8,1
16	ExpositoryPR	8
22	NarrativePR	8
31	NarrativePR	7,3
7	ExpositoryPR	7

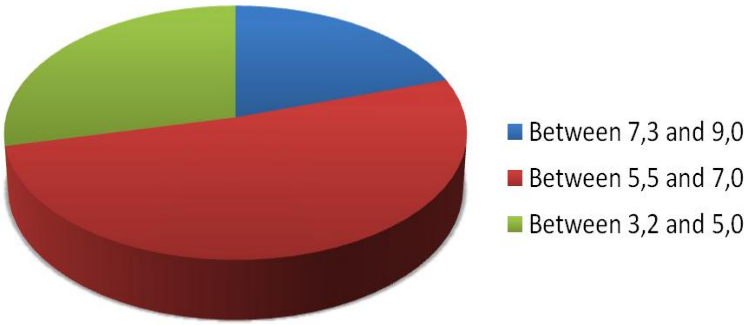
[13]Participants are presented here as a whole group. Just to clarify, participants 1 to 17 belong to Group I (ExpositoryPR) while participants 18 to 36 pertain to Group II (NarrativePR).

8	ExpositoryPR	7
15	ExpositoryPR	7
23	NarrativePR	7
18	NarrativePR	6,5
20	NarrativePR	6,5
33	NarrativePR	6,5
12	ExpositoryPR	6
17	ExpositoryPR	6
25	NarrativePR	6
32	NarrativePR	6
2	ExpositoryPR	5,7
4	ExpositoryPR	5,7
9	ExpositoryPR	5,5
10	ExpositoryPR	5,5
11	ExpositoryPR	5,5
27	NarrativePR	5,5
35	NarrativePR	5,5
5	ExpositoryPR	5
28	NarrativePR	5
3	ExpositoryPR	4,5
21	NarrativePR	4,5
34	NarrativePR	4,5
36	NarrativePR	4,3
30	NarrativePR	4,1
19	NarrativePR	4
24	NarrativePR	3,7
29	NarrativePR	3,2
13	ExpositoryPR	3,2
Mean		**5,93**
Minimun		**3,2**
Maximum		**9,0**

It is possible to observe in Table 13 that P13 and P29 both had the lowest scores (3,2), while P6 (8,7) and P14 (9,0) were the students with the greatest scores in the reading proficiency test. It is important to highlight that P6 and P14 are among the six students who have studied English at private schools for more than five semesters, while P13 and P29 are among the students who have only studied English at public schools. Surprisingly, P2 (5,7), P8 (7,0), P10 (5,5) and P17 (6,0), which are the other students who have been studying English at regular private courses, did not have such great scores in the reading proficiency test, which provides support to the allegation that time of exposure, alone, does not guarantee proficiency, and individual differences such as motivation, aptitude and attention should be taken into consideration.

From the results of the reading proficiency test, it is possible to observe that the participants of this study diverge as regards their ability to comprehend written material in English. Graph 1 below presents the reading proficiency scores divided into three parts: from score 7,3 to 9,0, corresponding to the highest scores; from score 5,5 to 7,0, which correspond to the medium scores; and from 3,2 to 5,0, corresponding to the lowest scores.

Graph 1. Participants' scores on the reading proficiency test divided as high, medium and low scores



Just six students (16,67%) scored from 8 to 9, which corresponded to the greatest scores among the participants of this study. Nineteen participants (52,78%) scored from 5,5 to 7,3. Eleven participants scored from 3,2 to 5,0, which corresponds to 30,55% of the sample. It is possible to visualize in Graph 1 above that the majority of the students scored from 5,7 to 7,0, that is, they had an average level of reading proficiency, as measured by the reading proficiency test.

The relationship between reading in L1 and L2 and whether one's L2 reading comprehension is determined by his/her general reading skills in the L1, or by his/her linguistic knowledge in the L2 has been discussed under two frameworks: the linguistic interdependence hypothesis and the linguistic threshold hypothesis. In a nutshell, the linguistic interdependence hypothesis (e.g. Goodman, 1973; Coady, 1979; Cummins, 1979, 1991, Alderson, 2000) predicts that L1 reading skills are going to be transferred for L2 reading comprehension, which means that a good reader in L1 is going to be a good reader in L2, as well). The linguistic threshold hypothesis (e.g. Clark, 1978; Cummins, 1979, 1991; Cziko, 1980), on the other hand, states that readers need a minimum level of proficiency in the L2 before they can really comprehend texts in that language, so the more proficient the reader, the easier it is going to be for him/her to understand a text. Also, such threshold level varies depending on the level of difficulty of the text. Alderson (1984, as cited in Yamashita, 2002) after reviewing studies that investigated these two hypotheses, concluded that L2 reading comprehension is affected not only by L2 reading skills but also by L2 reading proficiency, and that the latter has greater influence in L2 reading proficiency lower levels.

Taking into consideration these two theories, and given that the participants of the present research are mostly beginners/pre-intermediate learners of English as an L2, it is believed that an interaction of both hypothesis is useful in trying to explain this dissertation's results. It is believed that participants' L2 knowledge played a great role in their reading comprehension and inference generation, but their L1 reading skills cannot be ignored. Furthermore, some participants have not probably reached the threshold linguistic level in the L2, the reason why they were unable to comprehend the texts properly.

After analyzing participants' answers in the retrospective questionnaire, it is believed that the threshold hypothesis played a role in their reading comprehension, because several students mentioned that they struggled with the language during the realization of the activities,

because of lack of L2 knowledge. P34: *"I had a hard time reading the texts because I don't know much English"*; P20: *"It was difficult for me to read the texts because I have little experience with the English language"*; P19: *"My problem was with language domain";* P3: "*It was difficult because I understand almost no words in English";* P13: *"The difficulty I had was due to the fact that I know very few words in the language [English]".* Therefore, as advocated by Zwaan and Brown (1996), lexis is the greatest issue when it comes to L2 reading, especially for non-proficient learners.

Aebersold and Field (1997) bring attention to an important aspect of the issue of the reading proficiency level. They argue that when a student tries to read a text that is somehow beyond his/her language proficiency level, this reader is probably going to feel overwhelmed because of his/her lack of vocabulary or grammar knowledge. However, according to the authors, when a reader has sufficient knowledge about a certain topic, he/she tolerates a greater amount of unknown grammar or vocabulary, because comprehension is supported by background knowledge. In the present research, the use of pre-reading activities was included as a means of diminishing the negative impact that the lack of knowledge might impose on some low proficient students' reading comprehension. It is well acknowledged that background knowledge is very important for the construction of a coherent mental representation in any situation, but it is even more important when it comes to L2 reading, especially in the case of low proficient individuals. (Carrell & Eisterhold, 1983; Tomitch, 1988)

4.2. READING SPAN TEST

Table 14 on the next page presents the scores of the Reading Span Test, by participant, corrected both strictly and leniently.

Table 14. Participants' scores on the RST (strict and lenient)

Group I –ExpositoryPR			Group II –NarrativePR		
PT	**RST –SC**	**RST - LS**	**PT**	**RST - SC**	**RST - LS**
1	3,5	38	**18**	0	30
2	2,5	31	**19**	0	19
3	2,5	26	**20**	3	31
4	3	30	**21**	0	24
5	2	27	**22**	2	26
6	3	38	**23**	2,5	27
7	2	27	**24**	2	28
8	3,5	36	**25**	2,5	26
9	2,5	35	**26**	2	27
10	3	24	**27**	3	31
11	3	27	**28**	2	32
12	2,5	28	**29**	2,5	31
13	3	27	**30**	2,5	23
14	2,5	21	**31**	3	33
15	2,5	25	**32**	2,5	32
16	2,5	29	**33**	2	24
17	3	30	**34**	0	25
			35	2,5	24
			36	0	22
Mean:	**2,73**	**29,35**		**1,79**	**27,10**
Minimum:	**2**	**21**		**0**	**19**
Maximum:	**3,5**	**38**		**3,0**	**33**

PT= Participant RST-SC= Reading Span Test – Strict Score
RST-LS= Reading Span Test – Lenient Score

Following the Strict scoring method, 11 participants were categorized with a span between 3 and 3,5 (intermediate spans, according to Daneman and Carpenter, 1980) while 25 were considered low span readers. No participant achieved a span of 4 or 5, and therefore this scoring method did not have any high span individual.

As for the Lenient scoring method, eleven participants recalled from 31 to 38 words, and were categorized as high spans (Linderholm & van den Broek, 2002). Fifteen participants were considered intermediate spans, with a range between 26 and 30 words. Ten participants were categorized as low span readers, who recalled from 19 to 25 words.

Participants' answers in the retrospective questionnaire provide evidence about their reaction to the RST. Eleven participants affirmed that the test was very interesting and they felt calm during its realization. Five participants reported they felt anxious or confused during the RST test, and five were feeling nervous during the procedure. Five participants answered that they felt challenged by the activity, and felt motivated when they were able to recall the last words. Three students claimed that the test was very difficult. Two participants were feeling insecure according to their responses on the retrospective questionnaire. One student said he felt impotent, another one said he felt disappointed at himself, one was sad for not being able to recall the last words, and two were apprehensive. In sum, most participants reported that the test evoked some kind of anxiety feeling on them, which might have influenced their performance on the task. According to Ntim (2016):

> […] anxiety by itself tends to absorb portion of the cognitive processing and this leads to reduced amount especially in the amount of attention likely to be devoted to task demand (p.117)

Therefore, it is possible to hypothesize that the lack of higher spans in this study could be result of participants' inability to concentrate and remember the sentences final words due to test anxiety, which reduces WM capacity. Ironically, participants' WM span might not be accurate because their WM capacity was not working with its full capacity due to test anxiety. This assumption is corroborated by Ntim (2016), who claims that:

> Emotional states with respect to anxiety, worry, emotional arousal within and among individuals can distract available working memory away from current task and thereby leave insufficient capacity to attend to task demands at hand (Ilkowska & Engle, 2010). When this happens to reduce working memory capacity, task performance can become impoverished because resources needed to perform concurrent task become insufficient. (p.112)

As regards the strategies employed by the participants to help them remember the sentences final words, Friedman and Miyake (2004) proposed a classification of such strategies, which is going to be applied in this study for classification issues. The researchers affirmed that strategies can be visual (mental imagery, mimics), phonological (sub-vocal rehearsal) or semantic (creating sentences, stories). Most participants affirmed that they used some kind of strategy in order to try to recall the sentences last words, and the three kinds of strategies proposed by Friedman and Miyake (2004) were encountered in this study. Twelve participants affirmed that the strategy they employed was to silently repeat the final words, in order to remember them (phonological strategy). Eleven students applied the strategy of assimilating the words with other words, things or feelings (semantic). Six participants made use of a strategy where they counted the sentences with their fingers and attributed a word for each finger, in order to try to recall them (visual). Three participants attempted to create a coherent sentence with the final words, so as to make it easier to remember (semantic). One participant used a distinct strategy, in which he first silently read the final word, to then start reading the sentence aloud, while he repeated the final word silently (phonological). At last, three participants claimed that they did not use any strategy in order to remember the sentences final words.

The use of strategies is an important aspect in determining how effectively attention resources are employed by WM. McNamara and Scott (2001) claimed that the use of strategies may have an impact on participants performance on working memory tasks, which goes against a strong assertion in the field that when the presentation rate is controlled by the researcher, the WM task is so quick that participants do not have time to apply any strategy. Juffs and Harrington (2011) claim that in order to make the research results valid and reliable, two criteria must apply: first, the participants must operate in maximum

capacity (which is somehow difficult to control if one interprets maximum capacity as including being rested, concentrated, in a good mood, for example), and second, the researcher needs to guarantee that "there is no scope for strategic processing that might enhance performance in a way that is not directly related to memory capacity" (p.143), which can be achieved by having participants read the RST sentences aloud and immediately presenting successive items, as was done in the case of the present study.

In the case of this study, no extra time was available for the participants, so as to try to avoid the use of strategies. Therefore, as previously mentioned in the method section, at the moment a participant finished reading the sentence's last word, the next sentence was immediately shown on the screen. However, according to McNamara and Scott (2001), the problem is that "researchers have relied on the assumption that strategies require more time" (p.11). Following the same reasoning, Friedman and Miyake (2004) highlight that "it is perhaps inevitable that participants will develop idiosyncratic strategies for balancing the processing and storage components of working memory span tasks" (p.137). Therefore, it seems logical to affirm that the use of strategies is directly connected with working memory performance, because the better a participant applies strategies to recall the sentences final words, the better is going to be his/her reading span (McNamara & Scott, 2001; Friedman & Miyake, 2004; Wissheimer, 2007). Therefore, as claimed by Weissheimer (2007), individual differences are inherent "in the ability to employ efficient strategies for dealing with the test, and not solely in working memory capacity per se" (p.184).

Another issue regarding the selection of the RST version must be addressed, as it is believed to have an impact on participants' scores. As regards the issue of using different versions of the RST, as well as distinct scoring methods, Juffs and Harrington (2011) state that:

> It is of some concern that so many tests are used and that multiple variations of simple span, non-word repetitions and Reading Span tasks are used by different researchers from different language domains, since it makes comparison among all these studies rather difficult. (p.157)

Among the variations, it is possible to mention the test items, the supervision of the participants during data collection or not, whether the

data are collected individually or in groups, which according to Juffs and Harrington (2011), "make any future meta-analysis highly problematic" (p.157). In the case of this study, a Portuguese version of Daneman and Carpenter's (1980) RST, created by Tomitch (2003) and adapted by Bailer (2011) was used. This is, in fact, an issue which is going to be discussed hereafter, because although it seems plausible to claim that too many versions of a test might be problematic, using the same test with different populations seems even more problematic. Even when the population seems to be similar, as is the case of the participants of this study and Bailer's (2011), that were high school students as well, the geographical and cultural background must be taken into account for the selection of the RST sentences.

Some of the sentences used for the RST version adopted in this study (Tomitch, 2003, adapted by Bailer, 2011) might have had a negative impact on participants' performance on the test. Although they were previously used by Bailer (2011), and before her adaptation were used by Tomitch (2003), among others, the subjects of the present research come from a different region and have a different profile, when compared with those of previous studies. Tomitch's (2003) participants were undergraduate students from a federal university (UFSC), being enrolled on either a language or a medical program. Bailer (2011) changed 8 out of the 60 sentences because according to the researcher they were out of context for high school students, which were the subjects of her study. The participants of the present study are also high school students, but some important distinctions need to be highlighted: they come from the countryside, mostly from public schools and have almost no contact with books outside school (as it can be observed in their answers for the retrospective questionnaire and with my observation as a teacher of this and other groups at the same school). Therefore, it was possible to observe that certain words caused a problem in most participants' reading flow, because they were beyond their preexisting vocabulary knowledge (such as *pradarias* and *antílopes,* that are words that the majority of the participants did not even know how to pronounce, as well as *degradam, emulsões, neandertal, oceanógrafos, anaeróbicos, glaciações*). After reading such words, participants tended to slow down their reading, sometimes rereading the word and trying to make sense of it. Most of the participants showed some sign that the word was difficult, either by laughing, looking at me, or stammering. After that, they showed a tendency to forget the last words from the previous sentences. Thus, although it is not possible to ensure that participants' reading span was a

result of lack of preexisting vocabulary knowledge, it would be interesting to have pre-tested the sentences with a greater similar group, in order to ensure this kind of problem would not arise.

It is possible to suppose that this may be the reason why the greatest reading span in this study was 3.5, while Bailer (2011) and Tomitch (2003) had higher span individuals (as measured by the Strict scoring method), with WM span measures between 3,5 and 6 in Bailer's (2011) study and between 3,5 and 4,0 in Tomitch's (2003) research.

A similar problem was observed by Woelfer (2016) in his study, which was attributed to the RST version (Tomitch, 2003), which was not adapted for high school students. However, some of the words mentioned in his study as burdens (*antílopes* and *pradarias*), were also present in the version adapted by Bailer (2011) and used in the present study. Woelfer (2016) claims that the sentences used for the RST should be within an adequate level of difficulty for participants, so that "they would present the basic requirements for the simultaneous processing, manipulation and maintenance of verbal information in WM" (p.75). A possible solution for controlling pre-existing knowledge of larger samples would be the use of word frequency databases, as pointed out by Woelfer (2016).

According to Hambrick and Engle (2002) better performances in more demanding cognitive verbal tasks might be a result of preexisting knowledge, which seems to be the case of previous studies, but not the case of this particular research, meaning that the version of the RST here employed might have been too difficult for the participants of the present study. However, it is also possible that the most obvious explanation for the lack of high spans applies: the participants of this study were in their great majority low spans. In any circumstance, adaptations to the RST sentences must be performed with caution, not to hinder further comparisons with findings from other studies, because "a number of methodological factors - how the memory tests are administered and interpreted – can affect the validity and reliability of the findings" (Juffs & Harrington, 2011).

4.3 INFERENCE GENERATION

As previously mentioned in the Method chapter, after collecting data, participants' sentences were transcribed and categorized in accordance with the Inference Categorization Model proposed by Narvaez et al. (1999). The categories proposed by Narvaez et al. are

repeated and exemplified again below, so as to help the reader visualize the results:

> ✓ *Explanations:* are related to the reasons why something happens, and include explanations based on background knowledge and text-based explanations.
> ✓ *Associations:* provide information about characteristics and functions of people, objects and events in the text, including background associations and text-based associations.
> ✓ *Predictions:* refer to inferences about future consequences of a specific event.
> In sum, *Explanations* are background inferences, *Association*s are concurrent inferences, while *Prediction*s are forward inferences.
> ✓ *Evaluations:* regard comments about the text content, the text writing, or the reader's state.
> ✓ *Text-Based Coherence Breaks:* relate to statements about the coherence of the text content.
> ✓ *Knowledge-Based Coherence Breaks:* include statements regarding the readers' inability to understand as a result of knowledge or experience lack.
> ✓ *Repetitions:* regard repetitions of words or phrases in the text.(Narvaez et al., 1999, p.490)

Table 15 below presents samples from participants' protocols, translated from Portuguese to English, containing examples from all categories proposed by Narvaez et al. (1999):

Table 15 . Sample protocols and their respective categorization

Participant	***Statement***	**Statement Category**
P6	*There are still 600 thousand villages without electricity, 800 million illiterate people in the world, and more than 1 million people that live daily with hunger and poverty*	*Repetition*

P31	*Then, when he got closer, he saw that the man was throwing things into the water, repeatedly.*	*Repetition*
P28	*The world is kind of unfair because it is very good for some people and very bad for others, so they want it to be good for both sides.*	*Explanation*
P5	*The starfish is actually a message, that means that the small things can make a difference.*	*Explanation*
P20	*So, here in the second [paragraph] he says that he is throwing starfish into the ocean. He is answering the guy, the question that the guy asked in the previous paragraph.*	*Association*
P23	*Since the beginning, when he talked about the richer countries, I associated with the US.*	*Association*
P36	*And to construct a bridge, with the thoughts and culture from nowadays, is very difficult.*	*Evaluation*
P4	*Until the third paragraph I was kind of thinking. After the third paragraph I wasn't thinking anything. The fourth paragraph was even harder. And because I couldn't understand the fourth paragraph, I didn't understand much of the text.*	*Evaluation*
P20	*. In the first paragraph the character is walking on the beach. He is probably on vacation, I think. Let's*	*Prediction*

	see…	
P13	*From the words it is possible to see that the text is about economics, the differences between the poor and the rich.*	*Prediction*
P19	*Then the fisherman said to the other man....I didn't understand if the fisherman and the man are the same, but then the man said 'good morning, friend.*	*Text- Based Coherence Break*
P35	*I don't understand why they would become poorer. There should be a 'no' here. There is no 'no'.*	*Text- Based Coherence Break*
P11	*Why is the word 'I' in capital letters? This 'I' here.*	*Knowledge-Based Coherence Break*
P35	*I don't know whether they die or not [by lack of oxygen], I don't know if they resuscitate...*	*Knowledge-Based Coherence Break*
P11	*Fisherman is a man who fishes?The translation is 'pescador', then?*	*Translation Attempt*
P24	*He saw news [he mistranslated 'news', or 'notícias', in Portuguese, from the word 'noticed'] that people are throwing things into the ocean and contaminating [he mistranslated 'contaminated' from the word 'continued'] the ocean.*	*Incorrect Translation*

A total of 4.775 inferences were generated by the participants during the Pause Protocol task, being 2.342 for the narrative text and 2.433 for the expository one. Table 16 below presents the total number of inferences generated for the narrative and expository texts, as well as the correspondent percentage, divided according to Narvaez et al.'s (1999) Inference Categorization Model.

Table 16. Total number of inferences by text type

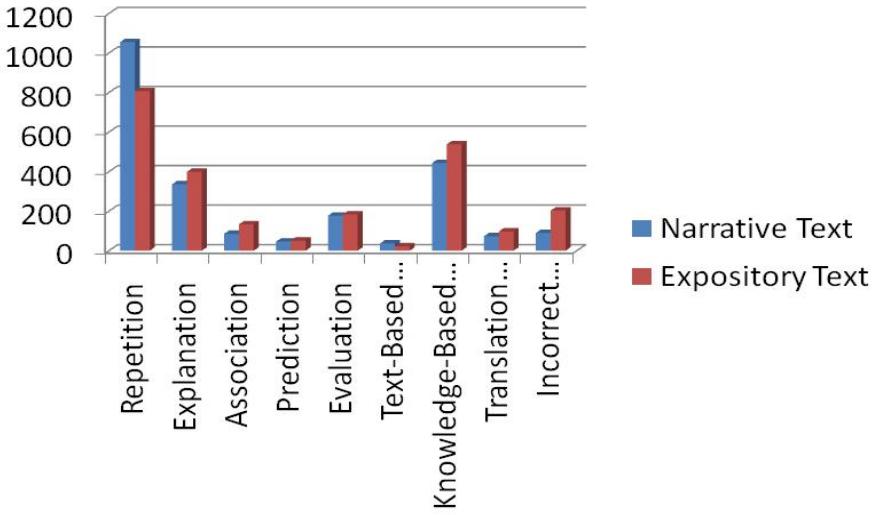
Inference Kind	Narrative text	Expository text
Repetition	1055 (45,05%)	807 (33,17%)
Explanation	336 (14,35%)	399 (16,40%)
Association	85 (3,63%)	133 (5,47%)
Prediction	46 (1,96%)	51 (2,10%)
Evaluation	177 (7,56%)	183 (7,52%)
Text-Based Coherence Break	37 (1,58%)	22 (0,90%)
Knowledge-Based Coherence Break	443 (18,92%)	538 (22,11%)
Translation Attempt	73 (3,12%)	97 (3,99%)
Incorrect Translation	90 (3,84%)	203 (8,34%)
Total	**2342**	**2433**
Mean	**65,05**	**67,58**

As regards the total number of inferences generated for each text, and taking the text type into consideration, the findings from this study do not corroborate those of Graesser, (1981), Britton, Graesser, Glyn, Hamilton and Penland (1983), Graesser and Kreuz (1993), Trabasso and Magliano (1996), Narvaez et al. (1999), Narvaez (2002), among others, who provide evidence that readers generate considerably more inferences when reading narratives. Even though this is not a

quantitative analysis, it is possible to observe that in this study participants generated more inferences for the expository text. More specifically, as it can be visualized in Table 16, a total of 2.342 inferences were generated for the narrative text, in comparison with 2.433 for the expository one. Furthermore, in the studies conducted by Horiba (2000), Baretta (2008) and Caldart (2012), inferences were more frequently generated for the expository text, when compared to the narrative one. According to Horiba (2000), and Baretta (2008), a possible interpretation for the discrepant findings resides in the text used in their experiments, which were not as demanding as those from previous studies (Trabasso & Magliano, 1996; Narvaez et al., 1999, among others). In other words, the reading flow of the less demanding expository texts was probably very similar to the reading flow of the narratives, due to the texts specific features, as topic familiarity and absence of new concepts introduction.

Graph 2 below visually presents the total number of inferences of each kind, generated for each text type, namely narrative and expository.

Graph 2. Total number of inferences by text type



The total number of inferences generated was very similar for the two text types, as it can be visualized in Graph 2 above. In fact, participants generated 91 inferences more for the expository text when

compared to the narrative one. *Repetitions* had the greatest incidence for both text types, followed respectively by *Knowledge-Based Coherence Break*s, and *Explanations*. The least incidence of inferences was observed in the *Text-Based Coherence Breaks* and *Prediction*s, for both text types.

Table 17 below presents the total number of each inference type, separated by text type (narrative and expository) and group (GI – ExpositoryPR and GII – NarrativePR). The percentages were also included in order to facilitate comparisons among the results.

Table 17. Total amount of inferences by group and text type

Inference	**Narrative text**		**Expository text**	
	GI	**GII**	**GI**	**GII**
REP	523 (43,99%)	532 (46,14%)	345 (34,12%)	462 (32,49%)
EXP	165 (13,88%)	171 (14,83%)	209 (20,67%)	190 (13,36%)
ASS	46 (3,87%)	39 (3,38%)	65 (6,43%)	68 (4,78%)
PRED	19 (1,60%)	27 (2,34%)	30 (2,97%)	21 (1,48%)
EV	108 (9,08%)	69 (5,98%)	86 (8,51%)	97 (6,82%)
KBCB	228 (19,18%)	215 (16,65%)	173 (17,11%)	365 (25,67%)
TBKB	12 (1,01%)	25 (2,17%)	9 (0,89%)	13 (0,91%)
TA	48 (4,04%)	25 (2,17%)	38 (3,76%)	59 (4,15%)
IT	40 (3,36)	50 (4,34%)	56 (5.54%)	147 (10,34%)
Total	**1189**	**1153**	**1011**	**1422**
Mean	**69,94**	**60,68**	**59,47**	**74,84**

GI=Group I GII=Group II REP= *Repetition* EXP=*Explanation* ASS=*Association* P=*Prediction* ASS=*Association* TCB=*Text-Based Coherence Break* KCB=*Knowledge-Based Coherence Break* TA=*Translation Attempt* IT=*Incorrect Translation*

As regards the narrative text, the total number of inferences generated was very similar for the two groups: GI (ExpositoryPR) generated 1189 inferences, while GII (NarrativePR) made 1153. It is interesting to observe that Group II, which was the one that performed the pre-reading activity previous to the reading of the narration, had the greatest incidence of *Explanations* and *Prediction*s and the least incidence of *Knowledge-Based Coherence Break*s. As for the expository text, the total number of inferences generated was much greater for Group II (1422), when compared with Group I (1011). The greatest incidence of *Explanations* was observed in Group I, which was the one that took part in the pre-reading activities previous to the reading of the expository text, also with the least incidence of *Knowledge-Based Coherence Break*s and *Incorrect Translation*s.

A possible explanation for the greatest incidence of inference generation for the expository text is related to the familiarity of the participants with the text content (the division between north and south, referring to the rich and poor countries), which is going to be further explained in the following paragraphs. Also, the greater incidence of *Association*s and *Evaluation*s generated in the expository text (which was also observed in Narvaez et al., (1999) and the lowest incidence of *Repetitions* is an evidence of broad background knowledge related to the text topic. As stated by Grabe (2009):

> Readers with minimal background knowledge of a topic tend to produce recalls that reflect the information presented in the text whereas students with extensive background knowledge produce recalls with higher levels of background knowledge and evaluative commentary. (p.47)

According to Afflerbach (1990), prior knowledge "facilitates a number of the component reading processes that otherwise occupy the resources of the cognitive workbench" (p.35). Therefore the demands on cognitive resources are diminished during the processing of texts with familiar topics, in which more inferences are consequently generated.

In accordance with Afflerbach (1990), as prior knowledge facilitates the component reading processes, "fewer resources will have to be allocated to fix-up strategies prompted by comprehension monitoring" (p.35). Therefore, readers are going to have more resources available for higher operations, such as macrostructure construction.

Concerning the importance of schemata for accurate inference generation, Afflerbach (1990), states that:

> […] when the text was unfamiliar and prior knowledge was lacking, the reader might have to restructure an existing schema to accommodate the unfamiliar text, or construct a new schema. In either case, the reader would have to allocate cognitive resources to the task, and there was a greater chance of generating inaccurate hypotheses or inferences. (p.42)

The topic of the expository text was the division between the north and south, referring to the rich and poor countries, an issue that most individuals have an opinion about and also have read many related texts. The narrative text, on the other hand, was about a fisherman who was saving starfish on the beach, which is a topic that is probably not so familiar, and is not related to participants' everyday life either (some of them have even mentioned during the pause protocol that they have never been to a beach). Nevertheless, less familiarity with the topic of the text did not prevent participants from comprehending it. In fact, participants performed better in the reading comprehension questions related to the narrative text. These data seem to bring evidence to support the claim that the text type somehow influences how readers approach a text.

Also regarding topic familiarity, Urquhart and Weir (1998) state that:

> In general, a text should not be so unfamiliar that it cannot be mapped onto a reader's existing schemata. Conversely, the content should not be so familiar that any question set can be answered without recourse to the text itself. (p.144)

It is believed that the texts used as stimuli in the present research were balanced in terms of topic familiarity, taking into consideration the technical high school students that participated in the study. However, it is not possible to predict exactly the amount of knowledge an individual might have on a particular subject, especially when it comes to larger groups.

As regards the influence of the text type, after comparing and analyzing the inferences generated in each text, some possible

conclusions were addressed. First, the number of *Repetitions* increased when participants read the narrative text (1055 *Repetitions*), when compared to the expository text (807 *Repetitions*), as it can be seen in Table 16 (on page 140). This pattern was very similar for both groups, as it can be visualized in Table 17 (on page 142): GI (ExpositoryPR) generated 523 inferences for the narrative text, while GII (NarrativePR) generated 532, which are respectively 43,99% and 46,14% of the total number of *Repetitions* for that text type. A possible explanation is that, as already pointed out, because narratives are easier to understand than expository texts, lower level processing, i.e., repetition, was sufficient for understanding.

In Narvaez et al.'s (1999) study, they observed that participants generated more *Repetitions* and *Evaluation*s when reading with a study purpose than when reading for entertainment. This may be the reason for the great incidence of *Repetitions* and *Evaluation*s observed in this study. Although no direct instruction was provided as regards the reading purpose (participants were only informed on the objectives of this study and were told that they should read the texts in order to comprehend and answer some reading comprehension questions), the data collection setting tends to elicit a more formal and study-related atmosphere. This pattern of findings, according to Narvaez et al. (1999) "corroborates readers' assessments of their own reading processes, in particular their perception that school (study) reading involves more rereading and attempts at integration (Lorch et al., 1993)" (p.493).

Continuing the analysis of each inference type separately with *Explanations,* that are believed to be closely connected to comprehension, Trabasso and Magliano (1996) state that:

> Explanations may serve to guide comprehension in that readers seem to have a need to know the causes and reasons for events and therefore attempt to determine why something occurs. (p.260)

An interesting data resulted from the comparison of the *Explanations* generated. The number explanatory inferences was greater for the expository text (399) when compared to the narrative one (336). According to Narvaez et al. (1999) "increased use of explanation while reading expository text has been related to increased understanding" (p.494). It is also an indicator that the participants in this study seem to

have used the best strategies for study purpose contrary to Narvaez et al.'s (1999) and Spring's (1985) studies results.

Furthermore, more *Explanations* were generated by the groups that performed a pre-reading activity previous to the text in question. Two hundred and nine *Explanations* were generated by Group I (ExpositoryPR) for the expository text, in comparison with 190 of Group II (NarrativePR). As for the narrative text, Group II (NarrativePR) generated more inferences than Group I (ExpositoryPR), being respectively 171 and 165 inferences. Although the differences are very subtle and that this is not a quantitative analysis, it is interesting to observe that the number of *Explanations* increased for the groups, when they performed a pre-reading activity previous to the reading of the text. Hence, it seems that explanatory inferences tend to be generated when coherence is maintained. According to Zwaan and Brown (1996), a factor that distinguishes good and poor readers is the ability of generating *Explanations* regarding the texts being read.

As regards the number of *Association*s, the expository text was the one with the greatest incidence (133) when compared with the narrative text (85). As regards the *Association*s generated by each group, it is interesting to observe that the group that did not perform any pre-reading activity was the one that generated more *Association*s when reading the texts, that is, GI (ExpositoryPR) generated more associative inferences for the narrative text (GI generated 46 *Associations* while GII made 39), while GII (NarrativePR) generated more *Association*s for the expository text (GII generated 68 *Associations* while GI made 65). As *Association*s are nonintegrative inferences, and tend to be generated by less skilled readers, or readers trying to make sense of the text (Zwaan & Brown, 1996), two possible explanations are addressed. First, what may have influenced the results is the lack of a pre-reading activity previous to the text in question.

Lack of relevant schemata related to the text being read may be as problematic as lack of language knowledge for reading comprehension (Carrell & Eisterhold, 1983; Tomitch, 1988). Taking into consideration that the purpose of the pre-reading activities is to build or activate relevant schemata, the absence of such activities is believed to hinder participants' comprehension of the text. Tierney and Cunningham (1984, as cited in Tomitch, 1991) claim that pre-reading activities function as a means of accessing the reader's background knowledge and "provide a bridge between his knowledge and the text" (p.31). When reading a text without the pre-reading activities to provide such a bridge, some information might not be properly associated with the

readers' previous knowledge, which in turn results in poor or insufficient comprehension.

The second possible explanation - which is also connected to the previous discussion - for the finding that the group that did not perform any pre-reading activity was the one that generated more *Association*s when reading the texts, is related to participants' reading skills, because most of them are not proficient in the L2, so the *Association*s were probably made in order to try to construct a coherent representation of the text, even though it might not be the best strategy in this case. When comparing the usefulness of *Explanations* and *Association*s or reading comprehension, Zwaan and Brown (1996), claim that:

> Explanations are more useful inferences than associations because they integrate information, thereby increasing the coherence of mental representation, whereas associations merely elaborate textual information. (p.311)

According to Linderholm and van den Broek (2002), *Association*s "help readers make links between text and their own opinions and background knowledge" (p.783). However, Zwaan and Brown (1996) call attention to the fact that "associations are often not directly supported by the previous text and therefore are likely to be irrelevant or erroneous" (p.294), as in the case of P9's statement *"This made me think about Dilma. I don't know why",* where the subject of the association had no direct relation with the text. For this reason, skilled readers tend to generate less associations than their less skilled counterparts.

Zwaan and Brown (1996) also propose a reflection about the generation of associations by skilled and less skilled readers:

> Are associations generated automatically, and are skilled comprehenders more effective at suppressing them before they reach consciousness than less skilled comprehenders? Or, are the skilled comprehenders simply editing out their potentially irrelevant associations during think-aloud? (p.321)

Although there is not an answer to the above mentioned question, it is interesting to reflect upon the output of think-aloud protocols, that according to Trabasso and Magliano (1996) might result in more ideas

than would occur in normal silent reading, because during the data collection there is a "speaker" addressing a "listener. In this case, some of the inferences might not be related to what was read, but to what was previously verbalized, "overestimating what is actually thought during understanding" (p.283).

Moving on to the results regarding *Predictive inference*s, Magliano, Trabasso and Graesser (1999) define *Prediction*s as "forward oriented in narrative time with respect to the focal sentence and provide the causal consequences of narrative events and actions" (p.618). Such definition gives emphasis to the role of narration in the generation of *Predictive inference*s. Considering the total number of inferences, the differences for the narrative and expository texts as regards *Predictive inference*s is very subtle (51 for the expository text and 46 for the narrative one), which is somehow surprising, due to the fact that a narration is a text type that tells a story and tends to instigate the reader's curiosity. Such result does not corroborate Narvaez et al.'s (1999), in which the number of *Prediction*s was greater for the narrative text, when compared with the expository one.

Interestingly, it is possible to observe that more *Prediction*s were generated for the text with the pre-reading activity, that is, GI (ExpositoryPR) generated more *Prediction*s for the expository text (30 x 21), while GII (NarrativePR) generated more *Prediction*s for the narrative text (27 x 19). It is possible to hypothesize that the predicting activity - in which participants were instructed to observe the title and the highlighted words and predict the content of the text - might have instigated their generation of *Predictive inference*s. However, as both texts had some words highlighted, it is not possible to affirm that participants did not carry out this instruction for both texts, especially because the difference in the total amount of *Prediction*s between the groups was very small.

It is important to emphasize that the small amount of *Predictive inference*s for both texts might be a result of the pre-reading activities, because one of the tasks included looking at the words and expressions that were highlighted, trying to predict the content of the text. As they have already taken a look at the texts' main words and elaborated hypotheses about their content, it is possible that the element of surprise was missing afterwards. Therefore, participants might have concentrated their efforts in confirming or refuting their initial hypothesis instead of creating new *Prediction*s. However, as the number of *Prediction*s was greater for the text in which participants carried out the pre-reading

activities, and not the opposite (as it would be expected), even though the difference is minimal, this assumption cannot be confirmed.

Zwaan and Brown (1996) argue that *Prediction*s are not among the best strategies for reading comprehension, because they are often incorrect. For this reason, most readers are conservative in making *Predictive inference*s. In fact, Magliano, Trabasso and Graesser (1999) claim that some reading strategies are incompatible with one another and that "it is difficult to both explain and predict concurrently" (p.625). Therefore, as *Explanations* are generally related to comprehension (Narvaez et al., 1999), the fact that more *Explanations* were generated than *Prediction*s is actually a good predictor of reading comprehension.

Evaluative comments, which are the next inference category, are considered an indication of critical reading behavior and metalinguistic awareness, because they reflect readers' view about the text content and their own reading behavior. According to Zwaan and Brown (1996), in order to make an *Evaluative* inference the reader needs to "(a) construct a model of the situation described in a sentence, and (b) compare this model to his or her own value system"(p.309). Therefore, because *Evaluation*s presuppose a situation model construction and not directly construct such model, Zwaan and Brown (1996) observed that in their study not many *Evaluation*s were generated for the L2 text, especially for less-skilled readers, when compared with L1 skilled comprehenders.

Reiterating, *Evaluation*s include sentences in which participants made statements as regards their opinion about the content or the writing of the text or their state of mind (Narvaez et al.1999). As can be observed in Table 29, the total number of *Evaluation*s was greater for the expository text (183), when compared with the narrative one (117), which is probably a result of the text topic, that allowed more personal opinion, assigned by P36's comment: *"It is very difficult to build a bridge with the thoughts and culture from nowadays"*. Furthermore, as expository texts are more difficult to understand, participants made more comments about the level of difficulty of the text, as can be seen on P32's comment: *This text is more difficult than the other!"*

Taking the different groups into consideration, GI (ExpositoryPR) generated more *Evaluative* comments for the narrative text (108) than for the expository one (86). Conversely, GII (NarrativePR) made more *Evaluation*s for the expository text (97) than for the narrative one (69). Observing the transcriptions of the think-aloud protocols (samples on Appendices H2 and K2) it is possible to verify that the majority of the comments were related to participants' opinion about the level of difficulty of the text, which explains the

results, because each group generated more *Evaluation*s for the text to which they did not perform the pre-reading activity and therefore was, at least in theory, more difficult to comprehend.

As regards *Text-Based Coherence Breaks*, the greatest incidence was observed for the narrative text, when compared with the expository one (37 *versus* 22), which is believed to be due to the subjective nature of the narrative text. The following is an example of a *Text-Based Coherence Break* made by Participant 11, as regards the narrative text "*Then I think he answered her. No, I guess it was her who asked."* It is possible to observe that he was confused about who the text was referring to, which is probably a consequence of the text structure, that is more subjective.

Curiously, Group II (NarrativePR) generated more *Text-Based Coherence Breaks* for both texts, even though the difference was very small (25 *Text-Based Coherence Breaks* for GII as opposed to 12 for GI, considering the narration; and 13 *Text-Based Coherence Breaks* for GII as opposed to 9 for GII, as regards the exposition). A possible explanation may be that although the groups are similar according to the statistical results, GI's (ExpositoryPR) average scores in the reading proficiency test were greater (6,31), when compared with GII's (5,59) what might have helped them to read the texts more easily.

Regarding *Knowledge-Based Coherence Break*s, the incidence was greater for the expository text, when compared to the narrative one (538 x 443). A possible explanation may be related to the text features, such as lexical choice, style, the presence of cognates, among others. Some participants mentioned in their retrospective questionnaires or during the pause protocol that they found the expository text more difficult than the narrative one; however, such claims were made by a small number of participants, and therefore are not conclusive. One example is P7's statement *"This text [expository] is more difficult than the other"* and P32's *"This one [expository text] is more difficult".*

Interestingly, the number of *Knowledge-Based Coherence Break*s was smaller for the text in which the groups performed the pre-reading activity. Group I (ExpositoryPR) generated 228 *Knowledge-Based Coherence Break*s for the narrative text, while 215 were generated by Group II (NarrativePR). Likewise, 365 *Knowledge-Based Coherence Break*s were generated by Group II (NarrativePR) for the expository text, in comparison with only 173 of the Group I (ExpositoryPR). Therefore, it is possible to hypothesize that the pre-reading activities played a role in reducing the coherence breaks related to each of the

texts, by enabling participants to activate prior knowledge, which in turn facilitates meaning construction.

The number of *Translation Attempt*s was greater for the expository text (97) when compared with the narrative one (73). However, such pattern was different in relation to the groups: GI (ExpositoryPR) generated more *Translation Attempt*s for the narrative text (48) than the expository one (25). Conversely, Group II (NarrativePR) generated more *Translation Attempt*s for the expository text (59) when compared with the narrative text (38). Once again, it is believed that the pre-reading activities might have helped students to activate the relevant schemata and therefore guess the meaning of some unknown words based on the context of the text.

The number of *Incorrect Translation*s was much greater for the expository text (203) when compared with the narrative one (90). Taking the groups into consideration, GII (NarrativePR) generated the greatest quantity of *Incorrect Translation*s (147, which correspond to 50% of the total of *Incorrect Translation*s), when reading the expository text, in relation to GI (56). GII also generated more *Incorrect Translation*s for the narrative text (50) when compared with GI (40). A possible explanation for the discrepant results of GII during the reading of the narrative text might be, once again, the lack of pre-reading activity. However, the fact that GII generated more *Incorrect Translation*s for both texts seems to indicate the greater lack of proficiency of the group, that had the lowest average in the reading proficiency test (5,59), when compared with GI's (6,31) what might have impaired their reading.

It is important to highlight that, differently from Zwaan and Brown's (1996) study that included both correct and incorrect paraphrases into the same category (*Paraphrases*) , this study separated correct *Repetitions* (which include correct *Paraphrases*) from the incorrect ones, which were then categorized as *Incorrect Translation*s.

4.3.1 The relationship between inference generation and reading comprehension: qualitative analysis

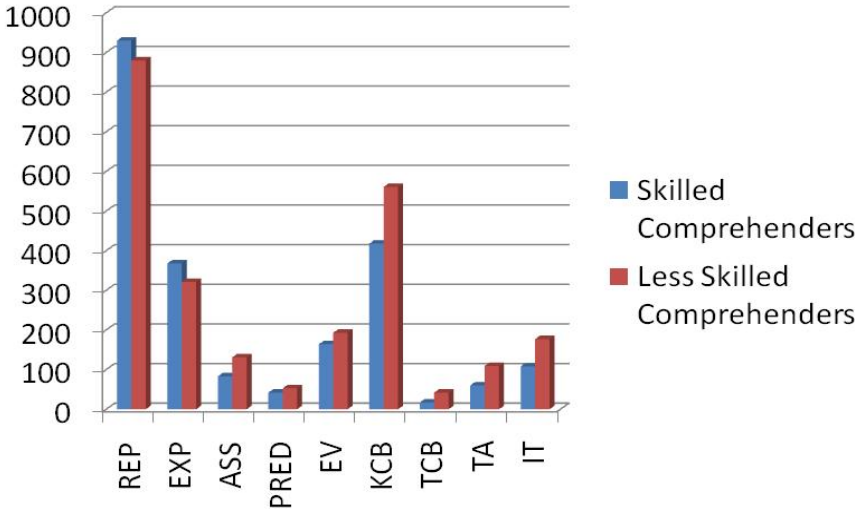
Regarding the relationship between inference type and performance on the reading comprehension questions, it was observed that for twenty six out of the thirty six participants, or 72%, the number of inferences was inferior for the text they performed better, which means that less inferencing was necessary to construct coherence. In other words, they generated more inferences in order to try to

understand the text. In relation to that, Ericsson and Simon (1993) have argued that for readers to provide data during think aloud protocols it is necessary to make use of tasks that demand readers' strategic and monitored control, so that some automatic processes are 'deautomatized'. In this sense, texts considered easy by the readers are read automatically, and consequently are less available to conscious report. According to Pressley and Afflerbach (1995), more challenging texts provide more data because they demand more controlled and careful reading, which was the case of this study, where participants generated more inferences for the text that was more challenging for them.

Taking into consideration the participants with the greatest average scores (i.e., P14 (9,63), P31 (9,15) and P23 (9,08), P27 (9,07) and P2 (8,89)) and those with the lowest average scores (P9 (4,9), P8 (4,9) and P34 (5,09), P19 (5,83) and P24 (5,84)) in the reading comprehension questions, it is possible to observe that the quantity of inferences did not vary so much among them (see Appendices N1, N2, N3 and N4 for the tables containing the number of each inference type generated by each participant for the narrative and expository text types), so what might have affected their performance was the type of the inferences generated.

Following the attempt to find a pattern of inference generation among more skilled and less skilled comprehenders, the 36 participants were separated into two groups, according to their scores in the reading comprehension questions, with 18 individuals in each group (highest and lowest scores). The highest average scores varied from 9,63 to 7,965, while the lowest varied from 4,9 to 7,96. After this separation, the results were more evident: the total number of inferences was greater for the less skilled readers (2517) when compared with the more skilled ones (2258). However, the most interesting results were related to the kinds of inferences that were predominant in each group. While more skilled readers had the greatest incidence of *Repetitions* and *Explanations*, the less skilled readers generated more *Association*s, *Prediction*s, *Evaluation*s, *Text-Based Coherence Breaks*, *Knowledge-Based Coherence Break*s, *Translations Attempts* and *Incorrect Translation*s. The comparison of the kinds of inferences generated by skilled and less skilled readers can be better visualized in the following graph.

Graph 3. Kinds of inferences generated by skilled and less skilled comprehenders



As previously stated in the subsection regarding inference generation, *Explanations* are believed to be more closely related to comprehension (Graesser et al, 1994; Trabasso & Magliano, 1996; Zwaan & Brown, 1996; Narvaez et al. 1999, Magliano, Trabasso & Graesser, 1999, among others), because *Explanations* are the primary means for coherence to be achieved (van den Broek, Risden & Husebye-Hartman, 1995, as cited in Trabasso and Magliano, 1996). In fact, the ability to use *Explanatory* inferences is what differentiates skilled from less skilled comprehenders (Zwaan & Brown, 1996).

Also, Trabasso and Magliano (1996) stated that *Paraphrasing* (which in this study was included in the *Repetitions* inference type) "increased the availability of a sentence for future use during comprehension" (p.282), which allows the construction of a "more coherent and complete textbase" (p.320). Furthermore, *Repetitions* are related to study purpose, which "corroborates readers' assessments of their own reading processes, in particular their perception that school (study) reading involves more rereading and attempts at integration (Lorch et al., 1993)" (p.493). Therefore, as these two inference types (*Explanations* and *Repetitions*) were the only ones in which more skilled

readers had the greatest number, this finding seems to corroborate those of Trabasso & Magliano (1996), Zwaan & Brown (1996) and Narvaez et al. (1999), that observed *Explanations* and *Repetitions* as being related to successful reading comprehension.

The greatest incidence of the other inference types (i.e. *Association*s, *Prediction*s, *Evaluation*s, *Text-Based Coherence Breaks*, *Knowledge-Based Coherence Breaks, Translation Attempts* and *Incorrect Translations*) were observed in the 18 subjects that belonged to the less skilled comprehenders' group. These results are also supported by the literature (Trabasso & Magliano, 1996; Zwaan & Brown, 1996; Narvaez et al. 1999), as it is going to be explained hereafter. According to Zwaan and Brown (1996) because *Association*s are not directly related to the text, they tend to be incorrect or irrelevant, the reason why skilled readers are more selective in the generation of *Association*s. As for *Prediction*s, they are not considered effective for understanding because they might be wrong. In what concerns *Evaluative* comments they are not directly related to situation model construction, since the situation model is the representation of what the text is about, while *Evaluations* encompass readers' perceptions of the text content, the text writing, or the readers' state while reading the text (Narvaez et al., 1999). And finally, *Text-Based Coherence Breaks*, *Knowledge-Based Coherence Break*s, *Translation Attempt*s and *Incorrect Translation*s are directly related with struggle in understanding therefore, it seems plausible to assume that a greater incidence of these inference types is related to less successful comprehension (Zwaan & Brown, 1996; Narvaez et al.1999).

4.4 READING COMPREHENSION

Table 18 on the next page presents the final scores (on a scale from 0 to 10) of the participants for both the narrative and expository text reading comprehension questions.

Table 18. Participants' final scores on the reading comprehension questions for the narrative and expository texts

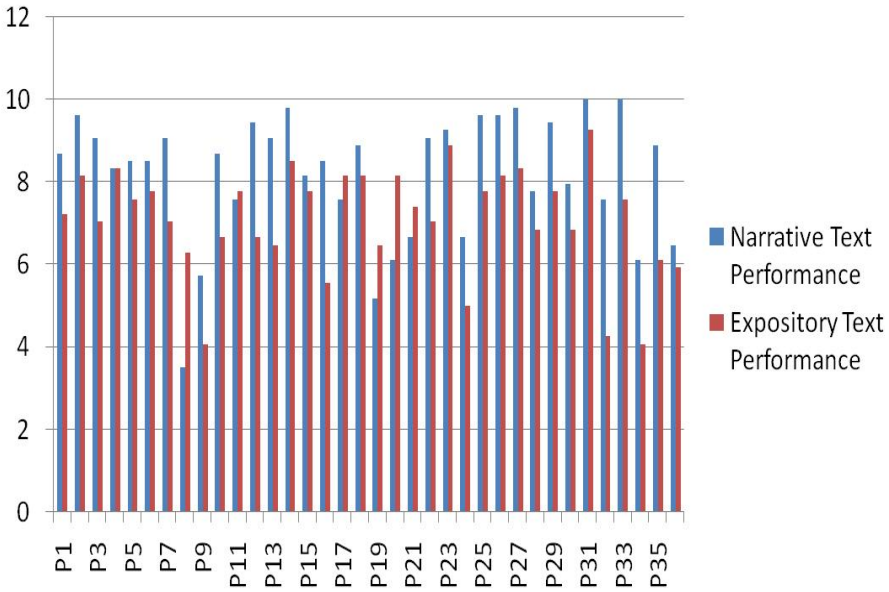
Group I - ExpositoryPR			Group II –NarrativePR		
PT	**RC-NT**	**RC-ET**	**PT**	**RC - NT**	**RC-ET**
1	8,7	7,22	**18**	8,89	8,15
2	9,63	8,15	**19**	5,18	6,48
3	9,07	7,04	**20**	6,11	8,15
4	8,33	8,33	**21**	6,67	7,41
5	8,52	7,59	**22**	9,07	7,04
6	8,52	7,78	**23**	9,26	8,89
7	9,07	7,04	**24**	6,67	5
8	3,52	6,3	**25**	9,63	7,78
9	5,74	4,07	**26**	9,63	8,15
10	8,7	6,67	**27**	9,81	8,33
11	7,59	7,78	**28**	7,78	6,85
12	9,44	6,67	**29**	9,44	7,78
13	9,07	6,48	**30**	7,96	6,85
14	9,81	8,52	**31**	10	9,26
15	8,15	7,78	**32**	7,59	4,26
16	8,52	5,56	**33**	10	7,59
17	7,59	8,15	**34**	6,11	4,07
			35	8,89	6,11
			36	6,48	5,93
Mean	**8,23**	**7,12**		**8,16**	**7,05**
Minimum	**3,52**	**5,18**		**5,18**	**4,07**
Maximum	**9,81**	**8,52**		**10,0**	**9,26**

PT= Participant RC-NT= Reading Comprehension of the narrative text
RC-ET= Reading Comprehension of the expository text

As it can be observed in Table 18 above, Participants' scores were mostly greater for the narrative text (with an average of 8,20) when compared with the expository text (with an average of 7,10), regardless

of the pre-reading treatment. Graph 4 below presents a better visualization of the results, that is, participants' individual performance on the narrative and expository text.

Graph 4. Comparison of participants' individual performance on the reading comprehension questions of the narrative and expository texts



As it can be easily observed in Graph 4 above, participants' performance was better in the narrative text, when compared with the expository one. As stated by Graesser, Singer and Trabasso (1994), "narrative text has a close correspondence to everyday experiences in contextually specific situations" (p.372). Conversely, "expository text is decontextualized and is normally written to inform the reader about new concepts, generic truths, and technical material" (p.372).

As it was successively pointed out throughout this dissertation, there is a great amount of evidence in the literature about the easiness with which individuals read narrative texts, in comparison with other text types, especially exposition (Noordman, Vonk & Kempff, 1992; Graesser & Kreuz, 1993; Trabasso & Magliano, 1996; Koda, 2008, among others).

Table 19 below shows how participants of Group I (ExpositoryPR) scored on the narrative and expository texts (on a scale from 0 to 10), according to the level of difficulty (from 1 - very easy, to 5 - very difficult). Additionally, it provides information regarding participants' perception of their performance in the reading comprehension questions, contrasted with their actual performance.

Table 19. Participants' reading comprehension perception and actual performance – group I (ExpositoryPR)

	NT LD	NT PF	NT RCP	ET LD	ET PF	ET RCP
P1	Very easy	8,7	Excellent	Very easy	7,22	Good
P2	Very easy	9,63	Excellent	Easy	8,15	Excellent
P3	Difficult	9,07	Bad	V. difficult	7,04	Reasonable
P4	V.difficult	8,33	Very good	Average	8,33	Reasonable
P5	Difficult	8,52	Very good	Average	7,59	Reasonable
P6	Easy	8,52	Excellent	Very easy	7,78	Very good
P7	Average	9,07	Good	Easy	7,04	Reasonable
P8	Difficult	3,52	Reasonable	Average	6,3	Reasonable
P9	Average	5,74	Good	Average	4,07	Good
P10	Very easy	8,7	Bad	Average	6,67	Good
P11	Easy	7,59	Good	Average	7,78	Good
P12	Difficult	9,44	Good	Average	6,67	Reasonable
P13	Average	9,07	Reasonable	Difficult	6,48	Reasonable
P14	Average	9,81	Good	Average	8,52	Good
P15	Average	8,15	Good	Easy	7,78	Reasonable
P16	Average	8,52	Reasonable	Difficult	5,56	Good
P17	Easy	7,59	Good	Difficult	8,15	Very good

NT= Narrative Text ET= Expository Text LD = Level of Difficulty[14]
PF = Performance[15] RCP = Reading Comprehension Perception[16]

Table 20 on the next page presents the information on how participants of Group II (NarrativePR) scored on the narrative and expository texts (on a scale from 0 to 10) according to the level of difficulty, which ranged from 1 - very easy, to 5 - very difficult. It also provides information regarding participants' perception of their

[14] Scored by students on the retrospective questionnaire
[15] Participants' scores on the reading comprehension questions
[16] Participants' perception of their reading comprehension performance on both texts

performance in the reading comprehension questions, contrasted with their actual performance.

Table 20 – Participants' reading comprehension perception and actual performance – group II (NarrativePR)

	NT LD	NT PF	NT RCP	ET LD	ET PF	ET RCP
P18	Average	8,89	Reasonable	Average	8,15	Reasonable
P19	Easy	5,18	Bad	Average	6,48	Reasonable
P20	Average	6,11	Reasonable	Difficult	8,15	Good
P21	Easy	6,67	Reasonable	Difficult	7,41	Good
P22	Easy	9,07	Reasonable	Average	7,04	Good
P23	Average	9,26	Very Good	Difficult	8,89	Good
P24	Easy	6,67	Bad	Difficult	5	Bad
P25	Average	9,63	Bad	Easy	7,78	Reasonable
P26	Average	9,63	Reasonable	Difficult	8,15	Good
P27	Difficult	9,81	Good	Average	8,33	Good
P28	Average	7,78	Reasonable	Average	6,85	Reasonable
P29	Average	9,44	Reasonable	Difficult	7,78	Good
P30	Average	7,96	Bad	V. Difficult	6,85	Reasonable
P31	Easy	10	Good	Average	9,26	Very Good
P32	Average	7,59	Reasonable	Difficult	4,26	Good
P33	Easy	10	Reasonable	Difficult	7,59	Good
P34	Average	6,11	Very Good	Average	4,07	Very Good
P35	Average	8,89	Reasonable	V. Difficult	6,11	Good
P36	Easy	6,48	Reasonable	Difficult	5,93	Reasonable

NT= Narrative Text ET= Expository Text LD = Level of Difficulty PF = Performance[17] RCP = Reading Comprehension Perception[18]

Participants' answers in the retrospective questionnaire showed that readers' perception of their own reading performance was, in most cases, similar to their actual reading performance. In fact, among the participants that evaluated their performance incorrectly, a tendency to underestimate their reading comprehension was observed.

The level of difficulty of the texts was evaluated by the participants in the retrospective questionnaire, varying from "very easy"

[17] Participants' scores on the reading comprehension questions
[18] Participants' perception of their reading comprehension performance on each text

to “very difficult”. In general, the narrative text was considered easier by the participants: 8,33% evaluated it as very easy (score 1) while 27,78% considered the text easy (score 2). A great number of participants (47,22%) affirmed that the text was average (not so easy, but not so difficult), while 13,89% rated it as difficult (score 4), and 2,78% as very difficult (score 5). As regards the expository text, 5,56% of the participants evaluated it as very easy (score 1) while 11,11% considered the text easy (score 2). The percentage of students who affirmed that the text level was average (not so easy, but not so difficult) was 41,67% , while 33,33% rated it as difficult (score 4), and 8,33% as very difficult (score 5). Therefore, it is possible to observe that for most participants, the exposition was more difficult than the narration (41,67% rated the expository text as difficult or very difficult, while only 16,67% of the participants gave the same rating for the narrative text). This evidence also corroborates with Narvaez et al.’s (1999), and Trabasso and Magliano’s (1996) findings, that indicate that narratives are easier to comprehend than expository texts.

Participants’ perception about their performance on the reading comprehension questions regarding both the narrative and the expository texts was also verified through a question in the retrospective questionnaire. The possible answers were “excellent”, “very good”, “good”, “reasonable”, and “bad”. As for the narrative text, once again it is believed that participants’ familiarity with the text type might have played a role. Although it is obvious that participants’ perception and their actual performance may vary, it is interesting to observe that reading a text that is considered easier improves their confidence as regards their performance in the reading comprehension questions. The percentage of participants that rated their performance as excellent in the narrative text questions was 2,78%, while 11,11% evaluated it as very good. Almost half the participants (44,44%) believe they did good in the reading comprehension questions of the narrative text, while 38,89% evaluated their performance as reasonable and 2,78% as bad. As for the expository text, 8,33% of the participants rated their performance as excellent in the reading comprehension questions, while 8,33% evaluated it as very good. At last, 27,78% of the students evaluated their performance in the reading comprehension questions of the expository text as good , while 38,89 rated their performance as reasonable and 16,67% as bad.

This evidence also corroborates with Narvaez et al.’s (1999), and Trabasso and Magliano’s (1996) findings, that indicate that narratives are easier to comprehend than expository texts. Moreover, it confirms

that pre-reading activities do not influence reading comprehension as much as text type. However, it is important to highlight that at least some threshold language knowledge is necessary for schema activation and text comprehension (Aebersold and Field, 1997; Tomitch, 1991, Torres, 1998).

4.4.1 Reading comprehension statistical tests

The following paragraphs present the statistical results of the comparisons between the groups (GI - ExpositoryPR and GII - NarrativePR) as regards their performance on the reading comprehension questions. Such results are presented previous to the other statistical results, because it is believed that these findings have an impact on further discussions as regards reading comprehension and the use of pre-reading activities in this study.

An independent sample Mann-Whitney test was used to compare the means of the two groups in terms of their reading comprehension of the narrative text. This non-parametric test was chosen since at least one variable does not follow an approximate normal distribution, as measured by the tests of normality. The mean ranks obtained with the test show that the NarrativePR group (N = 19) outperformed the ExpositoryPR group (N = 17) in terms of their reading comprehension of the narrative text. Still, the results obtained indicate that the groups do not differ statistically from one another ($z = -.143$; $p > .05$). These results were obtained with the test run on the data with the outliers (Participants 8 and 9).

An independent samples t-test was conducted to compare the means of the two groups in terms of their reading comprehension of the expository text. Such a parametric test was selected given the approximate normal distribution of the data for these variables. The results obtained indicate that the groups do not differ statistically from one another ($t = .494$; $p > .05$). The ExpositoryPR group ($M = 6.50$, $SD = 1.03$, $N = 17$) outperformed the NarrativePR group ($M = 6.29$, $SD = 1.46$, $N = 19$) in the reading comprehension of the expository text, even though such difference did not yield statistical significance. These results were obtained with the test run on the data with the outlier (Participant 32).

Independent samples t-tests were conducted to compare the means of the two groups in terms of their reading comprehension of the narrative and expository texts, this time without the outliers. The

removal of outliers from the data set caused an approximate normal distribution in the data for both narrative and expository texts in both groups. The results obtained with the statistical tests revealed that both groups are not statistically different from one another in terms of their reading comprehension of any of the two texts. Nonetheless, unlike the results obtained with the statistical tests run on the data with the outliers, the results revealed that the ExpositoryPR group outperformed the NarrativePR group in terms of their reading comprehension of the narrative text as well as the expository text, as shown in the following table:

Table 21. Group comparisons for reading comprehension

Reading Comprehension	**Groups**	**Statistics**			**t**	**df**	**Sig. (2-tailed)**
		N	Mean	SD			
RCNarrative	Expository PR	15	7.87	.56	1.23	31	.22
	Narrative PR	18	7.39	1.40			
RCExpository	Expository PR	15	6.73	.79	.66	31	.51
	Narrative PR	18	6.48	1.24			

Results from statistical tests in this research present two different perspectives. First, when statistical tests were run with the whole groups, results have shown that Group II (NarrativePR), which performed pre-reading previous to the reading of the narrative test, outperformed Group I (ExpositoryPR) in the reading comprehension questions. Similarly, although for this group the results were not statistically significant, Group I outperformed Group II in the reading comprehension questions of the expository text. These results were expected, as the literature in the area present evidence that pre-reading activities activate relevant schemata (Rumelhart, 1981; Tomitch, 1988; Taglieber, Johnson & Yarbrough, 1988, Ajideh, 2003, Ajideh, 2006; Mihara, 2011) and consequently enhance processing efficiency, reducing the overall demands on working memory (Afflerbach, 1990; Fincher-Kiefer et al., 1988), having a positive effect on comprehension.

However, when removing the outliers from the groups, different results were observed: Group I (ExpositoryPR), which was the group that performed the activities previous to the expository text, was better in the reading comprehension questions of both the expository and narrative texts. Taking these results into consideration, two possible explanations are addressed: (1) the pre-reading activities did not have an impact on readers' comprehension, as expected, and the better results from GI may be attributed to individual features, or (2) the pre-reading activities designed for one of the texts eventually had an impact on both of them.

The following section presents and discusses the results of the statistical correlational tests employed in this study, as regards the variables working memory, reading proficiency, inference generation and reading comprehension.

4.5 STATISTICAL CORRELATIONS

The following sub-sections aim at presenting the results and discussion of the statistical tests employed in this study, which include the correlations between reading proficiency and working memory (4.5.1), reading proficiency and inference generation (4.5.2) and reading proficiency and reading comprehension (4.5.3). Subsequently, the correlations between the two RST scoring methods (4.5.4) are presented, followed by the correlations between working memory and inference generation (4.5.5), and working memory and reading comprehension (4.5.6). At last, the correlations between inference generation and reading comprehension (4.5.7) are presented and discussed.

4.5.1 Correlations between reading proficiency and working memory capacity

The purpose of this subsection is to present and discuss the results of the statistical correlations as regards reading proficiency and working memory capacity. However, previous to this discussion, it is important to present the results of the group comparisons regarding reading proficiency. An independent-samples t-test was performed in order to compare both groups – ExpositoryPR and NarrativePR – in terms of possible differences in their reading proficiency. The results obtained with the statistical test showed that there is not a significant difference in reading proficiency between the ExpositoryPR group (M =

6.318, SD = 1.541, n = 17) and the NarrativePR group (M = 5.589, SD = 1.458, n = 19); t (34) = 1.456, p > .05. In light of the statistical test, it is possible to infer that both groups are similar in their reading proficiency. It is important to highlight that the test run without the outlier (Participant 13) did not show discrepancies either.

The correlation between participants' reading proficiency and WMC, as measured by the RST (strict and lenient) is presented on the following tables. Table 22 below presents the correlations between working memory and reading proficiency with the outlier (P13).

Table 22. Reading proficiency and working memory with outlier

	Correlation Test	**RP x RST Strict**	**RP x RST Lenient**
ExpositoryPR (n=17)	Pearson's Coefficient r	-	.249
	p value	-	.335
	Spearman's Rank Order	.113	-
	r value	.667	-
		RP x RST Strict	**RP x RST Lenient**
NarrativePR (n=19)	Pearson's Coefficient r	-	.099
	p value	-	.697
	Spearman's Rank Order	.226	-
	r value	.578	-

Note. n = sample size; RP = reading proficiency; RST = Reading Span Test; p = significance level; r value = significance level.

Pearson's Coefficient and Spearman's Rank Order tests show very similar results for both groups, that is, no statistically significant correlation was found for the variables reading proficiency and working memory for both groups, with the outlier in the ExpositoryPR group (*p*

>.05).The results of the ExpositoryPR group for the Strict score were *r*=.113, *p*=.667, while for the Lenient scoring method they were *r*=.249, *p*=.335. As for the NarrativePR group the results of the Strict score were *r*=.226, *p*=.578, while for the Lenient scoring method they were *r*=.099, *p*=.697.These correlations can be visualized in the scatterplots generated for these variables of both groups (Appendices S1, S2, S3 and S4).

Table 23 below presents the correlations between working memory (as measured by the RST – Strict and Lenient) and reading proficiency, without the outlier (Participant 13).

Table 23. Reading proficiency and working memory without outlier

	Correlation Test	RP x RST Strict	RP x RST Lenient
ExpositoryPR (n=16)	Pearson's Coefficient r	-	.218
	p value	-	.518
	Spearman's Rank Order	.211	-
	r value	.433	-

Note. n = sample size; RP = reading proficiency; RST = Reading Span Test; p = significance level; r value = significance level.

With the removal of the outlier (Participant 13) from the sample, the results obtained with Pearson's Coefficient and Spearman's Rank Order tests still show no statistically significant interaction among the variables (p >.05) for the ExpositoryPR group. The results of the ExpositoryPR group without the outlier (Participant 13) for the Strict score were *r*=.211, *p*=.433, while for the Lenient scoring method they were *r*=.218, *p*=.518.These correlations can be visualized in the scatterplots generated for these variables of both groups (Appendices S5 and S6).

The lack of significant correlations in the present study may be a result of at least three variables: (1) the small number of participants, which reduces the possibility of achieving significant results, especially because of the lack of higher spans; (2) the version of the RST employed, as already explained in Section 4.2, might have had a

negative impact on participants' performance on the test, not being able to measure participants actual reading span;(3) the level of proficiency of most of the participants was too low, which means that the threshold[19] level might have played a role in their performance. The following paragraphs are an attempt to reflect upon the lack of correlation between these two variables (working memory and L2 proficiency).

It is well acknowledged among reading scholars that WMC is a source of individual differences in L1 (Daneman & Carpenter 1980; Turner & Engle, 1989) and L2 (Harrington & Sawyer, 1992; Miyake & Friedman, 1998, Walter, 2004) development and use. According to Rai, Loschky, Harris, Peck and Cook (2011):

> When processing of an FL is less fully automatized, it will require more attention, which is a central executive resource (Service, Maury, & Luotoniemi, 2002). Thus, processing a FL in which one has low to moderate proficiency will lead to a reduction in executive WM resources (Service et al., 2002). (p.192)

Furthermore, poor vocabulary knowledge results in inefficient lower level reading processes (decoding and lexical access, for example), according to Grabe (1991), and even though the reader is able to automatize these processes, working memory is going to be overloaded. Zwaan and Brown (1996) corroborate with this claim when they state that "lexical access is more resource consuming in L2 than in L1 comprehension" (p.290), the reason why word activation for fluent L2 learners proceeds very similarly to the L1, while less proficient individuals need to use the L1 as a medium to access meaning. Linderholm and van den Broek (2002) also state that L2 English speakers spend a lot of their cognitive resources on translation, leaving a limited amount of resources for text processing. Additionally, L2 proficiency is also necessary to recognize linguistic cues and activate relevant schemata, as claimed by Aebersold and Field (1997), Tomitch (1991), among others.

[19] As previously stated, the linguistic threshold hypothesis claims that readers need a minimum level of proficiency in the L2 before they can really comprehend texts in the L2, so the more proficient the reader, the easier it is going to be for he/she to understand a text. (Clapham, 1996)

Research has shown that working memory capacity is not language-specific (Juffs, 2005; Osaka & Osaka, 1992; Osaka, Osaka & Groner, 1993), that is, "high-span individuals have more attentional resources to draw on than low-span individuals, independent of the language (native or foreign) involved." (Alptekin & Erçetin, 2010, p.206). In Harrington (1992), for example, a significant correlation was found between WMC and performance in L2 vocabulary, grammar and reading.

More recently, researchers have started trying to find evidence for the opposite: that WMC is, indeed, language-specific (Chung & Segalowitz, 2005; Van den Noort, Bosch & Hugdahl, 2006). Van den Noort, Bosch and Hugdahl (2006) carried out a study which aimed at investigating the interaction between WM capacity and language proficiency level. Results indicated that the storage capacity and speeding process of the participants increased proportionally with their proficiency level.

According to Walter (2004) the transfer of the structure-building ability from the L1 to the L2 is crucial for transferring the reading comprehension skills between these two languages. According to the author:

> If successful structure building is accomplished in L1 but not in L2, it is not the ability to build mental structures that is absent; what is lacking is the attainment of some level of L2 ability which acts as a pre-condition for the structure-building skill to operate. (p.333-334)

However, as the great majority of studies are carried out with proficient participants, more research is necessary before it can be claimed that the relationship between L1 and L2 working memory capacities is influenced by one's L2 competence (Alptekin & Erçetin, 2010). Alptekin and Erçetin (2010) also claim that studies that intend to verify the role of working memory on L2 reading should conduct reading span tests in the L2, not the L1, because, according to the authors, "despite the significant relationship between L1 and L2 reading spans, L2 reading span seems to be more directly related to L2 reading comprehension" (p.215). Therefore, it seems plausible to assume that the lack of significant correlational results between WMC and L2 proficiency might be due to the version of the RST employed in this study (Tomitch, 2003, adapted by Bailer, 2011), that might have had a

negative impact on participants' performance on the test due to lack of vocabulary knowledge, as previously mentioned, not being able to measure participants' actual reading span. However, it is important to emphasize that the RST version used in this study is believed to be somehow problematic only taking into consideration the participants of *this* research, not the ones for whom it was designed, that is, Tomitch (2003) and Bailer (2011). This is a limitation of the study which is going to be further addressed in chapter 5. It is also important to highlight that an English version of the test would not be feasible, because of the low proficiency level of the majority of the participants.

4.5.2 Correlations between reading proficiency and inference generation

The results reported in the present sub-section come from the statistical correlations between reading proficiency and inference generation, regarding both groups (ExpositoryPR and NarrativePR) and both text types investigated in this study (narrative and expository).

Table 24 below presents the correlations between reading proficiency and the types of inferences investigated in this research, based on Narvaez et al.'s (1999) taxonomy, as regards the expository text.

Table 24. Correlations between reading proficiency and the amount of inferences generated by type for the expository text

	Correlation Test	REP x RP	EXP x RP	ASS x RP	PRED x RP	EV x RP	KBCB x RP	TBCB x RP	TA x RP	IT x RP	TOTAL x RP
ExpositoryPR (n=17)	Pearson's Coefficient r	.055	-	-	-	-	-	-	-	-	-
	p value	.833	-	-	-	-	-	-	-	-	-
	Spearman's Rank Order	-	.021	-.275	.144	-.277	-.367	-.289	-.455	**-.545***	-175
	r value	-	.936	.284	.582	.282	.147	.260	.066	**.024**	.501
NarrativePR (n=19)	Pearson's Coefficient r	-.006	-	-	-	-	-.403	-	-	-.165	-.303
	p value	.980	-	-	-	-	.087	-	-	.499	.208
	Spearman's Rank Order	-	.019	-.007	.164	.000	-	-.158	**-480***	-	-
	r value	-	.938	.977	.503	.999	-	.517	**-.038**	-	-

Note. n = sample size; RP = reading proficiency; REP = *Repetition;* EXP = *Explanation;* ASS = *Association*; PRED = *Prediction*; EV = *Evaluation*; KBCB = *Knowledge-Based Coherence Break*; TBCB = *Text-Based Coherence Break*; TA = *Translation Attempt*; IT = *Incorrect Translation*; p = significance level; TOTAL = all types combined; *Correlation is significant at the 0.05 level (2-tailed).

According to Tomitch (1991), individuals' ability to make inferences is influenced by domain knowledge. However, domain knowledge alone does not guarantee that readers are going to generate

the most appropriate inferences when reading a text. Therefore, in order to activate the appropriate schemata and consequently the most accurate inferences, readers should be able to recognize linguistic cues. It is assumed that such recognition is only possible when the individual is proficient in a particular language. Torres' (1998) findings, conversely, provide evidence that "to some extent a high degree of domain knowledge may compensate for an inadequate L2 proficiency" (p.72), which does not mean that language deficiencies might be overcome through domain knowledge. In the case of the present research, it is believed that the impact of the lack of L2 proficiency might have been diminished through the pre-reading activities, which were expected to activate participants' schemata and enhance their domain knowledge. Therefore, it is important to keep in mind, while observing the results, that the two groups received different pre-reading activities, that is, the ExpositoryPR (Group I) had access to the pre-reading activity only previous to the expository text, while the NarrativePR (Group II) carried out the activities previous to the reading of the narrative text.

As it can be observed in Table 24 above Spearman's Rank Order tests show similar results for each of the experimental groups. Two statistically significant correlations were found, one for each of the experimental groups: one between *Incorrect Translation* and Reading Proficiency, which is a negative, moderate, statistically significant correlation (r=-.545, p=.024) for the ExpositoryPR group and one between *Translation Attempt* and Reading Proficiency, which is also close to a negative, moderate, statistically significant correlation(r=-480, p=.038). No statistically significant correlations were found for the remaining variables (*Repetitions*, *Explanations, Associations, Predictions, Evaluations, Knowledge-Based Coherence Break*s, *Text-Based Coherence Breaks* and Total of inferences) for both groups in terms of the relationship between the groups' reading proficiency and their type of inferences generated for the expository text.

Table 25 on the next page presents the correlations between reading proficiency and the types of inferences investigated in this research, based on Narvaez et al.'s (1999) taxonomy, as regards the narrative text.

Table 25. Correlations between reading proficiency and the amount of inferences generated by type for the narrative text

	Correlation Test	REP x RP	EXP x RP	ASS x RP	PRED x RP	EV x RP	KBCB x RP	TBCB x RP	TA x RP	IT x RP	TOTAL x RP
ExpositoryPR (n=17)	Pearson's Coefficient r	-.203	-	-	-	-	-	-	-	-	-
	p value	.436	-	-	-	-	-	-	-	-	-
	Spearman's Rank Order	-	.250	-.379	.026	-.476	**-.656****	-.045	-.313	-.379	-.449
	r value	-	.334	.134	.921	.054	**.004**	.864	.221	.133	.071
NarrativePR (n=19)	Pearson's Coefficient r	.002	-.319	-	-	-.386	-	-	-	-	**-.465***
	p value	.995	.183	-	-	.103	-	-	-	-	**.045**
	Spearman's Rank Order	-	-	.155	-.204	-	-.121	-.324	-.169	-.252	-
	r value	-	-	.527	.402	-	.622	.177	.490	.298	-

Note. n = sample size; RP = reading proficiency; REP = *Repetition;* EXP = *Explanation*; ASS = *Association*; PRED = *Prediction*; EV = *Evaluation*; KBCB = *Knowledge-Based Coherence Break*; TBCB = *Text-Based Coherence Break*; TA = *Translation Attempt*; IT = *Incorrect Translation*; p = significance level; TOTAL = all types combined; *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

As it can be observed in Table 25 above Pearson Product-Moment Correlation Coefficient and Spearman's Rank Order tests show similar results for each of the experimental groups. Two statistically significant correlations were found, one for each of the experimental groups: one between *Knowledge-Based Coherence Break*s and Reading Proficiency, which is a negative, moderate, statistically significant correlation (r=-.656, p=.004) for the ExpositoryPR group and one

between the Total number of inferences and Reading Proficiency, which is close to a negative, moderate, statistically significant correlation (*r*=-465, *p*=.045). No statistically significant correlations were found for the remaining variables (*Repetitions*, *Explanations*, *Association*s, *Prediction*s, *Evaluation*s, *Text-Based Coherence Breaks*, *Translation Attempt*s and *Incorrect Translation*s) for both groups in terms of the relationship between the groups' reading proficiency and their type of inferences generated for the narrative text.

In sum, although no statistically significant correlations were found between reading proficiency and most of the types of inferences generated for both the narrative and the expository texts, four statistically significant results were found for both groups, being two for the narrative text and two for the expository one. For the expository text, a negative, moderate statistically significant correlation was found between *Incorrect Translation* and Reading Proficiency for the ExpositoryPR Group. For the NarrativePR Group, a negative, close to moderate statistically significant correlation between *Translation Attempt* and Reading Proficiency was found. These results are easily explainable, because the more proficient a reader is the less *Translation Attempts* and *Incorrect Translation*s he/she is going to make.

Two other results did not reach statistical significance, but were very close to, and therefore deserve attention: the negative correlation between *Translation Attempt* and reading proficiency (*r*=-455, *p*=.066) of Group I (ExpositoryPR),which means that the greater the reading proficiency of the participants, the smaller was the quantity of *Translation Attempt*s observed. Also, a negative correlation between *Knowledge-Based Coherence Break*s and reading proficiency (*r*=-.403, *p*=.087) of Group II (NarrativePR) was observed, meaning that the greater the reading proficiency of the individuals, the smaller was the number of *Knowledge-Based Coherence Break*s observed. These findings were also expected, because it is believed that the greater is an individual's reading proficiency the less *Translations Attempts* and *Knowledge-Based Coherence Break*s (that are integration attempts) he/she is going to make while reading a text.

The results were very similar for the narrative text: a negative, moderate statistically significant correlation was found between *Knowledge-Based Coherence Break*s and Reading Proficiency for the ExpositoryPR Group. This result was also expected, because the more proficient a reader is, the less *Knowledge-Based Coherence Break*s he/she going to make. For the NarrativePR Group, a negative, close to moderate statistically significant correlation between the Total number

of inferences and reading proficiency was found. It is important to highlight that this same variable (Total of inferences) almost reached a negative significance for the ExpositoryPR group as well (r=-.449, p=.071). These results were somehow unexpected, because according to Cain, Oakhill, Barnes and Bryant (2001) more skilled readers tend to generate more inferences than less skilled readers. According to Narvaez et al. (1999), "narrative texts may promote increased inferencing" (p.493), which is probably the reason why the significant statistical correlations were found for the narrative text, but not the expository one.

The variable *Evaluations* was also close to reaching significance (r=-.476, p=.054). The negative correlation between *Evaluations* and reading proficiency was expected, because even though they indicate metalinguistic awareness and critical reading behavior, *Evaluations* presuppose a situation model construction, but do not directly construct it, according to Zwaan and Brown (1996), who also observed a smaller incidence of evaluative comments in their study, for the L2 text, especially by less-proficient participants.

As regards the issue of L2 proficiency and inference generation, Zwaan and Brown (1996) claim that "a certain level of L2 knowledge and skill is necessary for L2 inference generation and situation model construction"(p.322), the reason why it is expected that more inferences are generated by more proficient readers, when compared with less proficient ones.

As previously mentioned, the other types of inference did not reach statistical significance, what is probably due to the small sample of the study. As stated by Juffs and Harrington (2011) "as sample size increases, the likelihood of obtaining statistically significant correlations also increases" (p.145), so the lack of correlations in this study may be a reflection of the sample size. Another possible explanation for the lack of statistically significant results might be the constraints of L2 proficiency limitations, as most of the participants are not proficient in the L2.

4.5.3 Correlations between reading proficiency and reading comprehension

This sub-section intends to address the results and discussion of the correlations between reading proficiency and reading comprehension. Table 26, below, presents the correlations between

reading proficiency and reading comprehension for both groups (ExpositoryPR and NarrativePR), including the outliers.

Table 26. Reading proficiency and reading comprehension correlations with outliers

	Correlation Test	**Reading Proficiency x RCExpository**	**Reading Proficiency x RCNarrative**
ExpositoryPR (n=17)	Pearson's Coefficient r	.167	-
	p value	.523	-
	Spearman's Rank Order	-	.019
	r value	-	.944
NarrativePR (n=19)	Pearson's Coefficient r	.469*	.575*
	p value	.043	.010

Note. n = sample size; RCExpository = reading comprehension of the expository text; RCNarrative = reading comprehension of the narrative text; p = significance level; *Correlation is significant at the 0.05 level (2-tailed).

As shown in Table 26 above, Spearman's Rank Order Correlation Coefficient and Pearson Product-Moment Correlation Coefficient tests revealed different results for each of the experimental groups. Concerning the first experimental group, the ExpositoryPR group (n = 17), no statistically significant correlations between Reading Proficiency and Reading Comprehension of both expository (r=.167, p=.523) and narrative texts (r=.019, p=.944) were found (p> .05). As for the second experimental group, the NarrativePR group (n = 19), moderate positive statistically significant correlations were found between Reading Proficiency and Reading Comprehension of the expository (r=469, p =.043) and narrative (r=.575, p =.010) texts. This can be visually confirmed by inspecting the scatterplots generated for these variables of both groups (Appendices S7 and S8).

Table 27 below presents the correlations between reading proficiency and reading comprehension for both groups (ExpositoryPR and NarrativePR), this time without the outliers.

Table 27. Reading proficiency and reading comprehension correlations without outliers

	Correlation Test	Reading Proficiency x RCExpository	Reading Proficiency x RCNarrative
ExpositoryPR (n=14)	Pearson's Coefficient r	-.080	.233
	p value	.785	.423
NarrativePR (n=18)	Pearson's Coefficient r	.616**	.585*
	p value	.006	.011

Note. n = sample size; RCExpository = reading comprehension of the expository text; RCNarrative = reading comprehension of the narrative text; p = significance level; *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 27 above, Pearson Product-Moment Correlation Coefficient tests show different results for each of the experimental groups. Regarding the first experimental group, the ExpositoryPR group (n = 14), no statistically significant correlations between Reading Proficiency and Reading Comprehension of both expository (r=-.080, p=.785) and narrative texts (r=.233, p=.423) were found (p> .05). As for the second experimental group, the NarrativePR group (n = 18), moderate positive statistically significant correlations were found between Reading Proficiency and Reading Comprehension of the expository (r=.616, p =.006) and narrative (r=585, p =.011) texts. This can be visually confirmed by inspecting the scatterplots generated for these variables of both groups (Appendices S9 and S10).

Statistical results on the correlation between reading proficiency and reading comprehension present evidence that only for the NarrativePR Group, that is, GII, participants' reading proficiency

positively correlated with reading comprehension. As for the ExpositoryPR Group, that is, Group I, no statistical evidence was found between these two variables. A possible explanation is related to the different pre-reading treatment these two groups received. GI (ExpositoryPR) was instructed to observe five pictures that intended to start a reflection upon the subject of the text "Building a Bridge"; the pictures portrayed people trying to connect themselves or building concrete and metaphorical bridges. The pre-reading activity for the narrative text, "Making a Difference" that was only performed by GII (NarrativePR), included two videos; in the first one they could observe a kind of 'pass-it-forward chain', in which a person started doing something gentle to another one, who in turn helped another fellow, until it returned to the first person of the video, who did not intend to receive anything for his attitude but in the end was somehow forwarded. The second video was about group work, in which a tree had fallen on the street, blocking the transit and causing a mess, and when a small child went in the rain to try to take it off the road, everybody got touched by the act and started trying to help. Indeed, with everyone's help they were able to move the tree and continue with their lives. These two videos were intended to start a reflection on the importance of helping others, because even the small attitudes are capable of aiding people, and all these acts together might make the world a better place. It was expected that participants would benefit from these activities, which were supposed to activate relevant schemata related to the texts topics. However, although one of the texts was about the differences between the north and south, the industrial and developing nations and how it would be important to connect these two sides; and the other was a narration about a fisherman who was throwing starfish back to the ocean to prevent them from dying, the two texts were somehow about the same general topic: help. Therefore, the reading activities intended for one of the texts probably helped participants to activate schemata on both topics. However, it is believed that the NarrativePR Group (GII) have benefited more from the activity, because the videos are broader in relation to the pictures, that only portrayed the "building a bridge" and "north and south differences" topics. This is probably the reason why reading proficiency and reading comprehension only correlated for GII (NarrativePR), even though no statistically significant difference was encountered between both groups' reading proficiency (Expository PR Group $M=6.318$, $SD=1.541$, $N=17$; NarrativePR Group $M=5.589$, $SD=1.458$, $N=19$; $t(34)=1.456$, $p > 0.5$), with and without the outlier (P13).

Zwaan and Brown (1996) bring attention to the fact that non-fluent readers are "severely constrained by a lack of efficient lexical and syntactic process" (p.322) during L2 comprehension. In the case of the present study, the audio-visual pre-reading activities presented before the narrative text, only for Group II (NarrativePR) might have helped these participants to activate relevant schemata and consequently integrate information across sentences, arriving at a coherent situation model. As it can be observed by the correlation between reading proficiency and reading comprehension found for the NarrativePR group, the more proficient a reader, the greatest his/her performance on the reading comprehension questions, which brings another evidence to the threshold level hypothesis. According to Zwaan and Brown (1996):

> […] a certain level of L2 knowledge and skill is necessary for L2 inference generation and situation model construction so that L2 comprehension performance is not solely a function of a general language independent comprehension skill. (p.322)

Therefore, L2 readers need to achieve a certain level of proficiency in the L2 before comprehension can be achieved. However, it is important to emphasize that language proficiency alone does not guarantee that comprehension is going to be achieved. In addition to the knowledge of the language, the activation of relevant prior knowledge related to the topic of the text might help readers to construct a coherent situation model, when they have achieved such threshold level. In the case of the present study, relevant background knowledge was activated through the use of pre-reading activities related to the topic of the texts.

According to Urquhart and Weir (1998), as regards the threshold linguistic level, "there is a level below which a deficit in one component cannot be compensated for by a corresponding strength in another" (p.72), therefore, even though some participants' WM capacity is greater than the others, their lack of English proficiency made it difficult for them to understand the text. Therefore, the inclusion of the pre-reading activities was done so as to try to provide participants with the background knowledge necessary in order to comprehend the texts, as a means to balance lack of language proficiency and WMC constraints, because according to Hudson (1982, as cited in Clapham, 1996) it is possible for readers to override language problems if they are

encouraged to call up the relevant schemata, but only if they are strategic enough.

4.5.4 Working memory correlations: strict and lenient methods

The analysis reported in the present sub-section aims at discussing the results of the correlations between both WM scoring methods employed in this study, that is, Strict and Lenient, in an attempt to check the extent to which the scores obtained on these tests by the participants of this study correlate. This would also provide, to some degree, indication that both RST scoring methods were measuring the same constructs. Table 28 below presents the results concerning the correlations between both RST scoring methods, i.e., Strict and Lenient.

Table 28. Working memory correlations: RST strict and lenient scoring methods

	Correlation Test	RST Strict x RST Lenient
Expository PR (n=17)	Spearman's Rank Order	.515*
	r value	.035
NarrativePR (n=19)	Spearman's Rank Order	.543**
	r value	.016

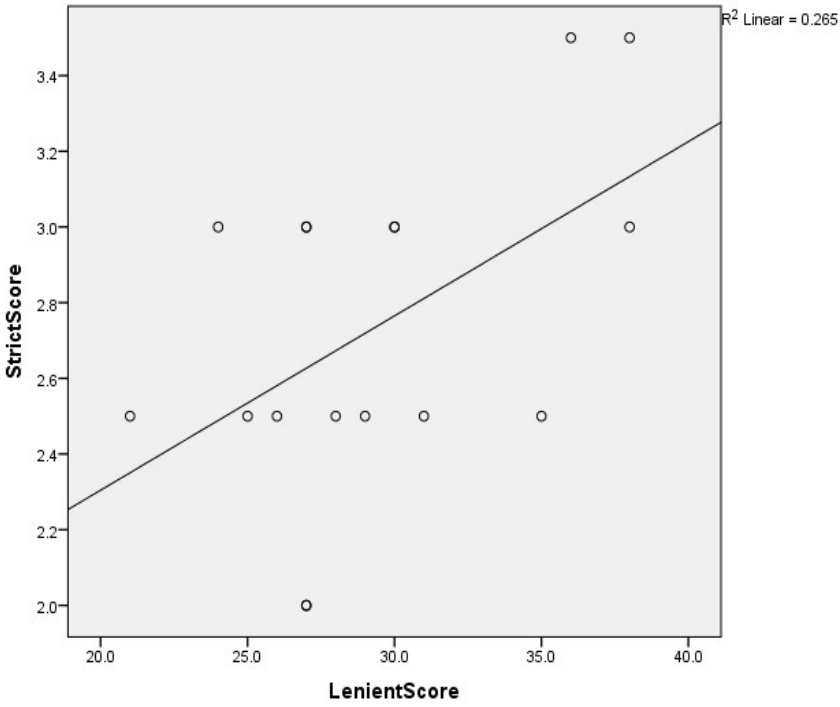
Note. n = sample size; p = significance level; RST = Reading Span Test; *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 28 above, Spearman's Rank Order tests show similar results for both groups. A moderate, positive, statistically significant correlation ($p < .05$) was found for the RST in terms of its Strict and lenient scoring methods (r=.515, p=.035 for the ExpositoryPR group, and r=.543, p=.016 for the NarrativePR

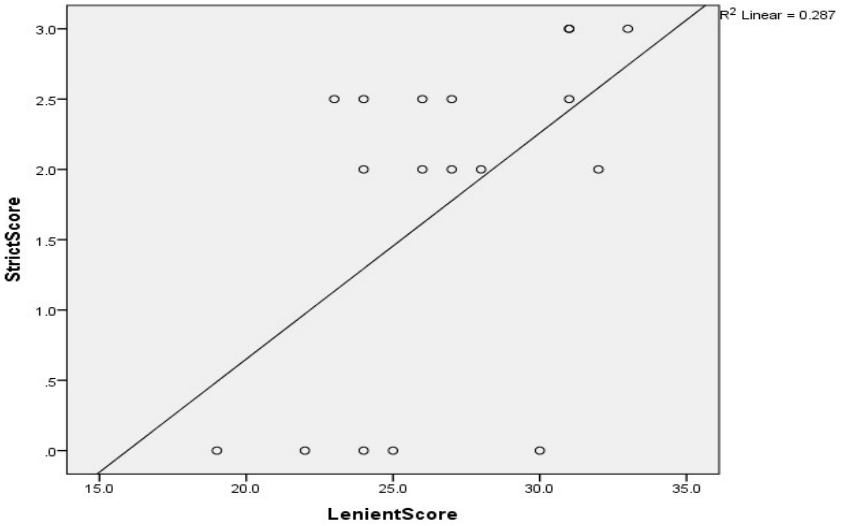
group).These results are confirmative of the alignment in terms of the two scoring methods chosen for the RST.

In order to graphically visualize the correlations reported in Table 28, scatterplots representative of those tests are now presented. Graphs 5 and 6 below present the correlations for the RST Strict and Lenient scoring methods. Graph 5 presents the correlations between Lenient and Strict scoring methods as regards the ExpositoryPR group, while Graph 6 presents the correlations between Lenient and Strict scoring methods as regards for the NarrativePR group.

Graph 5. Scatterplots of the correlations for the RST's strict and lenient scoring methods for the ExpositoryPR group



Graph 6. Scatterplots of the correlations for the RST's strict and lenient scoring methods for the NarrativePR group



It is possible to observe in Graphs 5 and 6 previously presented that the dots representing the two variables (Strict and Lenient scoring methods) slope from lower/mid left to upper right, which visually confirms that the two scoring methods (strict and lenient) are positively correlated.

As previously mentioned, a moderate, positive, statistically significant correlation between RST Strict and Lenient score methods was found in the present study, which means that possibly both scoring methods were measuring the same construct.

4.5.5 Correlations between working memory and inference generation

This sub-section intends to address the results and discussion of the correlations between WM (Strict and Lenient scoring) and inference generation for both groups (ExpositoryPR and NarrativePR) concerning the two text types investigated in this study, i.e. narrative and expository. Table 29 below presents the correlations between working memory capacity (Strict scoring) and inference generation, regarding the expository text.

Table 29. Working memory capacity (strict scoring) and inference generation correlations for the expository text

	Correlation Test	REP x S	EXP x S	ASS x S	PRED x S	EV x S	KBCB x S	TBCB x S	TA x S	IT x S	TOTAL x S
ExpositorryPR (n=17)	Spearman's Rank Order	-.134	**.506***	.385	.343	-.377	-.372	-.251	-.395	-.303	.029
	r value	.609	**.038**	.127	.178	.135	.142	.331	.117	.238	.913
NarrativePR (n=19)	Spearman's Rank Order	**.468***	.074	.240	-.040	-.264	.188	.200	-.236	-.084	.315
	r value	**.043**	.762	.322	.870	.274	.440	.411	.332	.732	.189

Note. n = sample size; S = strict scoring of the Reading Span Test; REP = *Repetition*; EXP = *Explanation*; ASS = *Association*; PRED = *Prediction*; EV = *Evaluation*; KBCB = *Knowledge-Based Coherence Break*; TBCB = *Text-Based Coherence Break*; TA = *Translation Attempt*; IT = *Incorrect Translation*; p = significance level; TOTAL = all types combined; *Correlation is significant at the 0.05 level (2-tailed).

As shown in Table 29 above, Spearman's Rank Order tests show similar results for both groups in that only one statistically significant relationship was found between each of the experimental group's working memory and their inference generation. Regarding the ExpositoryPR group, a positive, moderate statistically significant correlation was obtained ($p < .05$) between the *Explanations* and WM in relation to the expository text (r=.506, p=.038). As for the NarrativePR group, a positive, moderate statistically significant correlation was found($p < .05$) between *Repetitions* and WM concerning the expository text (r=*.468, p=.043*). As far as all of the other variables are concerned, statistical correlation tests run on the data showed no significant

relationships in either of the experimental groups. The implications of these findings are going to be further discussed later in this sub-section.

Table 30 below presents the correlations between working memory capacity (Lenient scoring) and inference generation, for both groups (ExpositoryPR and NarrativePR) regarding the expository text.

Table 30. Working memory (lenient scoring) and inference generation correlations for the expository text

	Correlation Test	REP x L	EXP x L	ASS x L	PRED x L	EV x L	KBCB x L	TBCB x L	TA x L	IT x L	TOTAL x L
ExpositoryPR (n=17)	Pearson's Coefficient r	.089	-	-	-	-	-	-	-	-	-
	p value	.734	-	-	-	-	-	-	-	-	-
	Spearman's Rank Order	-	**.497***	.083	-.070	-.041	-.148	-.144	-.169	.074	.364
	r value	-	**.043**	.750	.789	.877	.570	.582	.516	.777	.151
NarrativePR (n=19)	Pearson's Coefficient r	-	.055	-	-	-	.181	-	-	-.316	.163
	p value	-	.822	-	-	-	.458	-	-	.187	.506
	Spearman's Rank Order	**.587****	-	-.033	-.279	-.106	-	.101	-.133	-	-
	r value	**.008**	-	.892	.248	.666	-	.637	.586	-	-

Note. n = sample size; L = lenient scoring of the Reading Span Test; REP = *Repetition*; EXP = *Explanation*; ASS = *Association*; PRED = *Prediction*; EV = *Evaluation*; KBCB = *Knowledge-Based Coherence Break*; TBCB = *Text-Based Coherence Break*; TA = *Translation Attempt*; IT = *Incorrect Translation*; p = significance level; TOTAL = all types combined; *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 30, Pearson Product-Moment Correlation Coefficient and Spearman's Rank Order tests show similar results for both groups in that only one statistically significant relationship was found between each of the experimental group's WMC and their inference generation. Regarding the ExpositoryPR group, a positive, close to moderate statistically significant correlation ($p < .05$)was obtained between the *Explanations* and WM in relation to the expository text (r=.497, p=.043). As for the NarrativePR group, a positive, moderate statistically significant correlation ($p < .05$) was found between *Repetitions* and WM concerning the expository text (r=.587, p=.008). No significant relationships were found as regards the other variables in either of the experimental groups considering the Lenient scoring method of the RST. The implications of these findings are going to be further discussed later in this sub-section.

Table 31 below presents the correlations between WMC (Strict scoring) and inference generation for both groups (ExpositoryPR and NarrativePR) regarding the narrative text.

Table 31. Working memory (strict scoring) and inference generation correlations for the narrative text

	Correlation Test	REP x S	EXP x S	ASS x S	PRED x S	EV x S	KBCB x S	TBCB x S	TA x S	IT x S	TOTAL x S
ExpositoryPR (n=17)	Spearman's Rank Order	.296	**.522***	.010	-.248	-.154	-.088	-.088	.191	.013	.182
	r value	.249	**.032**	.971	.337	.555	.766	.331	.463	.238	.912
NarrativePR (n=19)	Spearman's Rank Order	**.484***	-.275	.211	-.276	-.309	.187	-.214	-.128	-.261	.075
	r value	**.036**	.255	.386	.252	.199	.443	.379	.602	.281	.761

Note. n = sample size; S = strict scoring of the Reading Span Test; REP = repetition; EXP = explanation; ASS = *Association*; PRED = *Prediction*; EV = *Evaluation*; KBCB = *Knowledge-Based Coherence Break*; TBCB = *Text-Based Coherence Break*; TA = *Translation Attempt*; IT = *Incorrect Translation*; p = significance level; TOTAL = all types combined; *Correlation is significant at the 0.05 level (2-tailed).

As shown in Table 31, Spearman's Rank Order tests show similar results for both groups in that only one statistically significant relationship was found between each of the experimental group's WMC and their inference generation considering the narrative text. Similar to the results previously presented, regarding the expository text, for the ExpositoryPR group, a positive, moderate statistically significant correlation was obtained ($p < .05$) between *Explanations* and WM in relation to the narrative text (r=.522, p=.032). As for the NarrativePR group, a positive, close to moderate statistically significant correlation was found ($p < .05$) between *Repetitions* and WM concerning the narrative text (r=.484, p=.036). As far as all of the other variables are concerned, statistical correlation tests run on the data showed no significant relationship in either of the experimental groups. The implications of these findings are going to be discussed later in this sub-section.

Table 32 on the next page presents the correlations between working memory capacity (Lenient scoring) and inference generation for both groups (ExpositoryPR and NarrativePR) regarding the narrative text.

Table 32. Working memory (lenient scoring) and inference generation correlations for the narrative text

	Correlation Test	REP x L	EXP x L	ASS x L	PRED x L	EV x L	KBCB x L	TBCB x L	TA x L	IT x L	TOTAL x L
ExpositoryPR (n=17)	Pearson's Coefficient r	-.187	-	-	-	-	-	-	-	-	-
	p value	.473	-	-	-	-	-	-	-	-	-
	Spearman's Rank Order	-	.295	.010	-.218	-.184	-.106	-.068	.148	.076	.032
	r value	-	.251	.971	.400	.479	.687	.795	.572	.772	.904
NarrativePR (n=19)	Pearson's Coefficient r	.013	-.302	-	-	-.361	-	-	-	-	-.292
	p value	.957	.208	-	-	.129	-	-	-	-	.225
	Spearman's Rank Order	-	-	-.084	-.062	-	-.080	-.186	.054	-.210	-
	r value	-	-	.732	.800	-	.746	.446	.827	.388	-

Note. n = sample size; L = lenient scoring of the Reading Span Test; REP = *Repetition*; EXP = *Explanation;* ASS = *Association*; PRED = *Prediction*; EV = *Evaluation*; KBCB = *Knowledge-Based Coherence Break*; TBCB = *Text-Based Coherence Break*; TA = *Translation Attempt*; IT = *Incorrect Translation*; p = significance level; TOTAL = all types combined; *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 32 above, Pearson Product-Moment Correlation Coefficient and Spearman's Rank Order tests show no statistically significant interaction between any of the inference generation and WM variables in relation to the narrative text by both experimental groups ($p > .05$) as far as the lenient scoring method is concerned.

Moving to the discussion as regards the results of the correlational statistical tests between inference generation and WMC, concerning the two RST scoring methods employed in this study (Strict and Lenient), two correlations were observed for the expository text, in relation to the relationship between inference generation and WMC, being one for each of the groups. This correlation was equal for both scoring methods, which is explainable by the fact that both scoring methods (Lenient and Strict) correlate positively in this study, meaning that they measure the same constructs. Regarding the ExpositoryPR Group (GI), a positive, moderate, statistically significant correlation was found between *Explanations* and WMC. This result is not surprising, because it is well acknowledged among reading scholars that skilled and less skilled readers can be differentiated by their ability to generate explanatory inferences (Zwaan & Brown, 1996; Trabasso & Magliano, 1996; van den Broek & Lorch, 1993, Graesser et al, 1994, among others). This may be explained by the assertion that *Explanations* help to "integrate the sentence information into a more coherent memory representation" (Magliano, Graesser & Trabasso, 1999, p.616), resulting in a better retention of the text, as well. Also, a better retention of the text was observed among the participants who generated *Explanations* during reading (Trabasso and Magliano; 1996; Magliano, Graesser & Trabasso, 1999).

Also regarding the expository text, a positive, moderate, statistically significant correlation was encountered between *Repetitions* and WMC for the NarrativePR Group (GII). This result is probably an effect of the text type, because according to Narvaez et al. (1999) "expository texts seem to evoke study-type behaviors" (p.493), which include the generation of *Repetitions*.

As for the narrative text, the same correlations were found between *Explanations* (ExpositoryPR Group) and *Repetitions* (NarrativePR Group) and WMC, but just when considering the Strict score method. However, it is interesting to observe that even though both text types presented correlations between WMC and *Repetitions*/ *Explanations*, the correlations were stronger for the narrative text, when compared with the expository one. The correlation between WMC (Strict scoring) and inference generation for the expository text was r=.506 (p.038), while this same correlation was r=522 (p.032) for the narrative text. Similarly, the correlation between *Repetitions* and WMC for the expository text was r=468 (p.043) as compared with r=484 (p.036) for the narrative text. The influence of the text type might have played a role in the above mentioned results, because, as previously

mentioned, narrative texts instigate different reading behaviors when compared with expository texts (Narvaez et al., 1999; Trabasso & Magliano, 1996), especially because they are easier to understand, and promote more inferences in general, especially *Explanations*.

No statistically significant correlations were observed between inference generation and WMC (Lenient score), for the narrative text. The lack of significant results for the Lenient score might be due to the sample size, which is small, and as already pointed out, the smaller the sample, the more difficult it is to observe statistically significant results. According to Juffs and Harrington (2011) "the absence of a significant correlation, especially in comparison to previous studies, may merely reflect direct sample sizes" (p.145).

4.5.6 Correlations between working memory and reading comprehension

This sub-section intends to address the results and discussion of the correlations between working memory (strict and lenient scoring) and reading comprehension for both groups (ExpositoryPR and NarrativePR) concerning the two text types investigated in this study, i.e. narrative and expository. Table 33 on the next page presents the correlations between WMC and reading comprehension, including the outliers.

Table 33. Reading comprehension and working memory with outliers

	Correlation Test	RCExpository x RST Strict	RCExpository x RST Lenient	RCNarrative x RST Strict	RCNarrative x RST Lenient
ExpositoryPR (n=17)	Pearson's Coefficient r	-	-.277	-	-
	p value	-	.281	-	-
	Spearman's Rank Order	-.093	-	-.378	.-367
	r value	.724	-	.135	.148
		RCExpository x RST Strict	RCExpository x RST Lenient	RCNarrative x RST Strict	RCNarrative x RST Lenient
NarrativePR (n=19)	Pearson's Coefficient r	.503*	.181	-	-
	p value	.028	.458	-	-
	Spearman's Rank Order	-	-	.463*	.311
	r value	-	-	.046	.195

Note. n = sample size; RCExpository = reading comprehension of the expository text; RCNarrative = reading comprehension of the narrative text; p = significance level; RST = Reading Span Test; *Correlation is significant at the 0.05 level (2-tailed).

As shown in Table 33 above, Pearson Product-Moment Correlation Coefficient and Spearman's Rank Order tests show different results for each of the experimental groups. While no statistically significant correlations were found for the first experimental group, the ExpositoryPR group (n = 17), in terms of the relationship between the groups' reading comprehension of both expository and narrative texts and the participants' WMC ($p > .05$), the results obtained with the statistical tests for the second experimental group – the NarrativePR group (n = 19), showed moderate, positive, statistically significant correlations ($p < .05$) between the group's reading comprehension of both the expository and narrative texts and their working memory capacity as far as the strict scoring method is concerned (r=.463, p=.046), but not the lenient method ($p > .05$). These correlations can be

visualized in the scatterplots generated for these variables of both groups (Appendices S11 and S12).

Table 34 below presents the correlations between working memory capacity (Strict and Lenient scoring methods) and reading comprehension, for both groups (ExpositoryPR and NarrativePR), as regards the two text types investigated in this study (narrative and expository) without the outliers.

Table 34. Reading comprehension and working memory without outliers

	Correlation Test	RCExpository x RST Strict	RCExpository x RST Lenient	RCNarrative x RST Strict	RCNarrative x RST Lenient
ExpositoryPR (n=14)	Pearson's Coefficient r	-	-.033	-	-.206
	p value	-	.910	-	.480
	Spearman's Rank Order	-.035	-	-.422	-
	r value	.905	-	.133	-
		RCExpository x RST Strict	RCExpository x RST Lenient	RCNarrative x RST Strict	RCNarrative x RST Lenient
NarrativePR (n=18)	Pearson's Coefficient r	-	.445	-	.428
	p value	-	.064	-	.076
	Spearman's Rank Order	.615**	-	.491*	-
	r value	.007	-	.039	-

Note. n = sample size; RCExpository = reading comprehension of the expository text; RCNarrative = reading comprehension of the narrative text; p = significance level; RST = Reading Span Test; *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 34 above, Pearson Product-Moment Correlation Coefficient and Spearman's Rank Order tests show different results for each of the experimental groups. While no statistically

significant correlations were found for the first experimental group, the ExpositoryPR group (n = 14), in terms of the relationship between the groups' reading comprehension of both expository and narrative texts and the participants' WMC (p> .05), the results obtained with the statistical tests for the second experimental group – the NarrativePR group (n = 18), showed moderate, positive, statistically significant correlations (p< .05) between the group's reading comprehension of both the expository and narrative texts and their WMC as far as the strict scoring method is concerned *(*r=.615, p=.007), but not the lenient method (p > .05), when outliers were not factored in. These correlations can be visualized in the scatterplots generated for these variables of both groups (Appendices S13 and S14).

Results from the statistical tests were different for both groups (ExpositoryPR and NarrativePR) in terms of their correlation between WMC and reading comprehension. No statistical correlation between these two variables was found for Group I (ExpositoryPR). However, for Group II (NarrativePR), a moderate, positive, statistically significant correlation between participants' reading comprehension and their WMC was observed. Nevertheless, such correlation was found only as far as the Strict score is considered, not the Lenient method.

A possible explanation for the lack of statistical significance of the ExpositoryPR Group is that it is smaller in the amount of participants (n=17), in comparison with the NarrativePR Group (n=19), which is a small difference but when it comes to statistical analysis, as previously pointed out, the smaller the sample, the more difficult it is to reach statistical significance.

The fact that only the Strict scoring method presented statistical significance, and not the Lenient, may be explained by the fact that "the Lenient score, for its nature, is less related to control than the Strict score which reflects controlled processes." (Finardi & Weissheimer, 2008, p.380) Because WM capacity limitations are probably more related to control and less related to automatic processes the correlation between working memory and reading comprehension was only observed for the Strict score.

As regards the result observed for Group II (NarrativePR), that presented a moderate, positive, statistically significant correlation between WMC and reading comprehension, it is possible to assume that once again the audiovisual pre-reading activity might have played a role, because the correlation was found for both the narrative and the expository text. Therefore, this group's schemata were probably

activated for both texts, which enriched their comprehension (Tomitch, 1991).

Taking into consideration that expository texts are considered more difficult to understand than narratives (Narvaez et al., 1999; Trabasso & Magliano, 1996), after analyzing the data from higher and lower spans, as well as their reading comprehension scores and the amount of inferences generated for each text, it is possible to observe that the results of the present study do not corroborate the evidence encountered in the literature that supports that differences between higher and lower spans are more evident when the task is difficult, as opposed to tasks considered easy, in which both groups will present similar results (Just & Carpenter, 1992; Budd, Whitney & Turley, 1995; Baretta, 2008, among others). Some of the participants with the greatest RST scores were better in the reading comprehension questions of the narrative text, while others had greater scores with the expository text. The same happened with the participants with the lowest RST scores. Similarly, the number of inferences generated by high and low spans did not follow a pattern. A possible explanation for such results might be the pre-reading activities that activated participants' schemata, making both texts similar in the level of difficulty. Therefore, what might have played a role in participants' results on the reading comprehension questions and on the inferences generated was probably individual interest in the text topics.

P14, which is a skilled reader, proficient in English, but was considered a low span because he could not remember many final words in the RST, emphasized in his retrospective questionnaire that *"I believe that my difficulty in memorizing words does not affect negatively my ability to read and comprehend texts in English."* In fact, P14 seemed extremely nervous during the RST, as well as the majority of the participants (see section 4.2 for details). Therefore, his low span might be attributed to inability to remember the sentences final words due to test anxiety. P14's scores on the reading comprehension questions were among the highest in the groups, which seems to bring evidence that he is a skilled, proficient reader, and his reading span was probably jeopardized by his anxiety, which according to Ntim (2016) can induce poor working memory performance.

4.5.7 Correlations between reading comprehension and inference generation

This subsection presents the statistical analysis of the correlations between inference generation and reading comprehension, as regards both groups (NarrativePR and ExpositoryPR) and both text types (narrative and expository). Table 35 below presents the results of the correlations between inference generation and reading comprehension, as regards the expository text.

Table 35. Reading comprehension and inference generation correlations for the expository text

	Correlation Test	REP x RC	EXP x RC	ASS x RC	PRED x RC	EV x RC	KBCB x RC	TBCB x RC	TA x RC	IT x RC	TOTAL x RC
ExpositoryPR (n=17)	Pearson's Coefficient r	.283	-	-	-	-	-	-	-	-	-
	p value	.271	-	-	-	-	-	-	-	-	-
	Spearman's Rank Order	-	.328	-.006	-.226	.257	.011	.155	.076	-.201	.060
	r value	-	.199	.983	.384	.320	.968	.552	.773	.438	.819
NarrativePR (n=19)	Pearson's Coefficient r	.295	.431	-	-	-	.051	-	-	-.280	.014
	p value	.221	.065	-	-	-	.834	-	-	.246	.953
	Spearman's Rank Order	-	-	-.045	.066	-.334	-	-.415	**-.642****	-	-
	r value	-	-	.854	.789	.162	-	.077	**.003**	-	-

Note. n = sample size; RC = reading comprehension; REP = Repetition; EXP = *Explanation;* ASS = *Association*; PRED = *Prediction*; EV = *Evaluation*; KBCB = *Knowledge-Based Coherence Break*; TBCB = *Text-Based Coherence Break*; TA = *Translation Attempt*; IT = *Incorrect Translation*; p = significance level; TOTAL = all types combined; **Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 35, Pearson Product-Moment Correlation Coefficient and Spearman's Rank Order tests show similar results for each of the experimental groups. A negative, moderate, statistically significant correlation ($p < .05$) was found between *Translation Attempt* and Reading Comprehension for the NarrativePR group (r=-.642, p=.003). No statistically significant correlations were found for the remaining variables (*Repetitions*, *Explanations, Associations*, *Predictions*, *Evaluations*, *Knowledge-Based Coherence Breaks*, *Text-Based Coherence Breaks, Incorrect Translations* and *Total*) for both groups in terms of the relationship between the groups' reading comprehension and the types of inferences generated for the expository text.

In a nutshell, just one negative moderate statistically significant correlation was found between inference generation and reading comprehension of the expository text. The negative correlation encountered was between *Translation Attempt* and reading comprehension for the NarrativePR Group (GII). Also, *Text-Based Coherence Breaks* almost achieved significance (r=-.415, p=.077), and therefore also deserves attention. These results show that the less participants tried to translate the text and the less they had coherence breaks related to the text, the greater was their reading comprehension.

Table 36 on the next page presents the results of the correlations between inference generation and reading comprehension for both groups (ExpositoryPR and NarrativePR), as regards the narrative text.

Table 36. Reading comprehension and inference generation correlations for the narrative text

	Correlation Test	REP x RC	EXP x RC	ASS x RC	PRED x RC	EV x RC	KBCB x RC	TBCB x RC	TA x RC	IT x RC	TOTAL x RC
ExpositoryPR (n=17)	Pearson's Coefficient r	-	-	-	-	-	-	-	-	-	-
	p value	-	-	-	-	-	-	-	-	-	-
	Spearman's Rank Order	.323	-.299	.259	.267	.116	-.322	-.240	.033	-.149	.025
	r value	.206	.243	.316	.301	.657	.208	.354	.899	.568	.923
NarrativePR (n=19)	Pearson's Coefficient r	.287	-.349	-	-	**-.690****	-	-	-	-	-.311
	p value	.234	.143	-	-	**.001**	-	-	-	-	.196
	Spearman's Rank Order	-	-	-.254	-.265	-	.132	-.433	**-.548***	**-.460***	-
	r value	-	-	.294	.273	-	.591	.064	**.015**	**.048**	-

Note. n = sample size; RC = reading comprehension; REP = *Repetition;* EXP = *Explanation;* ASS = *Association*; PRED = *Prediction*; EV = *Evaluation*; KBCB = *Knowledge-Based Coherence Break*; TBCB = *Text-Based Coherence Break*; TA = *Translation Attempt*; IT = *Incorrect Translation*; p = significance level; TOTAL = all types combined; *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 36 above, Pearson Product-Moment Correlation Coefficient and Spearman's Rank Order tests show that no statistically significant correlations were found for all of the variables for the ExpositoryPR group in terms of the relationship between the group's reading comprehension and the types of inferences generated for the narrative text ($p > .05$). As for the second experimental group – the NarrativePR group – three statistically significant relationships were

found ($p < .05$), which are going to be discussed in the following paragraphs: a negative, close to strong relationship between *Evaluation* and the group's reading comprehension of the narrative text (r=-.690, p=.001); a negative, moderate relationship between *Translation Attempt* and the group's reading comprehension of the narrative text (r=-.548, p=.015); and, finally, a negative, moderate relationship between *Incorrect Translation* and the group's reading comprehension of the narrative text (r=.-460, p=.048) were found.

In a nutshell, no statistically significant correlations were observed between inference generation and reading comprehension for the narrative text when considering the ExpositoryPR Group (Group I). As for the NarrativePR Group (Group II), three statistically significant correlations between inference generation and reading comprehension for the narrative text were found: a negative, close to strong correlation between *Evaluation* and reading comprehension; a negative, moderate relationship between *Translation Attempt* and reading comprehension; and a negative, moderate correlation between *Incorrect Translation* and reading comprehension of the narrative text. Also, *Text-Based Coherence Breaks* and reading comprehension of the narrative text almost reached significance (r=-.433, p=.064), and therefore, their negative correlation deserve attention as well.

The negative correlations were expected, because *Evaluation*s, *Text-Based Coherence Breaks*, *Translation Attempt*s and *Incorrect Translation*s are not integrative inferences. As previously mentioned, *Evaluation*s include the reader's opinion about the topic of the text, or his/her state of mind during the reading activity. *Text-Based Coherence Breaks*, *Translation Attempt*s and *Incorrect Translation*s, when excessively made may have a negative impact in the reading flow, and therefore jeopardize reading comprehension, so the least of these three inference types are made, the better for reading comprehension.

The aim of Section 4.5 was to present and discuss the correlational results of the statistical tests employed in this study. The following section addresses the insights that came from participants' answers in the retrospective questionnaire, as means to try to clarify some of this study's findings.

4.6 RETROSPECTIVE QUESTIONNAIRE INSIGHTS

The aim of the following section is to present some of the answers from participants' retrospective questionnaires that might help to understand the results of the present study. The main reason for

including a retrospective questionnaire in this study was to verify whether participants had any problems while performing the tasks that could have affected the results, in any of the steps of the data collection procedures. The answers provided in the retrospective questionnaires helped to better understand the results, allowing data triangulation and providing more internal validity to the research.

Thirty four participants (94,44%) reported having vocabulary or other language related problems (expressions, sentence order) while reading the texts, which were attributed to their low proficiency in English. Only two students (5,55%), P1 and P6, stated that they did not have any problems while reading and verbalizing the texts. Such results provide evidence that even the participants with an intermediate reading proficiency level (as measured by the reading proficiency test employed in this study) had language issues while reading the texts. It is important to highlight that most of the students who claimed having vocabulary problems when reading the texts affirmed that the pre-reading activities helped them to better understand such texts, which reinforces the importance of pre-reading activities for schema activation and consequent reading comprehension.

A question about whether participants believed the pre-reading activities helped their approach and further comprehension of the texts was also included in the retrospective questionnaire. Thirty participants (83,33%) affirmed that the pre-reading activity performed helped them to better understand the text in question, while six participants (16,67%) claimed that the pre-reading tasks did not seem to have helped them with the texts. From these 6 participants, four were among the most proficient students, as measured by the reading proficiency test employed in this study (P1, P6, P18 and P31). Therefore, it is possible to suppose that, at least for these more proficient participants, the pre-reading activities probably had less influence in their reading comprehension than it did for the less proficient ones.

It was expected that the lack of pre-reading activity for one of the texts would be mentioned, but instead, seven participants mentioned that the videos or the pictures actually helped them to understand both texts. In fact, the topics of both texts were more related than predicted by this researcher, the reason why the results regarding the impact of pre-reading activities were cautiously analyzed. As five out of the seven participants who mentioned the impact of the pre-reading on both texts belonged to Group II (NarrativePR), which was the one that saw the two videos previous to the reading of the narrative text, it is believed that

this group might have benefited more from the pre-reading activity, or at least was more aware of it.

The retrospective questionnaire question about the influence of the pre-reading activities on participants' comprehension had some interesting answers. P34 mentioned that *"it helped, because they were like clues that helped me to comprehend the texts".*P13 said *that "It helped because it created a basis and a preparation in relation to what would come after".* P20 claimed that *"for those who do not have much English knowledge and experience, the audiovisual resources can really help".* P5 stated that *"I consider that activity with the images showed before the text very interesting; they were very important for the understanding of the text. It was possible to have an idea about the topic of the text and therefore to deduce some words that I could not understand".* P8 stated that *"The reading is easier when you already know the topic of the text".*

P30 mentioned that she had difficulties while reading the second text, because she did not know what it was going to be about, and that made her anxious. This observation reinforces the importance of the pre-reading activities, not only for activating the relevant schemata, but also for motivating the reader to read the text.

The topic of the texts was also mentioned in participants' retrospective questionnaires. P33 said that *"the reading was good, because they made us stop and think about the others, not only ourselves".*

As regards the kinds of pre-reading activities selected for this study, one of the participants (P6) mentioned in the retrospective questionnaire that he believes that the pre-reading activities did not have any impact in his comprehension, because they were not vocabulary related. Although this participant is proficient in English (differently from most of the participants in this study), so building schemata prior to reading may not seem so important to him, it is interesting that he mentioned the absence of a vocabulary pre-reading task.

As regards the verbalization procedure for the Pause Protocol task, twenty eight (77,78%) participants claimed that the verbalizations helped their comprehension, six participants (16,67%) believed that it did not have any direct influence, and two participants (5,56%) claimed that having to verbalize their thoughts during reading seemed to jeopardize their understanding.

The eighth question of the retrospective questionnaire intended to check whether participants had faced any other problems while reading the texts and/or performing the tasks proposed by this study. Fourteen

participants mentioned that their main difficulty was the lack of knowledge in English, expressed by vocabulary difficulty and inability to create a coherent representation of the text. Three participants mentioned concentration problems and five claimed that they had problems with the verbalization procedure (two thought it was difficult to summarize the text ideas, one believed it was unusual to say his thoughts aloud, while the other two said they were a little ashamed of recording their answers). One participant mentioned that he does not like to express his knowledge in the presence of other people. The remaining thirteen participants affirmed that they did not have any extra difficulties or problems during the data collection procedure.

The responses provided in the questionnaire were very helpful in confirming or refuting interpretations, as the fact that thinking aloud might have influenced participants' performance on the reading task, for instance.

As a matter of fact, the finding that the pre-reading activity intended for one of the texts might have helped participants to activate relevant schemata related to both texts was only possible because of participants' answers on the retrospective questionnaires, what reinforces the importance of including this kind of triangulation measure in any research including human subjects.

Section 4.7 below aims at presenting the Research Questions and respective hypotheses again, in the light of the results and discussion addressed through Chapter 4, so as to verify which hypotheses were confirmed, partially conformed or refuted.

4.7 RESEARCH QUESTIONS AND HYPOTHESIS REVISITED

The following section readdresses the Research Questions and hypotheses presented in the Method, providing a summary of the main findings related to each of them, and indicating whether the hypotheses were confirmed, partially confirmed or refuted, according to the results and data analysis previously presented.

RQ1: What is the influence of individual differences, namely reading proficiency and WMC, on Technical High School Brazilian students' inference generation process and reading comprehension?

→**Hypothesis 1a:** Participants' WMC is going to correlate positively with their scores in the reading proficiency test and in the reading comprehension questions.

✓ ***Partially Confirmed***

No statistically significant correlation was found for the variables reading proficiency and working memory for both groups.

As regards the correlation between WMC and reading comprehension, no statistically significant correlations were found for GI (ExpositoryPR). The results of the statistical tests for GII (NarrativePR) showed moderate, positive, statistically significant correlations between the groups' reading comprehension of both the expository and narrative texts and their WMC as far as the strict scoring method is concerned, but not the lenient one.

→**Hypothesis 1b:** Participants' with higher WMC and better scores in the reading proficiency test are going to generate more inferences, especially *Explanations*, because according to Zwaan and Brown (1996), good and poor readers are distinguished by their ability to generate explanatory inferences during reading. As WMC and L2 proficiency are intrinsically connect with skilled reading, it is believed that these factors are going to play a role in the number and kind of inferences generated by the participants.

✓ ***Partially Confirmed***

As regards the correlation between reading proficiency and inference generation, no statistically significant correlations were found between reading proficiency and most of the types of inferences generated for both the narrative and the expository texts. Only four statistically significant results were found for both groups, being two for the NarrativePR Group (one for the narrative text and one for the expository one) and two for the ExpositoryPR Group (one for the narrative text and one for the expository one).

For the expository text, a negative, moderate statistically significant correlation was found between *Incorrect Translations* and Reading Proficiency for the ExpositoryPR Group. For the NarrativePR Group, a negative, close to moderate statistically significant correlation between *Translation Attempts* and Reading Proficiency was found.

As for the narrative text, a negative, moderate statistically significant correlation was found between *Knowledge-Based Coherence Break*s and Reading Proficiency for the ExpositoryPR Group. For the NarrativePR Group, a negative, close to moderate statistically significant correlation between the Total number of inferences and

Reading Proficiency was found. It is important to highlight that this same variable (total of inferences) almost reached a negative significance for the ExpositoryPR group as well (0.71).

As regards the correlation between WMC and inference generation, two positive, moderate correlations were observed for the expository text as regards the relationship between inference generation and WMC, being one for each of the groups. Interestingly, this correlation was equal for both scoring methods, being the strict and the lenient ones. Regarding the ExpositoryPR Group (GI), a positive, moderate, statistically significant correlation was found between *Explanations* and working memory. Also regarding the expository text, a positive, moderate, statistically significant correlation was encountered between *Repetitions* and working memory for the NarrativePR Group (GII).

As for the narrative text, the same correlations were found between *Repetitions* (ExpositoryPR Group) and *Explanations* (NarrativePR Group) and working memory, but just when considering the Strict scoring method. No statistically significant correlations were observed between inference generation and WMC (Lenient scoring method), for the narrative text.

RQ2: Does the text type (narrative or expository) have any influence in students' inference generation? If so, what kinds of inferences are most frequently generated by these students when reading expository *versus* narrative texts?

→**Hypothesis 2:** Taking into account that narrative texts are easier to understand than expository ones, according to evidence provided by the literature, readers are going to generate more inferences in general when reading the narration. As regards the types of inferences, it is expected that more *Explanations* and *Evaluation*s are generated when reading the expository text; and that *Association*s and *Prediction*s have the greatest incidence when reading the narrative text.

- ✓ ***Partially Confirmed***

As regards the total number of inferences generated for each text, and taking the text type into consideration, participants generated more inferences for the expository text, when compared with the narrative one. Participants generated more *Repetitions* and *Text-Based Coherence Breaks* while reading the narrative text.

The expository text, on the other hand, concentrated the greater incidence of *Explanations*, *Associations*, *Predictions*, *Evaluations*, *Knowledge-Based Coherence Breaks*, *Translation Attempts* and *Incorrect Translations*.

RQ3: Does the text type (narrative or expository) have any influence in students' reading comprehension?

→**Hypothesis 3:** Also considering the evidence that narration is easier to comprehend than exposition, participants' scores in the reading comprehension questions are expected to be greater for the narrative text when compared with the expository one.

- ✓ ***Confirmed***

Participants' performance was better on the narrative text, when compared with the expository one. In fact, there is a great amount of evidence in the literature about the easiness with which individuals read narrative texts, in comparison with other text types.

RQ4: Does the use of pre-reading activities have any influence on students' inference generation, that is, did the activities performed during the pre-reading phase influence the number and quality of the inferences generated by the participants?

→**Hypothesis 4:** It is expected that the group that performed the pre-reading activity previous to the reading of the narrative text or the expository text generate more *Explanations* when reading the text type in question. Conversely, it is expected that the group that did not perform any pre-reading activity generate more *Evaluations*, *Incorrect Translations*, *Text-Based Coherence Breaks* and *Knowledge-Based Coherence Breaks* on the text they read with no pre-reading activity.

- ✓ ***Confirmed***

As regards the narrative text, the total number of inferences generated was very similar for the two groups. Group II (NarrativePR) had the greatest incidence of *Explanations* and *Predictions* and the least incidence of *Knowledge-Based Coherence Breaks*. As for the expository text, the total number of inferences generated was much greater for Group II, when compared with Group I. The greatest incidence of

Explanations was observed in Group I (ExpositoryPR), also with the least incidence of *Knowledge-Based Coherence Break*s and *Incorrect Translation*s. In sum, more *Explanations* were generated by the groups that performed a pre-reading activity previous to the text in question, which confirms the hypothesis.

The groups that performed the pre-reading activity also had the greatest incidence of *Prediction*s. As regards *Text-Based Coherence Breaks*, Group II (NarrativePR) generated more *Text-Based Coherence Breaks* for both texts.

With the absence of a pre-reading activity, both groups generated more *Association*s, *Evaluation*s, *Knowledge-Based Coherence Break*s, *Translations Attempts* and *Incorrect Translation*s.

RQ5: Does the use of pre-reading activities have any influence on students' reading comprehension, that is, do students who experienced some kind of pre-reading activities perform better in the reading comprehension questions related to the text?

→**Hypothesis 5:** It is expected that the group that performed the pre-reading activity previous to the reading of the narrative text or the expository text have a greater performance in the reading comprehension questions related to that text, when compared to the other one. Conversely, it is expected that the group that did not perform any pre-reading activity have worse scores in the reading comprehension questions of the text they read with no pre-reading task.

- ✓ ***Partially Confirmed***

When statistical tests were run with the whole groups (including outliers), results have shown that Group II (NarrativePR) outperformed Group I (ExpositoryPR) in the reading comprehension questions for the narrative text. Similarly, although for this group the results were not statistically significant, Group I outperformed Group II in the reading comprehension questions of the expository text, confirming, therefore, the hypothesis.

However, when removing the outliers from the groups, different results were observed: Group I was better in the reading comprehension questions of both the expository and narrative texts.

RQ6: Is there a correlation between participants' reading comprehension and the number and quality of the inferences generated?

→**Hypothesis 6:** It is expected that the students who generated more *Explanations* have better results when answering the reading comprehension questions. Also, it is expected that the greater the incidence of *Evaluation*s, *Incorrect Translation*s, *Text-Based Coherence Breaks* and *Knowledge-Based Coherence Breaks* the worse are going to be participants' scores in the reading comprehension questions.

- ✓ ***Confirmed***

The total number of inferences was greater for the less skilled readers when compared with the more skilled ones. As regards the kinds of inferences that were predominant in each group, more skilled readers had the greatest incidence of *Repetitions* and *Explanations*, while the less skilled ones generated more *Association*s, *Prediction*s, *Evaluation*s, *Text-Based Coherence Breaks*, *Knowledge-Based Coherence Break*s, *Translations Attempts* and *Incorrect Translation*s.

In the light of the results and discussion proposed in the present section, it is possible to outline that from the 6 hypotheses initially presented, four were partially confirmed and three hypotheses were confirmed. However, there are some final considerations to be made as regards this study, as well as its acknowledged limitations, suggestions for further research and pedagogical implications, which are going to be proposed in the following chapter.

CHAPTER 5
FINAL REMARKS, LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH

Research is creating new knowledge.
-Neil Armstrong -

This chapter summarizes the most relevant findings and implications of the present study, regarding how students' WMC and the use of pre-reading activities affect inference generation and reading comprehension. *Section 5.1 Final Remarks* presents closing considerations as regards the study, including its major findings, which due to the nature of the present study are to be taken as suggestive rather than conclusive. In *Section 5.2 Limitations of the Study and Suggestions for Further Research*, the limitations of this study are listed, followed by suggestions for future similar studies. In *Section 5.3 Pedagogical Implications*, the pedagogical implications of this research are discussed, taking into consideration the context in which this research is inserted, that is, Brazilian Technical High School students of English as an L2.

5.1 FINAL REMARKS

The main objective of the present research was to investigate, through the analyses of Pause Protocol verbalizations, RST scores and reading comprehension questions, whether there was a relationship between the Technical High School Brazilian students' WMC, the use of pre-reading activities, and inference generation in reading comprehension in L2. More specifically, it intended to investigate (1) what was the influence of individual differences, namely reading proficiency and WMC on Technical High School Brazilian students' inference generation process and reading comprehension (2) whether the text type (narrative or expository) had any influence in students' inference generation and what kinds of inferences were most frequently generated by these students when reading expository *versus* narrative texts; (3) whether the text type (narrative or expository) had any influence in students' reading comprehension; (4) whether the use of pre-reading activities had any influence on students' inference generation, that is, whether the activities performed during the pre-reading phase influenced the number and quality of the inferences generated by the participants (5) whether the use of pre-reading

activities had any influence on students' inference reading comprehension, that is, whether students who experienced some kind of pre-reading activities performed better in the reading comprehension questions related to the text; and (6) whether there is a correlation between participants' reading comprehension and the number and quality of the inferences generated.

The method employed in order to meet the above mentioned purposes included the following tools of data collection, previously tested in the pilot study: (a) a reading proficiency test, which intended to measure participants' reading proficiency in English as an L2; (b) a reader profile, which was used to collect qualitative data as regards students' reading habits in general, considering both the L1 and the L2; (c) a RST, which was used to obtain WM span measures; (d) the Pre-reading activities, that intended to activate participants' relevant schemata as regards the topic of the text; (e) the Pause Protocol, which was used in order to collect data on the inferences generated by the participants during reading; (f) a narrative text and a expository text, which were used as stimuli for the Pause Protocol and further reading comprehension questions; (g) two sets of reading comprehension questions, being one for the narrative text and one for the expository one, which were used to obtain reading comprehension measures; (h) a retrospective questionnaire that was used to gather information as regards participants' perception about the tests used for data collection.

It was expected that data gathered by means of these tools would test the hypotheses readdressed in section 4.7, presenting evidence of a significant correlation between participants' WMC and reading proficiency, inference generation and reading comprehension. Also, it was expected that the use of pre-reading activities would increase participants' inference generation and reading comprehension. At last, it was expected that the text types used in the present study (narrative and expository) would present different impacts on participants' inference generation and reading comprehension.

In order to achieve the above mentioned goals and test the previously mentioned hypotheses, the data collected for this research was interpreted both qualitatively and quantitatively. A summary of the major findings of the present research is going to be presented next:

Finding 1 → WMC (as measured by the Strict scoring method) correlates significantly with reading comprehension. The results obtained with the statistical tests for GII (NarrativePR) showed moderate, positive, statistically significant correlations between the

groups' reading comprehension of both the expository and narrative texts and their working memory capacity as far as the strict scoring method is concerned ($p < .05$), but not the lenient method ($p > .05$). As regards these results, it is possible to assume that the audiovisual pre-reading activity performed by Group II (NarrativePR) might have played a role, because the correlation was found for both the narrative and the expository text. Therefore, this group's schemata were probably activated for both texts, which enriched their comprehension.

Finding 2 → The use of pre-reading activities activates relevant schemata and increases comprehension. Results from statistical tests in this research present two different perspectives. First, when statistical tests were run with the whole groups, results have shown that Group II (NarrativePR), which performed pre-reading previous to the reading of the narrative test, outperformed Group I (ExpositoryPR) in the reading comprehension questions. Similarly, although for this group the results were not statistically significant, Group I outperformed Group II in the reading comprehension questions of the expository text. These results were expected, as the literature in the area present evidence that pre-reading activities activate relevant schemata (Rumelhart, 1981; Tomitch, 1988; Taglieber, Johnson & Yarbrough, 1988, Ajideh, 2003, Ajideh, 2006; Mihara, 2011) and consequently enhance processing efficiency, reducing the overall demands on working memory (Afflerbach, 1990; Fincher-Kiefer et al., 1988), having a positive effect on comprehension.

However, when removing the outliers from the groups, different results were observed: Group I, which was the group that performed the activities previous to the expository text, was better in the reading comprehension questions of both the expository and narrative texts. Taking these results into consideration, two possible explanations were addressed: (1) the pre-reading activities did not have an impact on readers' comprehension, as expected, and the better results from GI may be attributed to individual features, or to the fact that this group had fewer participants (17) when compared to GII (19); or (2) the pre-reading activities designed for one of the texts eventually had an impact on both of them, and GI concentrated the most skilled and proficient readers (the average score of GI on the reading comprehension questions was 7,68, while GII's average score was 7,61; and the average reading proficiency of GI was 6,31, while GII's was 5,58), who ended up having greater scores in the reading comprehension questions.

Finding 3 → The use of pre-reading activities might compensate for WMC limitations and lack of knowledge related to the text topic. Some of the participants with the greatest RST scores were better in the reading comprehension questions of the narrative text, while others had greater scores in the expository text. The same happened with the participants with the lowest RST scores. Similarly, the number of inferences generated by high and low spans did not follow a pattern. A possible explanation for such results might be the pre-reading activities that activated participants' schemata, making both texts similar in the level of difficulty. Therefore, what might have played a role in participants' results on the reading comprehension questions and on the inferences generated was probably individual interest in the text topics.

Finding 4 → More proficient readers generate less inferences than less proficient readers. Four statistically significant results were found for both groups between reading proficiency and the types of inferences generated for both the narrative and the expository texts, being one for the narrative text and one for the expository one. For the expository text, a negative, moderate statistically significant correlation was found between *Incorrect Translation* and Reading Proficiency for the ExpositoryPR Group. For the NarrativePR Group, a negative, close to moderatestatistically significant correlation between *Translation Attempt* and Reading Proficiency was found. These results are easily explainable, because the more proficient a reader is the less translation attempts and incorrect translations he/she is going to make.

Two other results did not reach statistical significance, but were very close to, and therefore deserve attention: the negative correlation between *Translation Attempt* and Reading Proficiency (p. 0.66) of Group I (ExpositoryPR), and the also negative correlation between *Knowledge-based Coherence Breaks* and Reading Proficiency (p. 0.87) of Group II (NarrativePR). These findings were also expected, because a proficient reader is believed to make less *Translations Attempts* and less *Knowledge-Based Coherence Breaks* (that are integration attempts) than less proficient counterparts.

The results were very similar for the narrative text: a negative, moderate statistically significant correlation was found between *Knowledge-Based Coherence Breaks* and Reading Proficiency for the ExpositoryPR Group. This result was also expected, because the more proficient a reader is, the less *Knowledge-Based Coherence Breaks* he/she going to make.

For the NarrativePR Group, a negative, close to moderate statistically significant correlation between the Total number of inferences and Reading Proficiency was found. It is important to highlight that this same variable (Total of inferences) almost reached a negative significance for the ExpositoryPR group as well (0.71). These results were unexpected, because according to Cain, Oakhill, Barnes & Bryant (2001) more skilled readers tend to generate more inferences than less skilled readers. According to Narvaez et al. (1999), "narrative texts may promote increased inferencing" (p.493), which is probably the reason why the significant statistical correlations were found for the narrative text, but not the expository one.

Finding 5 → WMC positively correlates with *Repetitions* and *Explanatory* inferences. Regarding the ExpositoryPR Group (GI), a positive, moderate, statistically significant correlation was found between *Explanations* and working memory for the expository text. This result is not surprising, because it is well acknowledged among the reading scholars that skilled and less skilled readers can be differentiated by their ability to generate explanatory inferences (Zwaan & Brown, 1996; Trabasso & Magliano, 1996; van den Broek & Lorch, 1993, Graesser et al, 1994, among others). Also regarding the expository text, a positive, moderate, statistically significant correlation was encountered between *Repetitions* and working memory for the NarrativePR Group (GII). This result is probably an effect of the text type, because according to Narvaez et al. (1999) "expository texts seem to evoke study-type behaviors" (p.493), which include the generation of *Repetitions.*

As for the narrative text, the same correlations were found between *Repetitions* (ExpositoryPR Group) and *Explanations* (NarrativePR Group) and working memory, but just when considering the Strict score method. However, it is interesting to observe that even though both text types presented correlations between working memory and *Repetitions/ Explanations*, the correlations were stronger for the narrative text, when compared with the expository one. The influence of the text type might have played a role in the above mentioned results, because, as previously mentioned, narrative texts instigate different reading behaviors when compared with expository texts (Narvaez et al., 1999; Trabasso & Magliano, 1996), especially because they are easier to understand.

Finding 6 → Readers generate more inferences when reading expository texts, when compared to narrative ones. As regards the total number of inferences generated for each text, and taking the text type into consideration, the findings from this study do not corroborate those of Graesser, (1981), Britton, Graesser, Glyn, Hamilton and Penland (1983), Graesser and Kreuz (1993), Trabasso and Magliano (1996), Narvaez et al. (1999), Narvaez (2002), among others, who provide evidence that readers generate considerably more inferences when reading narratives. In this study, participants generated more inferences for the expository text. Nevertheless, in the studies conducted by Horiba (2000), Baretta (2008) and Caldart (2012), inferences were more frequently generated for the expository text, when compared to the narrative one. According to Horiba (2000), and Baretta (2008), a possible interpretation for the discrepant findings resides in the text used in their experiments, which were not as demanding as those from previous studies (Trabasso & Magliano, 1996; Narvaez et al., 1999, among others), which was probably the case of the texts used in this research as well. In other words, it might be that in the present study the reading flow of the less demanding expository texts was probably very similar to the reading flow of the narratives, due to the texts specific features, as topic familiarity and absence of new concepts introduction.

Finding 7→ Narratives are easier to comprehend than expository texts. Participants' performance was greater on the narrative text, when compared with the expository one. As stated by Graesser, Singer and Trabasso (1994), "narrative text has a close correspondence to everyday experiences in contextually specific situations" (p.372). Conversely, "expository text is decontextualized and is normally written to inform the reader about new concepts, generic truths, and technical material (p.372). As successively pointed out throughout this dissertation, there is a great amount of evidence in the literature about the easiness with which individuals read narrative texts, in comparison with other text types, especially exposition (Noordman et al., 1992, Graesser & Kreuz, 1993; Trabasso & Magliano, 1996; Koda, 2008, among others).

Finding 8 → The use of pre-reading activities positively influences the number and quality of the inferences generated by students. As regards the narrative text, the total number of inferences generated was very similar for the two groups. Group II (NarrativePR) had the greatest incidence of *Explanations* and *Prediction*s and the least incidence of *Knowledge-Based Coherence Break*s. As for the expository text, the

total number of inferences generated was much greater for Group II, when compared with Group I. The greatest incidence of *Explanations* was observed in Group I (ExpositoryPR), also with the least incidence of *Knowledge-Based Coherence Break*s and *Incorrect Translation*s. In sum, more *Explanations* were generated by the groups that performed a pre-reading activity previous to the text in question.

The groups that performed the pre-reading activity also had the greatest incidence of *Prediction*s. As regards *Text-Based Coherence Breaks*, Group II (NarrativePR) generated more *Text-Based Coherence Breaks* for both texts.

With the absence of a pre-reading activity, both groups generated more *Association*s, *Evaluation*s, *Knowledge-Based Coherence Break*s, *Translations Attempts* and *Incorrect Translation*s for the text which was not preceded by a pre-reading task.

<u>Finding 9 →</u> Less skilled readers generate more inferences in general, but more skilled readers generate more explanatory inferences, that are directly connected to comprehension. The total number of inferences was greater for the less skilled readers when compared with the more skilled ones. As regards the types of inferences generated by students, more skilled readers had the greatest incidence of *Repetitions* and *Explanations,* while less skilled readers generated more *Associations, Predictions, Evaluations, Text-Based Coherence Breaks, Knowledge-Based Coherence Breaks, Translation Attempts and Incorrect Translations.* As previously stated in Section 4.3, *Explanations* are believed to be more closely related to comprehension (Graesser et al, 1994; Trabasso & Magliano, 1996; Zwaan & Brown, 1996; Narvaez et al. 1999, Magliano, Trabasso & Graesser, 1999, among others), because *Explanations* are the primary means for coherence to be achieved (van den Broek et al., 1995, as cited in Trabasso and Magliano, 1996). In fact, the ability to use *Explanatory* inferences is what differentiates skilled from less skilled comprehenders, according to Zwaan and Brown (1996). Therefore, as these two inference kinds (*Explanations* and *Repetitions*) were the only ones in which more skilled readers had the greatest number, this finding seems to corroborate those of Trabasso & Magliano (1996), Zwaan & Brown (1996) and Narvaez et al. (1999), that observed *Explanations* and *Repetitions* as being related to successful reading comprehension.

Overall, the findings from this study seem to speak in favor of the relationship between WMC, reading proficiency, inference generation and reading comprehension. Additionally, the importance of pre-reading activities and text type for inference generation and reading comprehension is also observed. However, this study also presents limitations, which are going to be discussed in the following section.

5.2 LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH

A substantial amount of research has been conducted regarding the correlation between WMC and reading comprehension in L1, but there is still a lack of studies regarding L2, especially the ones that investigate the influence of working memory capacity on L2 inference generation and reading comprehension. Furthermore, the use of pre-reading activities on Technical High School contexts still needs investigation. In addition, although there is a great number of studies that investigate inferential processes in reading comprehension and discourse processing, there are several issues which remain open to debate and further discussion (Goldman et al., 1999), among which is the need of research using expository texts as stimuli, as opposed to narrative texts, which have been extensively investigated. Therefore, much more research is needed before generalizations about the results of these studies can be made. The present study provides empirical support for previous studies regarding the above mentioned issues. However, this study has limitations as well, based on which the following recommendations are made, intending to help researchers conducting further similar studies:

a) **Number of Participants:** as previously mentioned in Chapter 4 - *Results and Discussion*, the small number of participants is probably the reason why some of the statistical tests did not reach significance. Even though the total number of participants was 36, because they received different pre-reading treatments, all qualitative tests were run within the two groups (Group I – ExpositoryPR containing 17 participants, and Group II – NarrativePR containing 19 participants). For future research, it is strongly recommended that larger samples are used, in order to increase the study validity.

b) **Text Topics:** as mentioned on Sub-section 4.5.3 and Section 4.6, the pre-reading activities intended for one of the texts was probably helpful for both of them, namely the narrative and the expository text, because the broad topic of both texts was the same: 'help'. This similarity was very subtle and was only observed after some participants mentioned it in the retrospective questionnaire. Thus, for future research, it is recommended that the topics of the narrative and expository texts be very different, in order to ensure that the pre-reading activity designed for one of the texts does not have an impact in the other.

c) **Proficiency Level:** the results of the study could be more conclusive if the level of proficiency of the participants was more similar. The participants of this research were very heterogeneous, what made it difficult to select the most appropriate material, and also to make generalizations about the results. Furthermore, it would be great to include a proficiency test that evaluated all 4 skills (reading, writing, speaking and listening).

d) **Inferences Categorization Raters:** because the amount of transcribed pages (almost 200) in this study was too big, making it difficult to find volunteer raters to categorize them, participants' utterances from the Pause Protocol reports were transcribed and categorized only by this researcher, with supervision of the advisor, following Narvaez et al.'s (1999) Inference Categorization Model. The validity and reliability of the study would be increased if another researcher could categorize the same sentences, or at least some samples, so that the two categorizations could after be compared and any disagreements could be solved by a careful analysis of the criteria employed by each researcher for the inferences categorization.

e) **WMC tests:** this study could have included more tests for verifying participants' WM span, such as the Operation-Word Span Test – OSPAN[20], which was originally designed by Turner and Engle (1989) to investigate the hypothesis that WM capacity is not language-specific and therefore can be generalized to any

[20] The OSPAN test consists in solving simple mathematical operations while trying to recall a set of unrelated words.

cognitively complex task (Conway et al., 2005). Future studies could include both WMC measures, as a means to compare their results, because the RST and the OSPAN reflect two different views of WMC (Engle, Cantor & Carullo, 1992). While the OSPAN reflects the general capacity hypothesis, which suggests that WMC would predict significant correlations with performance on other complex language tasks, the RST reflects the task-specific hypothesis, which proposes that WMC is functional and therefore dependent on the task performed.

f) **The RST:** some of the RST sentences used in this study (in the version created by Tomitch, 2003, and adapted by Bailer, 2011) might have had a negative impact on participants' performance on the test. It was possible to notice that certain words caused a problem in most participants' reading flow, because they were beyond their preexisting vocabulary knowledge (similar to Woelfer, 2016). Therefore, it is possible that the absence of higher scores (as measured by the Strict scoring method) occurred because participants were employing too much WMC to execute lower level reading processes. For this reason, although it is not possible to ensure that participants reading span was a result of lack of preexisting vocabulary knowledge, it would be interesting to pre-test the sentences with a greater group, so as to ensure this kind of problem would not arise. Also, the RST could have been applied with related sentences, instead of unrelated ones. This procedure would possibly enable subjects to integrate the sentences in chunks. As a result, the load on their working memory would be reduced, and they would present larger spans (Daneman & Carpenter 1980, p. 464).

g) **The Language of the RST:** in the present study, participants' WM span was tested in their L1, that is, Portuguese. It would be interesting to measure participants' WM span both in English and in Portuguese, in order to verify whether WMC is language-specific or not. It was not possible to use the English version of the RST in the present study due to participants' low proficiency level.

h) **The Pre-reading Activities:** different kinds of pre-reading activities could have been used, such as vocabulary pre-teaching, semantic map, request procedures and possible sentences. For future studies, it would be interesting to compare the impacts of distinct pre-reading activities on inference generation and reading comprehension.

i) **Reading Time:** taking into consideration that skilled and less skilled readers present differences as regards their reading speed, dividing researchers between those who present evidence that it correlates positively with text comprehension (Gagné et al., 1993; Jones, 1995; Just & Carpenter, 1987, Caldart, 2012), and the ones that argue that greater reading times do not necessarily indicate problems in constructing meaning from text, because strategic readers may sometimes need longer reading times to build a coherent mental representation of the texts (Kintsch & van Dijk, 1978; Paris, Wasik & Turnar, 1991; Davies, 1995; van den Broek et al., 1995; Murray, 1995; Pressley & Afflerbach, 1995; Narvaez et al., 1999; O'Brien & Myers, 1999; Nuttall, 2004), it would be interesting to measure participants' reading times, so as to provide more insights into the debate regarding individual differences in reading speed.

Despite the above-mentioned limitations it is believed that this study contributed to a better understanding of the reading process, especially regarding inference generation and reading comprehension, and their relation to WMC.

5.3 PEDAGOGICAL IMPLICATIONS

It is well acknowledged that individual differences play a great role on students' learning. In the case of English as an L2, factors such as language proficiency, background knowledge, reading skills, motivation and WMC must be taken into consideration by any L2 teacher before planning the classes. Although WMC is not measured at school, teachers must be aware of its impact on learning. It is important that the texts selected for reading classes are adequate for students' level of proficiency, so that their WMC is not overloaded with lower level reading processes. Also, taking into consideration that the generation of inferences helps students to construct meaning from texts, understanding how low and high span readers generate inferences, and how inference

generation affects comprehension can help teachers to assist their students, aiding them to become more proficient readers. In addition, understanding the importance of pre-reading activities for reading comprehension and inference generation, and also their possible effect on reducing the demands on working memory capacity during reading, may help teachers to prepare classes that better fit the students' needs.

Also regarding the pre-reading activities, this study's results show that more *Explanations* were generated by both groups (NarrativePR and ExpositoryPR) when performing the pre-reading activities previous to the text in question. Also, the group that performed the pre-reading activity had a greater performance in the reading comprehension test, as showed by the qualitative analysis. These results support the claim that pre-reading activities are of great importance for students' schema activation and, consequently, inference generation and reading comprehension.

Based on the finding of this study when comparing the reading comprehension of the narrative and expository text types, in which participants' performance was greater on the narrative text, when compared with the expository one, it seems reasonable to suggest that teachers include the teaching of text types in their classes. However, it is important to highlight that students can benefit not only from explicit instruction, but also by the use of different texts types and genres in the classroom, which may help readers to become aware of their specific features.

Finally, based on participants' answers on the reader profile, in which most of them claimed that they do not use any reading strategy when reading, findings from this study also confirm the importance of making students aware of the reading strategies they already use, and also teach them other reading strategies, based on the text type and reading purpose, so that they feel comfortable to extend beyond the texts and become more proficient and critical readers.

The main purpose of the present dissertation research was to investigate, through the analyses of Pause Protocol verbalizations, RST scores and reading comprehension questions, whether there was a relationship between the Technical High School Brazilian students' WMC, the use of pre-reading activities, and inference generation and reading comprehension. The study also intended to verify whether different text types (exposition *versus* narration) had any influence on inference generation and reading comprehension, the importance of pre-reading activities for reading comprehension and inferencing, and the

influence of WMC and reading proficiency on inference generation in reading comprehension.

Findings from this research are believed to contribute, even though in a small scale, to the understanding of the role of working memory capacity and the use of pre-reading activities on Technical High School Brazilian students' inference generation and reading comprehension. Furthermore, it is expected that this study will add to the existing research on individual differences in WMC and reading performance, not only in the educational area, but also areas like discourse comprehension, text and computational linguistics, and psycholinguistics, providing findings that contribute to a better understanding of the reading comprehension process.

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APPENDIX A1 – Consent Form (IFRS)

(Responsável pela Instituição da Coleta de Dados)

Declaro para os devidos fins e efeitos legais que, objetivando atender as exigências para a obtenção de parecer do Comitê de Ética em Pesquisa com Seres Humanos, e como representante legal da Instituição IFRS – Câmpus Sertão, tomei conhecimento do projeto de pesquisa: **"A Relação entre a Capacidade de Memória de Trabalho de Estudantes Brasileiros de Ensino Médio Técnico, Atividades de Pré-Leitura, Geração de Inferências e Compreensão Leitora",** sob responsabilidade da pesquisadora Deise CaldartRoscioli, e cumprirei os termos da Resolução CNS 466/12 e suas complementares, e como esta instituição tem condição para o desenvolvimento deste projeto, autorizo a sua execução nos termos propostos.

Sertão, …...../...../.....

ASSINATURA: ….....

NOME : Roberto Valmorbida de Aguiar
CARGO: Diretor de Ensino

CARIMBO DO/A RESPONSÁVEL

APPENDIX A2 –Consent Form (Participants)[21]

UNIVERSIDADE FEDERAL DE SANTA CATARINA
PROGRAMA DE PÓS-GRADUAÇÃO EM INGLÊS: ESTUDOSLINGUÍSTICOS E LITERÁRIOS

TERMO DE ASSENTIMENTO LIVRE E ESCLARECIDO
Participantes

Prezado(a) aluno (a):

Sou **Deise Caldart Roscioli**, estudante de Doutorado da **Universidade Federal de Santa Catarina**. Faço pesquisa na área de leitura e cognição e sou orientada pela professora **Lêda Maria Braga Tomitch**. Sou professora de Língua Portuguesa/Inglesa no IFRS – Câmpus Sertão desde 2013.

Convido você para ser participante da pesquisa **"A Relação entre a Capacidade de Memória de Trabalho de Estudantes Brasileiros de Ensino Médio Técnico, Atividades de Pré-Leitura, Geração de Inferências e Compreensão Leitora".** Explicarei abaixo os detalhes.

Por que esta pesquisa está sendo realizada?
A compreensão de textos e a geração de inferências durante a leitura, tanto em língua materna quanto em língua estrangeira, está relacionada a fatores como a capacidade de memória de trabalho, e ao uso de atividades de pré-leitura.
Temos como objetivo investigar até que ponto esses fatores influenciam a compreensão e a geração de inferências de alunos do Ensino Técnico Integrado ao Ensino Médio.

Que atividades serão realizadas?
Você realizará oito tarefas (descritas abaixo) nas próprias dependências da escola, em três encontros, sendo o primeiro em sala de aula, juntamente com sua turma, e outros dois em horários extraclasse marcados previamente, de acordo com a sua disponibilidade. As tarefas

[21] The Consent Form was developed by Woelfer (2016) and adapted for the purpose of this study.

serão aplicadas pela própria pesquisadora. Informamos que a realização das atividades foi devidamente autorizada pela Escola e que, caso você e/ou seus pais ou responsáveis decida(m) não participar da pesquisa, os dados obtidos nas tarefas não serão utilizados pela pesquisadora, sem prejuízo para você.

Na tarefa 1 você responderá a um questionário sobre seu perfil como leitor(a); na tarefa 2 você realizará um teste para verificar sua proficiência em leitura em Língua Inglesa, lendo textos e respondendo a algumas perguntas objetivas em Português; na tarefa 3 você realizará um teste de memória, envolvendo a leitura de frases em língua portuguesa; na tarefa 4 você participará de atividades de pré-leitura; na tarefa 5 você lerá um texto, concomitantemente com a tarefa 6, na qual você verbalizará seus pensamentos durante a leitura do texto (destacamos que as verbalizações serão gravadas para posterior análise e que somente as pesquisadoras terão acesso às gravações); na tarefa 7 você responderá à perguntas de compreensão a respeito do texto, em Português; na tarefa 8 você descreverá, por escrito, suas impressões ao realizar as atividades. No primeiro encontro você realizará as tarefas 1 e 2; no segundo encontro será realizada a atividade 3, e no terceiro encontro serão realizadas as demais atividades.

Haverá algum risco envolvido na realização dessas tarefas?
Na verdade estas tarefas são muito parecidas com as atividades que você já realiza nas aulas de inglês, por isso os riscos são mínimos. O que pode acontecer é você ficar um pouco ansioso (a), pois essa geralmente é a reação que as pessoas têm quando pensam que podem ter suas limitações expostas. Para evitar que você se sinta assim, você receberá instruções bem detalhadas e realizará sessões de treino antes de realizar as tarefas. Salientamos que todas as atividades, apesar de envolverem textos escritos em Inglês, serão compostas por perguntas escritas e que devem ser respondidas em Português, incluindo as verbalizações feitas durante a leitura, o que pode ajudá-lo(a) a ficar menos ansioso(a).Com relação à exposição, informamos que todos os dados serão confidenciais.

E haverá algum benefício?
Sim. As tarefas que você realizará envolvem exercícios de verbalização de inferências e atividades de interpretação que ajudam a desenvolver a capacidade de compreensão, auxiliando-o(a) no processo de se tornar um(a) leitor(a) mais consciente e crítico(a).

A sua identidade será revelada?
Não. Como já foi mencionado anteriormente, todos os seus dados serão confidenciais**,** ou seja, seu nome não será divulgado. Você e os demais participantes serão identificados como 'Participante 1, Participante, 2, 3,4...'.

Haverá acompanhamento de alguém em caso de necessidade?
Sim. Em todas as etapas você terá o meu acompanhamento. Quaisquer dúvidas ou dificuldades serão atendidas prontamente.

Você, seus pais, ou responsáveis terão acesso aos resultados da pesquisa?
Sim. Após a coleta e a análise dos dados informaremos quais foram as conclusões obtidas. Distribuiremos um relatório a cada participante e também promoveremos uma breve conversa na qual o relatório será comentado em detalhes.

A participação nessa coleta de dados é obrigatória?
Não. A sua participação é totalmente voluntária. Este documento se trata de um convite. Se você não desejar participar, sua decisão será respeitada e isso não afetará a sua relação com a escola, nem tampouco as suas notas.

Haverá alguma despesa para quem decide participar?
Não. A coleta de dados ocorrerá na escola mesmo e em horário de aula ou extraclasse, portanto não haverá despesas extras com transporte ou alimentação, uma vez que os alunos do Ensino Médio Integrado residem na escola em regime de internato. Mesmo assim, os pesquisadores se comprometem a ressarcir despesas eventuais que possam vir a ocorrer e que sejam decorrentes da participação na pesquisa.

Haverá compensação financeira para os participantes?
Não. Esclarecemos que não haverá compensação financeira em função da sua participação na pesquisa, mas os pesquisadores se comprometem a garantir indenização diante de eventuais danos comprovadamente decorrentes da pesquisa.
É possível desistir de participar depois de ter aceitado?
Sim. Mesmo que você tenha aceitado participar da pesquisa, e por qualquer razão queira desistir, você poderá fazê-lo a qualquer momento, sem prejuízo em suas notas e sem problemas de relação com a escola.

Basta que me comunique através do fone (54) 9120-1717, ou mesmo pessoalmente na escola.

Em caso de outras dúvidas, com quem se deve entrar em contato?
Em caso de dúvidas ou sugestões, o contato pode ser feito através do endereço: Rodovia RS 135, Km 25 | Distrito Eng. Luiz Englert | CEP: 99170-000 | Sertão/RS, e de meu e-mail (deise.roscioli@sertao.ifrs.edu.br) ou do e-mail de minha orientadora (leda@cce.ufsc.br).

Se você precisar entrar em contato com o Comitê de Ética em Pesquisas com Seres Humanos - CEPSH-UFSC, que é o departamento que aprova a realização desse tipo de pesquisa, você pode escolher uma das seguintes formas de contato:
Comitê de Ética em Pesquisas com Seres Humanos - CEPSH-UFSC
Prédio Reitoria II (Edifício Santa Clara),
R: Desembargador Vitor Lima, nº 222, sala 401, Trindade, Florianópolis/SC
CEP 88.040-400
Contato: (48) 3721-6094
cep.propesq@contato.ufsc.br

Esta pesquisa cumpre todas as exigências legais necessárias?
Sim. Declaramos para os devidos fins e efeitos legais que cumpriremos os termos da Resolução CNS 466/12 e suas complementares, que são os documentos que normatizam a realização de pesquisa com seres humanos no Brasil.

Esse documento deverá ser assinado em duas vias, todas as páginas rubricadas, ficando uma via com você e outra com a pesquisadora. Assinando o Assentimento Pós-Informação abaixo, você estará consentindo com o uso dos dados coletados para a pesquisa. Muito obrigada!

Declaração de Assentimento Pós-Informação:

Eu, _____ (nome completo), fui esclarecido sobre a pesquisa **A Relação entre a Capacidade de Memória de Trabalho de Estudantes Brasileiros de Ensino Médio Técnico, Atividades de Pré-Leitura, Geração de Inferências e Compreensão Leitora**, e concordo que meus dados sejam utilizados para a realização da mesma.

Nome: _____

_____

Assinatura do participante

CPF _____

Assinatura das Pesquisadoras Responsáveis:

_____ _____

Deise Caldart Roscioli
Pesquisadora

Lêda Maria Braga Tomitch
Orientadora

Sertão, _____ de _____ de 2016.

APPENDIX A3 –Consent Form (Participant, Parents or Legal Representative)[22]

UNIVERSIDADE FEDERAL DE SANTA CATARINA
PROGRAMA DE PÓS-GRADUAÇÃO EM INGLÊS: ESTUDOSLINGUÍSTICOS E LITERÁRIOS

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO
Aluno(a), pais ou responsáveis legais

Prezado Sr./ Sra.:

Sou **Deise Caldart Roscioli**, estudante de Doutorado da **Universidade Federal de Santa Catarina**. Faço pesquisa na área de leitura e cognição e sou orientada pela professora **Lêda Maria Braga Tomitch**.. Sou professora de Língua Portuguesa/Inglesa no IFRS – Câmpus Sertão desde 2013 e lecionei a disciplina de Língua Inglesa I para seu(sua) filho(a) no segundo semestre de 2015.

Convido seu filho (a), ou menor pelo qual o Sr. (Sra.) é responsável, para ser participante da pesquisa **"A Relação entre a Capacidade de Memória de Trabalho de Estudantes Brasileiros de Ensino Médio Técnico, Atividades de Pré-Leitura, Geração de Inferências e Compreensão Leitora".** Explicarei abaixo os detalhes.

Por que esta pesquisa está sendo realizada?
A compreensão de textos e a geração de inferências durante a leitura, isto é, a compreensão do que está subentendido no texto, tanto em língua materna quanto em língua estrangeira, está relacionada a fatores como a capacidade de memória de trabalho (a memória do aqui e agora), e ao uso de atividades de pré-leitura.
Temos como objetivo investigar até que ponto esses fatores influenciam a compreensão e a geração de inferências de alunos do Ensino Técnico Integrado ao Ensino Médio.

Que atividades serão realizadas?

[22]The Consent Form was developed by Woelfer (2016) and adapted for the purpose of this study.

Serão realizadas oito tarefas (descritas abaixo), nas próprias dependências da escola, em três encontros, sendo o primeiro em sala de aula, juntamente com a turma de seu(sua) filho(a), e outros dois em horários extraclasse marcados previamente, de acordo com a disponibilidade de seu(sua) filho(a). As tarefas serão aplicadas pela própria pesquisadora. Informamos que a realização das atividades foi devidamente autorizada pela Escola e que, caso o(a) Sr./Sra. e/ou seu(sua) filho(a) decida(m) não participar da pesquisa, os dados obtidos nas tarefas não serão utilizados pela pesquisadora, sem prejuízo para seu(sua) filho(a).

Na tarefa 1 será aplicado um questionário sobre o perfil de seu(sua) filho(a) como leitor(a); na tarefa 2 será realizado um teste de proficiência em leitura em Língua Inglesa; na tarefa 3 será realizado um teste de memória, envolvendo a leitura de frases em língua portuguesa; na tarefa 4 o(a) aluno(a) participará de atividades de pré-leitura; a tarefa 5 envolverá a leitura de um texto, concomitantemente com a tarefa 6, na qual o(a) participante verbalizará seus pensamentos durante a leitura do texto (destacamos que as verbalizações serão gravadas para posterior análise e que somente as pesquisadoras terão acesso às gravações); na tarefa 7 o(a) aluno(a) responderá à perguntas de compreensão a respeito do texto, em Português; na tarefa 8 o(a) participante descreverá, por escrito, suas impressões ao realizar as atividades. No primeiro encontro serão realizadas as tarefas 1 e 2; no segundo encontro será realizada a atividade 3, e no terceiro encontro serão realizadas as demais atividades.

Haverá algum risco envolvido na realização dessas tarefas?
Na verdade estas tarefas são muito parecidas com as atividades que os alunos já realizam nas aulas de inglês, por isso os riscos são mínimos. O que pode acontecer é os alunos ficarem um pouco ansiosos, pois essa geralmente é a reação que as pessoas têm quando pensam que podem ter suas limitações expostas. Para evitar que os alunos se sintam assim, os mesmos receberão instruções bem detalhadas e realizarão sessões de treino antes de realizar as tarefas. Com relação à exposição, os alunos serão informados de que todos os dados serão confidenciais.

E haverá algum benefício?
Sim. As tarefas envolvem exercícios de verbalização de inferências e atividades de interpretação que ajudam a desenvolver a capacidade de compreensão, auxiliando os(as) alunos(as) no processo de se tornarem leitores(as) mais conscientes e críticos(as).

A identidade dos alunos será revelada?
Não. Como já mencionado anteriormente, todos os dados serão confidenciais**,** ou seja, os nomes não serão divulgados. Os participantes serão identificados como 'Participante 1, Participante, 2, 3,4...'.

Haverá acompanhamento de alguém em caso de necessidade?
Sim. Em todas as etapas os alunos terão o meu acompanhamento. Quaisquer dúvidas ou dificuldades serão atendidas prontamente.

Os alunos, seus pais, ou responsáveis terão acesso aos resultados da pesquisa?
Sim. Após a coleta e a análise dos dados informaremos quais foram as conclusões obtidas com o estudo através de um relatório impresso que será entregue a cada participante, que em particular poderá tirar dúvidas sobre seu desempenho.

A participação nessa coleta de dados é obrigatória?
Não. A participação é totalmente voluntária. Este documento se trata de um convite. Se o (a) aluno (a) não desejar participar, sua decisão será respeitada e isso não afetará a sua relação com a escola, nem tampouco as suas notas.

Haverá alguma despesa para quem decide participar?
Não. A coleta de dados ocorrerá na escola mesmo e em horário extraclasse, portanto não haverá despesas extras com transporte ou alimentação, uma vez que os alunos do Ensino Médio Integrado residem na escola em regime de internato. No caso de alguma eventualidade em que a coleta de dados ocorra em horário em que o aluno não precisaria estar na escola, as despesas com transporte a alimentação serão devidamente ressarcidas.

Haverá compensação financeira para os participantes?
Não. Esclarecemos que não haverá compensação financeira em função da participação na pesquisa, mas os pesquisadores se comprometem a garantir indenização diante de eventuais danos comprovadamente decorrentes da pesquisa.

É possível desistir de participar depois de ter aceitado?
Sim. Mesmo que o (a) aluno (a) tenha aceitado participar da pesquisa, e por qualquer razão queira desistir, poderá fazê-lo a qualquer momento.

Os senhores também poderão cancelar essa autorização a qualquer momento. Caso isso ocorra, não haverá prejuízo para o (a) aluno (a) em termos de notas, e nem mesmo problemas de relação com a escola. Basta que me comuniquem através do telefone (54) 9120-1717, ou mesmo pessoalmente na escola.

Em caso de outras dúvidas, com quem se deve entrar em contato?
Em caso de dúvidas ou sugestões, o contato pode ser feito através do endereço do endereço: Rodovia RS 135, Km 25 | Distrito Eng. Luiz Englert | CEP: 99170-000 | Sertão/RS, ou do telefone (54) 9120-1717, ou de meu e-mail (deise.roscioli@sertao.ifrs.edu.br) ou do e-mail de minha orientadora (leda@cce.ufsc.br).

Se você precisar entrar em contato com o Comitê de Ética em Pesquisas com Seres Humanos - CEPSH-UFSC, que é o departamento que aprova a realização desse tipo de pesquisa, você pode escolher uma das seguintes formas de contato:

Comitê de Ética em Pesquisas com Seres Humanos - CEPSH-UFSC
Prédio Reitoria II (Edifício Santa Clara),
R: Desembargador Vitor Lima, nº 222, sala 401, Trindade, Florianópolis/SC
CEP 88.040-400
Contato: (48) 3721-6094
cep.propesq@contato.ufsc.br

Esta pesquisa cumpre todas as exigências legais necessárias?
Sim. Declaramos para os devidos fins e efeitos legais que cumpriremos os termos da Resolução CNS 466/12 e suas complementares, que são os documentos que normatizam a realização de pesquisa com seres humanos no Brasil.

Esse documento deverá ser assinado em duas vias, todas as páginas rubricadas, ficando uma via com você e outra com a pesquisadora. Assinando o Assentimento Pós-Informação abaixo, você estará permitindo o uso dos dados coletados do (da) menor pelo qual o Sr. (Sra.) é responsável para a pesquisa. Muito obrigada!

Declaração de Consentimento Pós-Informação:

Eu, _____ (nome completo), fui esclarecido sobre a pesquisa **A Relação entre a Capacidade de Memória de Trabalho de Estudantes Brasileiros de Ensino Médio Técnico, Atividades de Pré-Leitura, Geração de Inferências e Compreensão Leitora**, e autorizo que os dados do/da menor _____ sejam utilizados para a realização da mesma.

Nome: _____

_____
Assinatura do responsável

CPF _____

Assinatura das Pesquisadoras Responsáveis:

_____ _____

Deise Caldart Roscioli
Pesquisadora

Lêda Maria Braga Tomitch
Orientadora

Sertão, _____ de _____ de 2016.

APPENDIX B1 – Reader Profile

Nome: _____ Idade: _____

Cursou o Ensino Fundamental e Médio em escola: ( ) pública ( ) particular

I – Responda/ assinale as seguintes questões a respeito de seus hábitos de leitura:

1. Com que frequência você costuma ler:
a) Jornais: _____ b) Revistas: _____
c) Artigos científicos: _____ c) Obras literárias: _____
d) Textos na internet: _____ e) Outros (quais?): _____

2. O que você mais gosta de ler?
( ) jornais ( ) revistas ( ) livros de ficção ( ) publicações científicas ( ) outros: ___

3. Seus pais ou responsáveis tem o hábito de ler? Que tipo de publicação?_____
_____

4. Como você procura manter a concentração durante uma leitura que demanda atenção? _____
_____

5. Você se considera um leitor crítico? Elabore sua resposta. ____
_____

6. Você costuma ler livros/ artigos em Inglês? Com que frequência?_____

7. Que estratégias você utiliza para ler textos escritos em Português? _____
_____

8. Você utiliza estas mesmas estratégias para ler textos em Inglês? Explique._____
_____

APPENDIX C1–Reading Proficiency Test

TESTE DE PROFICIÊNCIA EM LEITURA

→ Leia os textos e responda às perguntas a seguir com calma e atenção.

TEXTO I[23]: Leia o artigo. Por qual motivo esses estudantes trabalham? Marque corretamente *(✓).*

The Daily Grind

Brandon Smith

I'm a junior in high school, and I have a part-time job in a restaurant. I bus dishes on Saturdays and Sundays from 8:00 until 4:00. I earn $5.50 an hour. It isn't much money, but I save almost every penny! I want to go to a good university, and the cost goes up every year. Of course, I spend some money when I go out on Saturday nights.

Lauren Russell

I'm a senior in high school. I have a job as a cashier in a grocery store. The job pays well – about $6.75 an hour. I work every weeknight after school from 4:00 until 8:00. I don't have time for homework, and my grades aren't very good this year. But I have to work, or I can't buy nice clothes and I can't go out on Saturday nights. Also, a car costs a lot of money.

Erica Davis

I'm a freshman in college. College is very expensive, so I work in a law office for three hours every weekday afternoon. I make photocopies, file papers, and sort mail for $8.25 an hour. The job gives me good experience because I want to be a lawyer someday. But I don't want to work every semester. I need time to study.

	Brandon	Lauren	Erica
Para juntar dinheiro para a faculdade			
Para comprar roupas bacanas			
Para sair nos finais de semana			
Para comprar um carro			
Para adquirir experiência de trabalho			

[23] Texto extraído do livro *Interchange – 3rd Ed.* (2005)

TEXTO II[24]**: Leia o e-mail da Jéssica e marque *(✓)* <u>quatro</u> coisas que podem ser feitas no bairro dela.**

Hi, Sarah!
Guess what! I moved into my new apartment yesterday. I really like my new roommates. I also like the neighborhood. There are lots of different restaurants here. Last night, I ate at a Vietnamese restaurant just around the corner. The food was delicious. And I want to try a new Brazilian restaurant near here. For breakfast this morning, I came to this great coffee shop across from my apartment. Actually, it's an internet café, so I'm e-mailing you now!

It's a really convenient neighborhood. There's a Laundromat on our street and there are some interesting stores, too. One store sells lots of amazing CDs, DVDs, and books from all over the world. And my roommates told me there's a dance club just two blocks away. I want to go dancing every weekend!
Come visit!
Jessica
****

( ) pegar livros emprestados ( ) cortar os cabelos
( ) lavar e secar roupas ( ) enviar e-mails
( ) comer comida argentina ( ) sair para dançar
( ) assistir a filmes ( ) fazer compras
( ) se exercitar na academia

TEXTO III[25]**: Leia o texto e marque *(✓)*<u>quatro</u> coisas que as pessoas sugeriram que o escritor fizesse.**

TOO MUCH ADVICE!

Isn't it amazing? You have a health problem, and everyone gives you different advice. For several months, I felt tired all the time. Some people suggested I sleep longer, but others said I was sleeping too much. One friend told me I was working too hard, and she said it's important to relax. Another friend suggested that it's helpful to get a

[24] Texto extraído do livro *Interchange – 3rd Ed.* (2005)
[25] Texto extraído do livro *Interchange – 3rd Ed.* (2005)

lot of fresh air. His advice was that I should go for a long walk every day after work. One co-worker told me, "You're not tired, just lazy!" Even different doctors give you different advice for the same problem! I visited one doctor, and she gave me some vitamin C. It didn't work. So I went to another doctor, and he simply suggested I take a vacation. That didn't work either. A third doctor told me to pick up some medicine from the drugstore. I felt even more tired! Finally, I went to a doctor of traditional Chinese medicine. He gave me some medicinal plants. He advised me to cook them in water and then drink the herbal mixture. It worked! Now, I'm never tired but I can't sleep at night! Who should I ask for advice this time?

****

( ) Pedir conselhos a alguém
( ) Trabalhar mais
( ) Caminhar antes do trabalho
( ) Procurar um médico
( ) Não dormir a noite
) Procurar um novo emprego
( ) Dormir mais
( ) Tirar férias
( ) Tomar uma aspirina
( ) Largar o trabalho
( ) Usar plantas medicinais (
( ) Dormir menos

TEXTO IV[26]: Leia o artigo e verifique se as informações são verdadeiras (V) ou falsas (F) ou se não aparecem no texto (N):

THE BEST PUBLIC TRANSPORT SYSTEM IN THE WORLD.

Curitiba in Brazil is no ordinary city; it has the best public transport system in the world. The mayor, Jaime Lerner, along with the council, began developing the world-famous system in 1971.

Mr Lerner had grown up in Curitiba and knew that the street was an important part of city life for the residents. He made many of the streets into pedestrian areas, with no access for cars. The council put in flowers, lights, and kiosks where people could sell food and other products. To encourage shoppers to use the new areas, the mayor gave away free paper so that local children could paint pictures in the street. Cyclists also benefit from 150km of cycle lanes, which follow old river valleys and railway tracks around the city.

[26] Texto extraído do livro *New English Files* - Intermediate (2006)

Mr Lerner realized that to increase the development and growth of the city in the future, the public transport system also had to improve. Buses were chosen as the main transport because it was the cheapest. Curitiba's transport system now consists of over 300 routes that use around 1,900 buses to carry approximately 1.9 million passengers every day. Approximately 60km of the roads are for buses only, so traffic jams are unusual. Bus travel is faster and more convenient than using private cars. The city now uses 30% less fuel than other large cities in Brazil and people spend only about 10% of their yearly salaries on transport costs.

Some of the buses are able to carry 170–270 passengers. School buses are yellow, and buses for disabled people are blue. They are designed with three doors – two exits and one entrance – so that people can get on and off quickly. Bus stations provide free maps and facilities to help parents with young children and people carrying heavy bags to board the buses easily. Passengers buy a ticket at the office in advance and then wait for their bus, like in an underground station.

Because of the success of Curitiba's public transport system, Jaime Lerner now offers advice to city councils around the world on how they can solve their cities' transport problems.

****

( ) Curitiba é diferente de outras cidades do mundo.
( ) Jaime Lerner passou muito tempo brincando nas ruas quando era criança.
( ) O Comitê permite que as pessoas vendam coisas nas ruas destinadas a pedestres.
( ) Todos os quiosques vendem comida local.
( ) O Comitê optou por aumentar o serviço de ônibus porque este era o meio de transporte mais barato.
( ) A população da cidade é de aproximadamente 1.9 milhões de pessoas.
( ) Outras grandes cidades do Brasil estão planejando cortar a quantidade de combustível por elas utilizada.
( ) Os ônibus possuem cores diferentes de acordo com sua finalidade.
( ) Os passageiros compram suas passagens assim que entram nos ônibus.
( ) O Sr. Lener gosta de ser um perito no desenvolvimento de sistemas de transporte.

APPENDIX D1 – List of RST Sentences[27]

TRAINING SESSION

1 - Caiu o número de profissionais que diziam querer ficar por muito tempo no atual **emprego**. (15 palavras, *Você S/A*, fevereiro de 2011, p.51)

2 - O consumo de proteínas estimula a produção de células dos tecidos ósseos e musculares, acelerando o **crescimento**. (17 palavras, *Superinteressante*, agosto de 2000, versão online)

3 - Adotar uma postura ética eleva tanto o nível de felicidade quanto ganhar um **aumento**. (14 palavras, *Superinteressante*, dezembro de 2010, versão online)

4 - De modo geral, os imigrantes vindos do Terceiro Mundo têm famílias mais numerosas que os **europeus**. (16 palavras, *Veja*, 24 de outubro de 2007, p.120)

5 - Descobriu-se que o grau de identificação com a equipe não tinha relação com as vitórias ou **derrotas**. (17 palavras, *Mente e Cérebro*, maio de 2011, p.41)

6 - Para construir a trama os atores passaram, durante dois meses, por um processo diretamente influenciado pelo **cinema**. (17 palavras, *Mente e cérebro*, maio de 2010, p.11)

7 - O açúcar é uma parte natural da vida humana desde os primórdios de nossa **existência**. (15 palavras, *Veja*, 24 de outubro de 2007, p.11-12)

8 - O consumo isolado de farinha de linhaça não vai baixar os tão desejados pontinhos da **balança**. (16 palavras, *Women's Health*, abril de 2010, p.46)

9 - Não se esqueça de incluir a cidade de onde escreve e telefone para **contato**. (14 palavras, *Mente e cérebro*, maio de 2010, p.7)
START

[27] (Tomitch, 2003; Bailer, 2011)

1 - O intelsat-6 foi lançado em 1990, mas nunca funcionou – ficou numa órbita **errada**. (13 palavras, *Veja*, 20 de maio de 1992, p.63)

2 - A iniciativa deve partir da própria pessoa interessada em ter um corpo bonito e **saudável**. (15 palavras, *Veja SC*, 15 de abril de 1992, p.4)

3 - Ele é uma pessoa que gosta de contar a todos o que anda fazendo, nos mínimos **detalhes**. (17 palavras, *Mente e cérebro*, maio de 2010, p.44)

4 - As bactérias degradam as emulsões coloridas do filme, criando imagens que podem ser definidas como **futuristas**. (16 palavras, *Superinteressante*, fevereiro de 1992, p.14)

5 - A padronização agrícola, para atender aos consumidores, ameaça a diversidade biológica do mundo **vegetal**. (14 palavras, *Superinteressante*, julho de 1992, p.10)

6 - Os diálogos acontecem ao mesmo tempo, e cabe ao espectador escolher para onde dirigir sua **atenção**. (16 palavras, *Mente e cérebro*, maio de 2010, p.7)

7 - Para realizar as atividades cerebrais do pensamento, os neurônios tiram energia do oxigênio e da **glicose**. (14 palavras, *Superinteressante*, julho de 1992, p.10)

8 - O truque, portanto, é partir triunfante rumo ao objetivo antes do início da **partida**. (14 palavras, *Mente e cérebro*, maio de 2010, p.24)

9 - Cerca de 250 milhões de pessoas, ao redor do mundo, se encontram na mais profunda **depressão**. (16 palavras, *Superinteressante*, setembro de 1992, p.57)

10 - O repórter não deu grande importância à frase, mas esse parecia ser justamente o segredo do **sucesso**. (17 palavras, *Mente e cérebro*, maio de 2010, p.24)

11 - Uma manifestação estudantil ontem em Brasília foi marcada por atritos com a **polícia**. (13 palavras, *Folha de S. Paulo*, 17 de setembro de 1992)

12 - Mostra a capacidade do homem em transformar coisas simples em obras de arte, através da **dedicação**. (16 palavras, *Superinteressante*, setembro de 1992, p.3)

13 - A expressão refere-se à tentativa de conciliar o progresso com a preservação da **natureza**. (14 palavras, *Veja*, 3 de junho de 1992, p.34)

14 - Cada volume traz textos inéditos escritos por psicólogos e psicanalistas, todos especialistas no **assunto**. (14 palavras, *Mente e cérebro*, maio de 2010, p.8)

15 - Pesquisa do Sebrae aponta que o novo salário mínimo deve provocar uma onda de **demissões**. (15 palavras, *Folha de S. Paulo*, 17 de setembro de 1992)

16 - Se o Brasil pretende ir ao espaço sem pedir licença, não pode dispensar um programa de **foguetes**. (17 palavras, *Superinteressante*, setembro de 1992, p.10)

17 - O médico deve levar em conta a idade, número de filhos e saúde do **paciente**. (15 palavras, *Folha de S. Paulo*, 17 de setembro de 1992)

18 - Soube que o marido não ganhou o direito de protestar contra o abandono em momento tão **delicado**. (17 palavras, *Superinteressante*, setembro de 1992, p.4)

19 - Nós pedimos para o mundo falar e a mensagem soou alta, clara e extraordinariamente **perfeita**. (15 palavras, *Veja*, 3 de junho de 1992, p.98)

20 - A obra custou caro demais, a utilidade é incerta e o resultado final, **polêmico**. (14 palavras, *Veja*, 23 de setembro de 1992, p.60)

21 - É a primeira vez que se consegue em órbita a ovulação e fertilização de espécies **animais**. (16 palavras, *Veja*, 23 de setembro de 1992, p.61)

22 - Os fabricantes de microcomputadores estão criando produtos com novas tecnologias, a preços mais **atraentes**. (14 palavras, *Folha de S. Paulo*, 23 de setembro de 1992)

23 - Pesquisadores descobrem que o antílope das pradarias norte-americanas é o mais resistentes dos mamíferos **terrestres**. (15 palavras, *Superinteressante*, julho de 1992, p.37)

24 - O neandertal tinha testa curta e grossa, mandíbula forte, de queixo curto, e seus ossos eram **pesados**. (17 palavras, *Superinteressante*, julho de 1992, p.37)

25 - Reconhecer a importância da identidade social abre as portas para novas possibilidades de **reflexão**. (14 palavras, *Mente e Cérebro*, maio de 2011, p.43)

26 - Às vésperas do fim da reserva da informática, cresce a pressão por novos privilégios e **favores**. (16 palavras, *Veja*, 23 de setembro de 1992, p.80)

27 - Seu público eram as pessoas que olham muito para a pechincha e pouco para a **qualidade**. (16 palavras, *Veja*, 23 de setembro de 1992, p.83)

28 - O Brasil reforça sua presença no milionário clube da telefonia celular com o anúncio de novos **editais**. (17 palavras, *Veja*, 23 de setembro de 1992, p.85)

29 - Quando o cineasta dá rédea solta ao puro amor pelas imagens, o filme arrebata os **sentidos**. (16 palavras, *Folha de S. Paulo*, 23 de setembro de 1992)

30 - Na catarata, a vítima perde a visão gradualmente porque as células do cristalino tornam-se mais **opacas**. (16 palavras, *Superinteressante*, fevereiro de 1992, p.9)

31 - É difícil acreditar no acidente que interrompeu a arrancada do trem voador japonês, rumo às rotas **comerciais**. (17 palavras, *Superinteressante*, fevereiro de 1992, versão online)

32 - Os conservadores usaram e abusaram das teses de perversidade, da futilidade e da **ameaça**. (14 palavras, *Folha de S. Paulo*, 23 de setembro de 1992)

33 - Elas mostraram sinais de rotas das caravanas de mercadores, que levaram os pesquisadores à **cidade**. (15 palavras, *Superinteressante*, junho de 1992, p.10)

34 - Cartão-postal sob suspeita: radiação eletromagnética das antenas da Avenida Paulista pode afetar a saúde **humana**. (15 palavras, *Superinteressante*, junho de 1992, versão online)

35 - O investidor pode estar procurando a segurança do ouro, um investimento tradicional, neste momento de crise **política**. (17 palavras, *Folha de S. Paulo*, 23 de setembro de 1992)

36 - As fêmeas dos escorpiões só deixavam os abrigos dez vezes por ano, no **máximo**. (14 palavras, *Superinteressante*, agosto de 1992, p.8)

37 - O caso de Jill continua sendo estudado por especialistas que buscam soluções para doenças relacionadas à **memória**. (17 palavras, *Mente e cérebro*, maio de 2010, p.16)

38 - Os satélites ajudam os oceanógrafos a descobrir a temperatura da água em diversos locais do **planeta**. (16 palavras, *Superinteressante*, agosto de 1992, p.5)

39 - Nos casos de históricos de vida sedentária, evitar esportes anaeróbicos que exigem melhor condicionamento **físico**. (15 palavras, *VIP EXAME*, junho de 1992, p.19)

40 - Catástrofes à parte, a maior atração da viagem são a própria Galáxia e seus incríveis **habitantes**. (16 palavras, *Superinteressante*, agosto de 1992, p.24)

41 - O computador mostrou que, mesmo sem se quebrarem, alguns capacetes transmitem muita energia mecânica para a **cabeça**. (17 palavras, *Superinteressante*, agosto de 1992, p.30)

42 - A saúde instável do presidente serviu como outro elemento psicológico do ataque de nervos do **mercado**. (16 palavras, *Veja*, 23 de setembro de 1992)

43 - É a primeira vez que o Brasil vende tênis em quantidades expressivas no **exterior**. (14 palavras, *Veja*, 23 de setembro de 1992, p.84)

44 - O resto é luz do céu, claridade que desce da lua prateando a superfície **gelada**. (15 palavras, *VIP EXAME*, junho de 1992, p.44)

45 - O IBGE lançou um Atlas que mostra trezentas e três espécies de animais ameaçadas de **extinção**. (16 palavras, *Folha de S. Paulo*, 23 de setembro de 1992)

46 - O equipamento tem memória que permite dar ao usuário detalhes sobre eventuais defeitos em processos **industriais**. (16 palavras, *Folha de S. Paulo*, 23 de setembro de 1992)

47 - Os bosques de mangues, regados pelas marés, garantem comida farta para a fauna dos **oceanos**. (15 palavras, *Superinteressante*, maio de 1992, p.25)

48 - Hoje, quando o planeta é visto de cima pelos satélites, seus contornos não têm mais **segredo**. (16 palavras, *Superinteressante*, maio de 1992, p.34)

49 - Mesmo sem saber o índice de queda nas vendas, desvalorizou as ações da **empresa**. (14 palavras, *Veja*, 23 de setembro de 1992, p.86)

50 - Para os oitenta milhões de telespectadores brasileiros, a televisão significa lazer acessível e **barato**. (14 palavras, *Veja*, 23 de setembro de 1992, p.92)

51 - É preciso desmontar os motores em terra para prever as falhas, trabalho que consome tempo e **dinheiro**. (17 palavras, *Superinteressante*, julho de 1992, p.10)

52 - O paciente precisa de ressuscitação cardiorrespiratória o mais rápido possível, feita por pessoas **treinadas**. (14 palavras, *Folha de S. Paulo*, 28 de setembro de 1992)

53 - Segundo Senna, a chuva fez com que o desgaste dos pneus fosse excessivo na **corrida**. (15 palavras, *Folha de S. Paulo*, 28 de setembro de 1992)

54 - O povo com certeza irá ocupar as ruas para mostrar aos deputados o que querem seus **eleitores**. (17 palavras, *Folha de S. Paulo*, 28 de setembro de 1992)

55 - O telefone celular pode ser usado em qualquer ponto da cidade coberto por uma **célula**. (15 palavras, *Folha de S. Paulo*, 28 de setembro de 1992)

56 - Grandes quantidades de sal tornam a água mais pesada ou densa, diminuindo, em consequência, seu **volume**. (16 palavras, *Superinteressante*, julho de 1992, p.17)

57 - Como seres civilizados, deixamos as cavernas nas últimas glaciações, no início da Idade da Pedra **Polida**. (16 palavras, *Superinteressante*, agosto de 1992, p.73)

58 - A desvalorização é o que mais dói no orgulho nacional e no bolso de suas **vítimas**. (16 palavras, *Veja*, 23 de setembro de 1992, p.78)

59 - Não existe uma regra para definir a melhor hora para dar uma pausa no **trabalho**. (15 palavras, *Você S/A*, fevereiro de 2011, p.78)

60 - Os efeitos do sal na pressão das artérias dependem de outros minerais no **organismo**. (14 palavras, *Superinteressante*, fevereiro de 1992, p.15)

APPENDIX D2 – List of Words To Be Recalled (RST)

TRAINING SESSION

1 – emprego
2 – crescimento
3 – aumento
4 – europeus
5 – derrotas
6 – cinema
7 – existência
8 – balança
9 – contato

INÍCIO

1 – errada
2 – saudável
3 – detalhes
4 – futuristas
5 – vegetal
6 – atenção

7 – glicose
8 – partida
9 – depressão
10 – sucesso
11 – polícia
12 – dedicação
13 – natureza
14 – assunto
15 – demissões

16 – foguetes
17 – paciente
18 – delicado
19 – perfeita
20 – polêmico
21 – animais
22 – atraentes
23 – terrestres
24 – pesados
25 – reflexão
26 – favores
27 – qualidade

28 – editais
29 – sentidos
30 – opacas
31 – comerciais
32 – ameaça
33 – cidade
34 – humana
35 – política
36 – máximo
37 – memória
38 – planeta
39 – físico
40 – habitantes
41 – cabeça
42 – mercado

43 – exterior
44 – gelada
45 – extinção
46 – industriais
47 – oceanos
48 – segredo
49 – empresa
50 – barato
51 – dinheiro
52 – treinadas
53 – corrida
54 – eleitores
55 – célula
56 – volume
57 – Polida
58 – vítimas
59 – trabalho
60 – organismo

APPENDIX D3 –Reading Span Test Answer Sheet

READING SPAN TEST

Training Session

2 = _____ _____

3 = _____ _____ _____

4 = _____ _____ _____ _____

Start

Sets of 2 sentences

1st set	2nd set	3rd set

Sets of 3 sentences

1st set	2nd set	3rd set

Sets of 4 sentences

1st set	2nd set	3rd set

Sets of 5 sentences

1st set	2nd set	3rd set

Sets of 6 sentences

1st set	2nd set	3rd set

APPENDIX D4 – Reading Span Test Instructions

INSTRUÇÕES TESTE DE CAPACIDADE DE LEITURA: RST

Um conjunto de frases não relacionadas será apresentado a você na tela do computador. As frases estarão escritas em português. Cada vez que uma nova frase aparecer, leia-a em voz alta e tente memorizar a última palavra da frase.

As frases foram divididas em grupos. Ao final de cada grupo, pontos de interrogação aparecerão na tela. Cada vez que os pontos de interrogação aparecerem, diga em voz alta todas as últimas palavras daquele grupo, exatamente na ordem em que foram mostradas.

O número de frases em cada grupo vai aumentando progressivamente, conforme você for avançando.

Um treinamento inicial será feito, para que você possa entender o procedimento e tirar suas dúvidas.

APPENDIX E1 – Pause Protocol Instructions

1. Instrução do protocolo de pausa (Adaptado de Cavalcanti, 1989 por Leda Tomitch, 2003)

Esta parte do experimento consta da leitura de dois textos. Durante a leitura de cada um dos textos, observe o seguinte procedimento:

1 – Leia o texto silenciosamente. O objetivo da leitura é uma compreensão geral do texto.
2 – O texto deve ser lido **silenciosamente**; contudo, essa leitura silenciosa deve ser interrompida quando você:

2.1 detectar uma ***pausa** (não importa a duração) durante a leitura

***Pausa** – momento em que a atividade de leitura é interrompida e você nota que está, por exemplo, pensando sobre um problema que encontrou ou sobre alguma coisa que tenha chamado sua atenção).

2.1.1 - Quando a leitura for interrompida devido à ocorrência de uma pausa, por favor,

a) localize a pausa no texto, isto é, leia em voz alta a palavra, expressão ou oração que a ocasionou.

b) comente sobre a razão da pausa, isto é, se resultou de algum problema encontrado na leitura ou de algo que lhe chamou a atenção.

2.2 - chegar ao final de cada parágrafo. (Um ponto vermelho foi colocado no final dos parágrafos como lembrete).

2.2.1 – Quando terminar de ler cada parágrafo, por favor

a) fale sobre o que acabou de ler, isto é, sobre o conteúdo do parágrafo.

b) comente sobre o que estava pensando enquanto lia o parágrafo.

Obs: Se a pausa requer a solução de um problema antes que você possa continuar a leitura, por favor, tente pensar em voz alta enquanto tenta resolvê-lo.
3 – Continue a ler o texto e a falar sobre ele até o final.
4 – Tente ler como se você estivesse sozinho.
5 – A sessão será gravada.
6 – Será feito um treinamento inicial.

INSTRUÇÕES PÓS-LEITURA

1 - Por favor, tente escrever tudo o que você se lembrar do texto. Tente usar frases completas.

APPENDIX F1 – Practice Text (For The Pause Protocol)

A DAY TO REMEMBER[28]

One day a man came home from work to find total chaos in his house. His three children were outside, still in their pajamas, playing in the mud. There were empty food boxes all around the front yard. ●

The door of his wife's car was open, and the front door to the house was open too. He looked around but he didn't find his wife. He began to feel worried and as he got into the house he found an even bigger mess. Dirty dishes in the sink, dog food spilled on the floor, a broken glass under the table, toys and clothes all over the floor, a total mess. ●

He ran up the stairs, stepping over toys and more clothes, looking for his wife. "Did anything serious happen to her?" he thought, more worried than before. He found her in the bedroom, still in bed, still in her pajamas, reading a novel. She looked up at him, smiled and asked, "Did you have a good day?" ●

The man felt happy to see that his wife was OK but he didn't seem to understand the situation. He looked at her with a silly expression and asked, "What happened here today?" ●

She again smiled and said, "You know every day when you come from work and ask me what I did today?" "Yes," he answered, still confused. The smile remained on her face as she said, "Well, today I didn't do it!" ●

[28] Texto extraído do livro *Inglês série Brasil* (2005)

APPENDIX G1 – Pre-Reading Activities for the narrative text

ATIVIDADES DE PRÉ-LEITURA PARA O TEXTO NARRATIVO

Você irá assistir a dois vídeos curtos. Por favor, preste atenção!

VÍDEO 1: **https://www.youtube.com/watch?v=GJeWFoKZ63U**

VÍDEO 2:
https://www.youtube.com/watch?v=cinIaODneJo&nohtml5=False

Após assistir aos vídeos, por favor responda às seguintes perguntas, por escrito:

1 – De que tratam os vídeos? O que eles têm em comum?

_____
_____
_____
_____

2 - Agora você irá ler um texto chamado "*Making a Difference*". Você conhece essa expressão? O que ela significa? Se não conhece, procure-a no dicionário. _____
_____

3 – Agora, faça uma leitura rápida do texto, observando as palavras destacadas em negrito e as expresses sublinhadas. Qual você acredita ser o tema central do texto?

_____

_____

2 – Qual a relação do texto com os vídeos que você assistiu inicialmente?_____
_____
_____
_____
_____

APPENDIX H1 – Narrative Text

MAKING A DIFFERENCE[29]

While I was walking down the **beach**, I began to see a man in the distance. As I came nearer, I noticed that the man was bending down, picking something up and throwing it out into the water. He did that many times. Time and again he continued throwing things out into the ocean. ●

As I came even closer, I saw that he was a **fisherman**. He was picking up starfish that had been washed up on the beach and, one at a time, he was throwing them back into the **water**. I was curious. I approached the fisherman and said: "Good morning, friend. I was wondering what you are doing." ●

"I'm throwing these **starfish** back into the ocean. You see, it's low tide right now and all of these starfish are up here on the sand. If I don't throw them back into the water, they'll **die** up here from lack of oxygen." ●

"I understand", I said, "but there are thousands of starfish on this beach. You can't possibly get to all of them. There are simply too many. And don't you realize that at this time this is probably happening on hundreds of beaches all up down this coast? Can't you see that you can't possibly make a difference?" ●

The man smiled, bent down one more time and picked up another starfish. He threw it back into the sea and answered, "I made a difference to that one!" ●

[29] Texto extraído do livro *Inglês série Brasil* (2005)

APPENDIX H2 – Narrative Text Pause Protocol Transcription Sample

P1: 800 milhões de pessoas não são alfabetizadas no mundo. Então, por que tantas não alfabetizadas? Seja talvez por difícil acesso à escola, talvez seja por não ter escola ou talvez porque tem que largar a escola para trabalhar. Então, há diversos motivos aí.

Então, tem... esse primeiro parágrafo fala, uma das maiores contradições do nosso tempo é que no mundo, as nações mais prósperas são aquelas que possuem acesso às telecomunicações e novas tecnologias dessa era. Mas, mesmo assim, existem 600 milhões de vilas que não tem nem eletricidade e 800 milhões de pessoas que não são alfabetizadas. Tirando o fato de que 1 bilhão de pessoas continuam na fome e na pobreza.

O segundo parágrafo fala que essas... nações mais ricas ficam mais isoladas dos outros como eu falei antes da... da relação das imagens com as suas palavras em negrito e é o que eu até percebi que nessas... nessas nações mais ricas, elas não são... não procuram ajudar o próximo.

Por exemplo, um país que seja menos desenvolvido e que tenha necessitado. Elas procuram superar uma outra nação que já era desenvolvida. Ou seja, não tem muito sentido porque para que chegar ao topo do mundo se todos podem viver na mesma faixa? Então, elas acabam por se isolar e como disse a imprensa e tal, essas coisas, elas focam em quem é desenvolvido.

Principalmente um exemplo, é aquelas... aqueles ataques que tiveram na França. Como a França é um país relativamente rico, não... deram tanta ênfase a um ataque terrorista que teve lá, que causou até, se for comparar, não que diminua a tragédia, mas se for comparar com outros ataques terroristas foi pequeno. E em compensação a Síria...

Bom, no Facebook, mas é até porque foi criado aquele filtro só com a bandeira da França e a Batalha de Alepo da Síria que causa tantas mortes todo dia, e ninguém dá a mínima, e nem na imprensa é focada para aquilo, muito menos uma rede social que nem o Facebook que abrange o todo o mundo, praticamente, por que? Porque quem usa o Facebook não é os sírios, não é as pessoas de um país pobre. É as pessoas de país que têm condição, ou seja, que não é afetado. E quando um desses países é afetado, foi o caso da França, e foi utilizado o meio de comunicação para demonstrar seu luto pelo ataque.

Esse parágrafo que fala do que eu estava pensando exatamente. Pensei em falar no segundo parágrafo um assunto que eu não falei,

deixei para falar nesse. Que ao invés de criar uma ponte e ajudar no que precisar, os países em vez de fazer isso, eles utilizam barcos que foi falado para demonstrar...

Não sei... Então, em vez de eles criarem uma ponte para se ajudar e ir diretamente, e a todo momento, não só quando a nação rica precisa, eles mandam esses barcos porque seria o que? Um país só ajuda... o rico só ajuda o país pobre quando ele precisa de alguma coisa que tem lá, não foi o caso da... das guerras, a Primeira Guerra Mundial, que os EUA só colocou para ajudar a derrotar a Alemanha depois que já tinha vendido arma, que tinha lucrado e tinha virado uma potência mundial. Ou seja, se aproveitou de uma briga dos outros, e de morte de várias pessoas para crescer. Não é certo.

E depois, quando quis dar uma de herói querendo ajudar, no caso só queria terminar de vez com o único competidor deles tornando a única potência do mundo. E mesma coisa no Iraque. Por que é que os EUA eram tão interessados naquele lugar? Porque... em ajudar o Iraque a fornecer arma para se defender na guerra? Porque lá ele tem interesse comercial que é o petróleo.

Então, em vez de você só ajudar a dar armas, tentar parar a guerra porque você precisa do que tem lá, por que é que você não ajuda direto que aí você tem uma boa convivência, você acaba com uma boa parte da violência do mundo? Por que é que você só vai atrás das pessoas quando você precisa do que ela... de alguma coisa que ela tenha, de alguma coisa que ela saiba fazer?

Então, se eu sou um... um ferreiro, por que é que eu não estabeleço uma... relação de confiança e amizade com o pedreiro, para quando ele precisar de alguma ferramenta eu dou para ele, quando eu precisar de um ser vivo dele ele faz para mim?

Esse aqui fala, por que é que os EUA investem 10 por cento do seu orçamento militar em vez de ajudar todos os milhões de pessoas que passam fome na Ruanda? Então, é o que eu falei. Por que é que você não ajuda se você tem de sobra? Em vez de você gastar o que você tem de sobra para ajudar alguém que tem de menos, você usa isso daí para somar capital que você não precisa, simplesmente pelo fato de você querer ser o maior de todos? Querer ser a maior potência do mundo em armamento e em economia.

E essas nações ricas só vão decidir fazer essa ponte quando ela sentir na pele o que essas nações pobres passam, no caso é meio difícil de acontecer algum dia. Mas é o que fala, que não tem os problemas, como vão entender. Eles só vão fazer isso quando acontecer com eles. Então, nunca. Vai ser sempre essa desordem.

O texto em si fala sobre essa necessidade de uma nação que tem de sobra ajudar uma nação que tem de menos. Em vez de querer só ostentar o que tem. Porque se você não precisa de tal verba, por que é que você não ajuda o que está precisando? Que nem é o caso da Grécia. A Grécia está falida mas daí pega emprestado dos bancos, os bancos acho que até da Alemanha e dos EUA, e daí em vez do banco, viu que ele não tem.

Como a Grécia não pagava, não vai pagar de jeito nenhum, nem daqui a mil anos, por que é que eles não simplesmente cortam e que nem, procuram ajudar o país a se reerguer, não fazem um consenso? Não precisava ser só um, por que não todos esses que tem de sobra não ajudam um tal país a se reerguer?

APPENDIX I1 – Reading Comprehension Questions for the narrative text

PERGUNTAS DE COMPREENSÃO:

Responda às seguintes perguntas de acordo com o texto "Making a Difference":

1 - Onde se passa o evento narrado no texto"? _____
_____

2 - O que o pescador estava fazendo"?

( ) armando sua rede para pescar ( ) jogando estrelas do mar no oceano ( ) passeando

3 - Ao observar o pescador o narrador ficou:

( ) aborrecido com a situação ( ) curioso a respeito do ato ( ) feliz com o ocorrido

4 - Qual o motivo que levou o pescador a praticar o ato descrito no texto?

_____
_____

5 - De acordo com o narrador, a atitude do pescador foi válida? Por quê?

_____

_____

6 - "Você não percebe que simplesmente não pode fazer a diferença?" Por qual motivo o narrador pronunciou esta frase ao pescador?

_____
_____

7 - De que forma o pescador acreditava estar fazendo a diferença?

_____

8 - Você acredita que a atitude do pescador seja válida? Comente.

_____

_____

9 - Qual a relação entre o texto e os vídeos que você assistiu inicialmente?

_____

_____

10 - Você acredita que pequenos gestos são capazes de mudar o mundo? Explique e exemplifique. _____

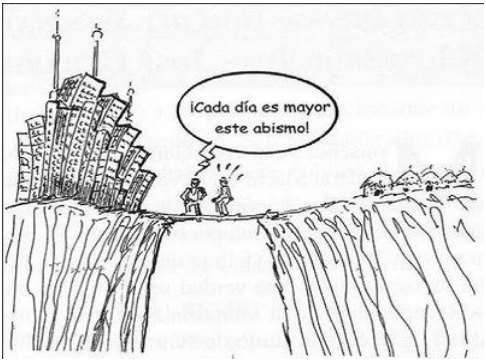
_____

_____

APPENDIX J1: Pre-Reading Activities for the expository text

ATIVIDADES DE PRÉ-LEITURA PARA O TEXTO EXPOSITIVO

Observe com atenção as imagens a seguir e responda às perguntas oralmente:



1 – De que tratam as imagens? O que elas têm em comum?

2 –Agora você irá ler um texto chamado "*To Build a Bridge*". Você conhece essa expressão? O que ela significa? Se não conhece, procure-a no dicionário.

3 – Agora, faça uma leitura rápida do texto "*To Build a Bridge*", observando as palavras destacadas em negrito e as expresses sublinhadas. Qual você acredita ser o tema central do texto?

4 – Qual a relação do texto com as imagens que você analisou inicialmente?

APPENDIX K1 – Expository Text

TO BUILD A BRIDGE[30]

One of the great **contradictions** of our time is the fact that, while the world's most prosperous nations are living in the era of interactive television, faxes and satellite communication, there are still 600,000 **villages** without electricity and over 800 million **illiterate** people in the world. For more than 1 billion human beings the daily reality continues to be **hunger** and **poverty**. ●

In a world where **interdependence** becomes stronger each day and where exchanges – trade, communications, population movements and epidemics – are taking a globaldimension, it would be foolish to suppose that the rich countries can **isolate** themselves from the poor ones. ●

We all know there is a **gap** between the **North** and the **South**, the industrial and the developing nations. They are like two sides of a **river**, a poor side and a rich one. Sometimes the rich nations send boats across this river with different types of aid. But we need more than that. We need global vision for the future, not just in case of an emergency. What is needed is a permanent connection, a **bridge** between those two sides of the river. ●

What would happen if the United States invested 10% of its military budget to feed the millions of hungry people of Rwanda? America would not be much poorer and Rwanda (to take just one example) would be less poor. ●

If the rich nations decided they could become slightly "poorer", they would truly **help** the nations in **need**. All it takes is political decision and politicians selfless enough to build that bridge. ●

[30] Texto extraído do livro *Inglês série Brasil* (2005)

APPENDIX K2 – Expository Text Pause Protocol Transcription Sample

P14: Primeiro parágrafo fala de uma pessoa que estava caminhando na praia e ela avistou um homem a uma longa distância, e quando essa pessoa começou a se aproximar deste homem, ela percebeu que o homem estava se abaixando no chão e pegando estrelas-do-mar e jogando de volta para o mar. E ele fazia esse movimento várias vezes.

O segundo parágrafo fala que esta pessoa se aproximou do indivíduo que estava jogando coisas dentro do mar e observou que se tratava de um pescador que estava... eh... recolhendo as estrelas-do-mar, que estavam na beira da praia e jogando-as de volta para... para o mar. A pessoa ficou curiosa e falou pra... e falou para o... para o pescador que ela estava maravilhada com o que... ele estava fazendo.

O terceiro parágrafo... eh... apresenta a fala do... do pescador, onde ele diz que ele estava jogando as estrelas-do-mar de volta para o mar, por conta da maré baixa, que fazia com que elas ficassem presas na areia. Se... e o pescador disse que, se ele não fizesse isso, elas acabariam morrendo porque iam ficar sem... sem oxigênio.

No quarto parágrafo mostra uma fala do... da pessoa, que... que ela diz que... eh... havia milhares de... de estrelas-do-mar ao longo da praia e que o pescador não seria capaz de jogar todas as estrelas de volta para o mar. E a pessoa ainda... eh... faz um questionamento para o pescador dizendo que, mesmo assim, ele... se ele ia conseguir fazer a diferença.

No último parágrafo... ahn... mostra... fala de... que o pescador, ele... ele sorriu e se abaixou, pegou uma estrela e jogou no... jogou de volta para o mar e falou para essa estrela, faz a diferença. Para essa, faz a diferença.

O texto fala de um... de uma pessoa que estava caminhando em uma praia e ela observou de longe um... a presença de outra pessoa que fazia um movimento de se abaixar e jogar algo no mar. Quando ela se aproximou, ela observou que se tratava de um... de um pescador que estava pegando as estrelas-do-mar que estavam presas na... na areia e jogando elas de volta para... para o mar. A pessoa ficou maravilhada, surpresa com essa atitude e... e perguntou para o pescador se valia a pena, né? Se ia fazer a diferença jogar uma estrela no... algumas estrelas-do-mar de volta para o mar, uma vez que haviam milhares de... dessas estrelas-do-mar ao longo da praia. Pescador... pescador então, ele... se abaixou... sorrindo, ele se abaixou, pegou uma estrela e jogou de volta para o mar. E ele falou para essa, faz diferença.

APPENDIX L1 – Reading Comprehension Questions for the expository text

PERGUNTAS DE COMPREENSÃO:

Responda às seguintes perguntas de acordo com o texto "To Build a Bridge":

1 - De acordo com o autor do texto, qual e uma das maiores contradições atuais?

_____

2 – É possível que as nações ricas consigam se isolar das mais pobres? Por quê?

_____

3 - De acordo com o texto o Norte e o Sul representam, respectivamente:

( ) Nações industriais e nações em desenvolvimento ( ) Nações em ascensão e nações pobres ( ) Nações ricas e nações industriais

4 - A que o autor compara os países do Norte e do Sul?

( ) duas faces de uma moeda ( ) dois lados de um rio ( ) duas metades de uma laranja

5 - Os países ricos auxiliam, de alguma forma, os países em desenvolvimento? Isso é suficiente? Explique.

_____

_____

6 - Qual a relação do título com o conteúdo do texto? A que se refere essa "ponte"? _____

_____

7 - O que aconteceria se os EUA investissem 10% de seu orçamento militar para alimentar a população da Rwanda, de acordo com o texto?

8 – “Tudo o que Precisamos é de decisões políticas e políticos altruístas o suficiente para construir esta ponte.” Você concorda com esta afirmação? Comente.

9 – Qual a relação do texto com as imagens que você analisou inicialmente? Após ler o texto você mudou sua visão a respeito de alguma delas?

10 - De que outras formas você acredita que esta “ponte” possa ser construída? Explique e exemplifique.

APPENDIX M1 – Retrospective Questionnaire

Muito obrigada por sua participação nesta pesquisa! A fim de elucidar os resultados deste estudo, gostaria que você respondesse a algumas questões referentes à sua percepção sobre os textos e atividades:

Nome: _____ Data: _____

I – Por favor responda às seguintes perguntas. Você não precisa fornecer respostas longas, mas peço que tente responder da forma mais completa possível.

1. O que você achou do teste de memória? Como você se sentiu durante sua realização?

_____
_____
_____

2. O que você fez para conseguir memorizar as últimas palavras? Você utilizou algum tipo de estratégia? Se sim, qual?

_____
_____
_____

3. Com relação à dificuldade, como você classifica os textos lidos? (Sendo 1 muito fácil e 5 muito difícil):

MuitoFácil **Muito difícil**
Texto I: 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
Texto II: 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )

4. Você teve alguma dificuldade ao ler os textos? Em caso afirmativo, quais?

_____
_____
_____

5. Como você classifica seu desempenho nas tarefas de compreensão?

Texto I: excelente ( ) muito bom ( ) bom ( ) razoável ( ) ruim ( )

Texto II: excelente ( ) muito bom ( ) bom ( ) razoável ( ) ruim ( )

6 . Você acredita que as atividades realizadas antes da leitura do texto ____ tenham tido algum impacto em sua compreensão? Comente, por favor.

_____
_____
_____

7. Como foi a experiência de verbalizar seus pensamentos durante a leitura? Você acredita que este procedimento ajudou, atrapalhou ou não teve influencia em sua compreensão?

_____
_____
_____

8. Você teve alguma outra dificuldade enquanto desempenhava as atividades? Se sim, quais? Por favor, explique.

_____
_____
_____

9. Você tem algum outro comentário ou sugestão?

_____
_____
_____
_____

Muito Obrigada! ☺

APPENDIX N1 – Table 37: Total Amount of Inferences Generated by Group I (ExpositoryPR) for the Narrative Text

INFERENCE CATEGORIES - NARRATIVE TEXT										
GI	**REP**	**EXP**	**ASS**	**PRED**	**EV**	**KCB**	**TCB**	**TA**	**IT**	**T-**
P1	22	35	4	2	3	1	0	1	0	**68**
P2	34	7	2	2	3	1	1	2	2	**54**
P3	26	11	3	1	13	7	0	8	4	**73**
P4	37	7	5	0	27	32	4	13	9	**134**
P5	21	6	1	2	12	13	0	0	1	**56**
P6	36	8	3	0	3	4	0	3	0	**57**
P7	21	6	2	0	5	1	1	0	2	**38**
P8	30	11	0	0	0	1	0	0	8	**50**
P9	22	3	0	1	3	31	0	1	7	**68**
P10	31	7	3	1	0	10	0	0	0	**52**
P11	54	17	10	0	8	50	3	14	1	**157**
P12	38	5	4	0	0	25	0	3	0	**75**
P13	48	5	9	2	24	28	0	2	3	**121**
P14	40	6	0	2	3	0	0	0	2	**53**
P15	19	6	0	2	3	22	2	1	0	**55**
P16	25	15	0	3	0	0	0	0	0	**43**
P17	19	10	0	1	1	2	1	0	1	**35**
GIT-	**523**	**165**	**46**	**19**	**108**	**228**	**12**	**48**	**40**	**1189**

GI=Group I GII=Group II P=Participant REP= *Repetition* EXP=Explanation ASS=*Association* P=*Prediction* ASS=*Association* TCB=*Text-Based Coherence Break* KCB=*Knowledge-Based Coherence Break* TA=*Translation Attempt* IT=*Incorrect Translation* T-=Total

APPENDIX N2 – Table 38: Total Amount of Inferences Generated by Group II (NarrativePR) for the Narrative Text

INFERENCE CATEGORIES - NARRATIVE TEXT										
GII	**REP**	**EXP**	**ASS**	**PRED**	**EV**	**KCB**	**TCB**	**TA**	**IT**	**T-**
P18	21	9	1	0	2	7	0	1	7	**48**
P19	35	14	1	0	8	8	4	4	5	**79**
P20	24	11	5	2	5	8	0	1	3	**59**
P21	19	14	4	3	6	7	8	0	2	**63**
P22	20	6	1	0	1	4	1	1	2	**36**
P23	32	6	3	1	3	16	2	0	2	**65**
P24	22	7	0	4	1	7	1	1	4	**47**
P25	37	5	1	1	2	18	0	0	0	**64**
P26	17	9	1	2	1	11	0	0	0	**41**
P27	36	5	2	1	0	0	0	0	3	**47**
P28	27	6	1	2	4	28	0	4	0	**72**
P29	26	12	0	1	3	22	2	0	0	**66**
P30	26	11	2	0	1	26	0	1	6	**73**
P31	43	15	2	0	4	6	0	1	2	**73**
P32	28	3	1	1	4	5	4	3	0	**49**
P33	30	7	0	3	0	11	0	0	0	**51**
P34	20	10	8	3	9	3	1	4	12	**70**
P35	37	7	5	1	6	24	2	4	0	**86**
P36	32	14	1	2	9	4	0	0	2	**64**
GII T-	**532**	**171**	**39**	**27**	**69**	**215**	**25**	**25**	**50**	**1153**

GI=Group I GII=Group II P=Participant REP= *Repetition* EXP=Explanation ASS=*Association* P=*Prediction* ASS=*Association* TCB=*Text-Based Coherence Break* KCB=*Knowledge-Based Coherence Break* TA=*Translation Attempt* IT=*Incorrect Translation* T-=Total

APPENDIX N3 - Table 39: Total Amount of Inferences Generated by Group I (ExpositoryPR) for the Expository Text

INFERENCE CATEGORIES - EXPOSITORY TEXT										
GI	**REP**	**EXP**	**ASS**	**PRED**	**EV**	**KCB**	**TCB**	**TA**	**IT**	**T-**
P1	12	48	16	13	7	0	0	0	0	**96**
P2	30	12	0	0	19	11	3	3	6	**84**
P3	13	3	2	0	10	1	2	10	2	**43**
P4	14	16	3	0	5	2	0	0	2	**42**
P5	29	16	4	0	7	14	0	2	9	**81**
P6	30	12	0	0	1	11	0	0	0	**54**
P7	14	7	1	0	11	5	1	0	2	**41**
P8	24	12	3	0	1	0	0	0	5	**45**
P9	20	4	8	1	5	30	0	5	9	**82**
P10	8	11	4	3	1	2	0	0	4	**33**
P11	35	11	10	2	7	33	3	15	6	**122**
P12	20	11	1	1	0	30	0	2	6	**71**
P13	20	12	2	1	3	7	0	0	1	**46**
P14	24	8	1	1	3	1	0	1	0	**39**
P15	23	6	3	1	2	26	0	0	0	**61**
P16	15	9	2	3	3	0	0	0	3	**35**
P17	14	11	5	4	1	0	0	0	1	**36**
GI T-	**345**	**209**	**65**	**30**	**86**	**173**	**9**	**38**	**56**	**1011**

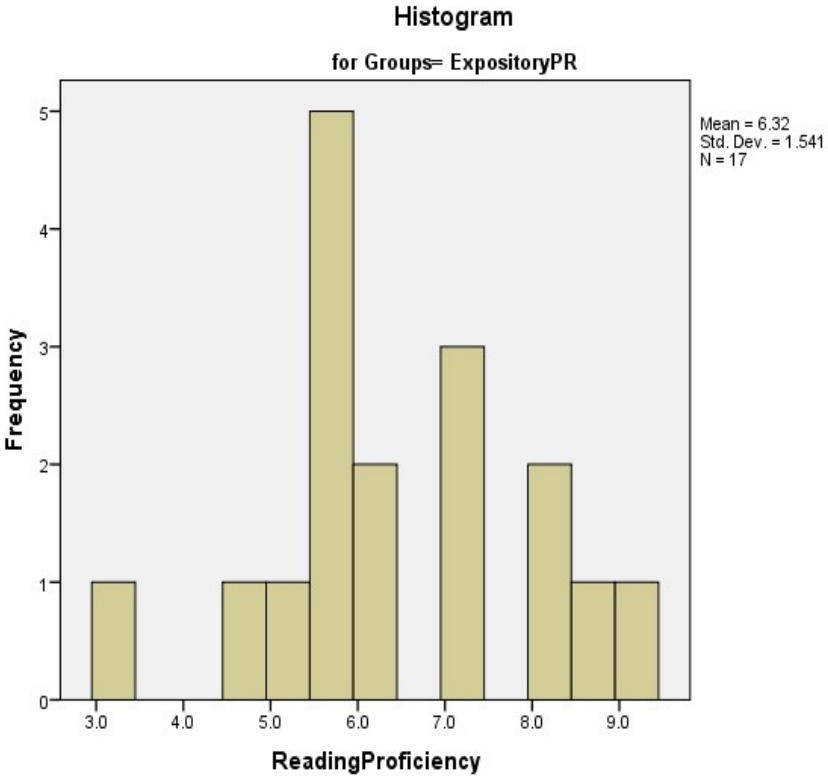
GI=Group I GII=Group II P=Participant REP= *Repetition* EXP=Explanation ASS=*Association* P=*Prediction* ASS=*Association* TCB=*Text-Based Coherence Break* KCB=*Knowledge-Based Coherence Break* TA=*Translation Attempt* IT=*Incorrect Translation* T-=Total

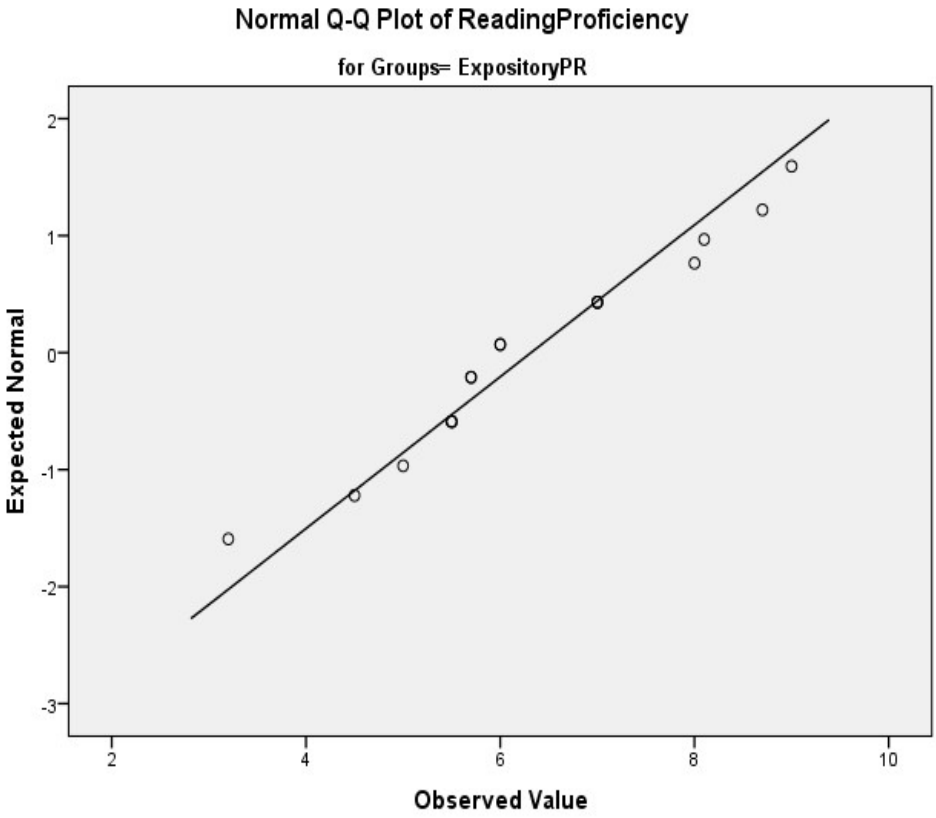
APPENDIX N4 - Table 40: Total Amount of Inferences Generated by Group II (NarrativePR) for the Expository Text

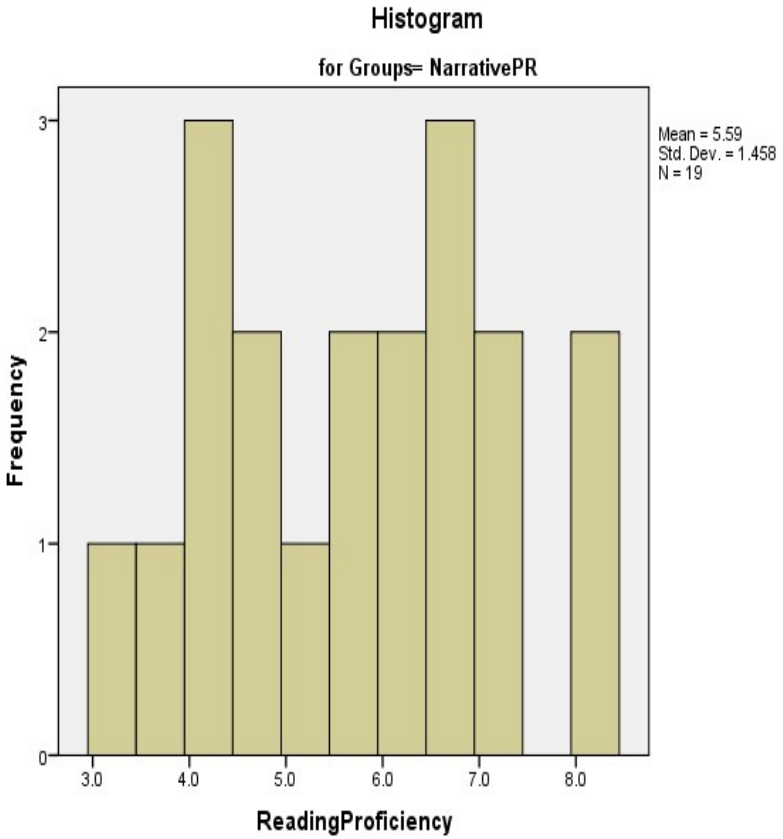
INFERENCE CATEGORIES - EXPOSITORY TEXT										
GII	**REP**	**EXP**	**ASS**	**PRED**	**EV**	**KCB**	**TCB**	**TA**	**IT**	**T-**
P18	27	5	1	0	4	11	0	3	9	**60**
P19	20	18	1	0	4	17	1	4	8	**73**
P20	27	11	3	1	11	15	3	3	13	**87**
P21	18	12	3	1	9	11	0	1	13	**68**
P22	21	7	1	0	3	10	0	1	4	**47**
P23	38	13	6	0	3	20	0	1	5	**86**
P24	17	3	1	0	1	27	2	4	6	**61**
P25	18	6	4	2	1	33	0	1	14	**79**
P26	17	9	1	1	3	16	0	0	3	**50**
P27	28	19	3	1	1	0	0	0	1	**53**
P28	40	4	3	0	4	47	0	11	8	**117**
P29	21	15	2	0	1	50	0	1	0	**90**
P30	23	4	2	0	1	35	0	4	13	**82**
P31	37	24	4	1	3	20	0	3	5	**97**
P32	26	3	3	0	5	6	5	3	9	**60**
P33	22	7	2	6	0	5	0	0	4	**46**
P34	24	13	6	5	4	16	0	7	10	**85**
P35	23	4	9	1	23	20	2	8	14	**104**
P36	15	13	13	2	16	6	0	4	8	**77**
GII T-	**462**	**190**	**68**	**21**	**97**	**365**	**13**	**59**	**147**	**1422**

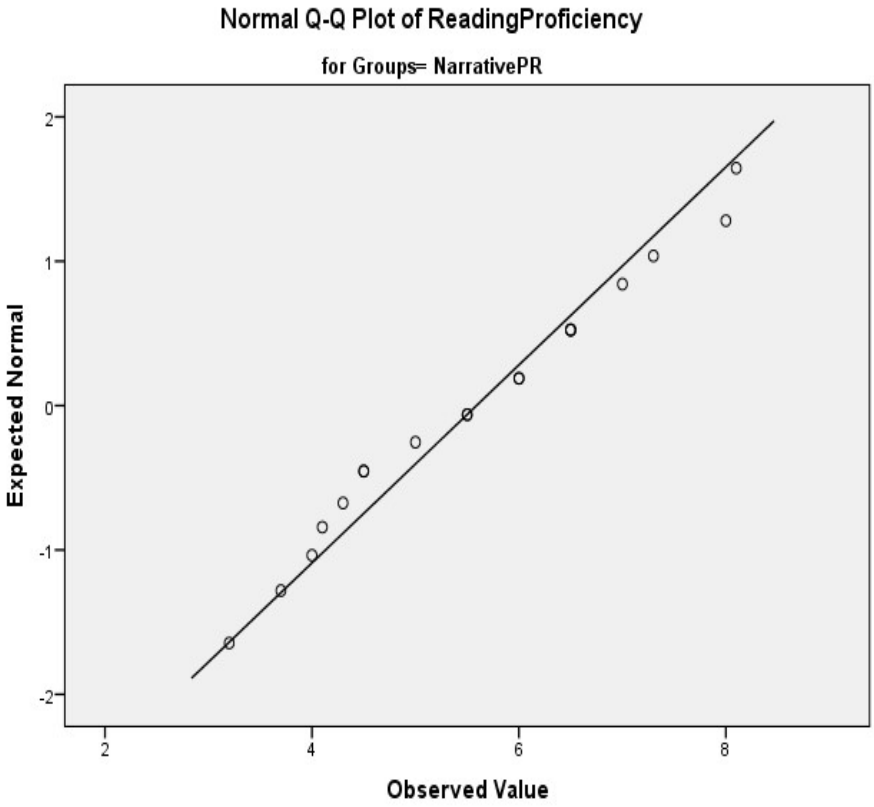
GI=Group I GII=Group II P=Participant REP= *Repetition* EXP=Explanation ASS=*Association* P=*Prediction* ASS=*Association* TCB=*Text-Based Coherence Break* KCB=*Knowledge-Based Coherence Break* TA=*Translation Attempt* IT=*Incorrect Translation* T-=Total

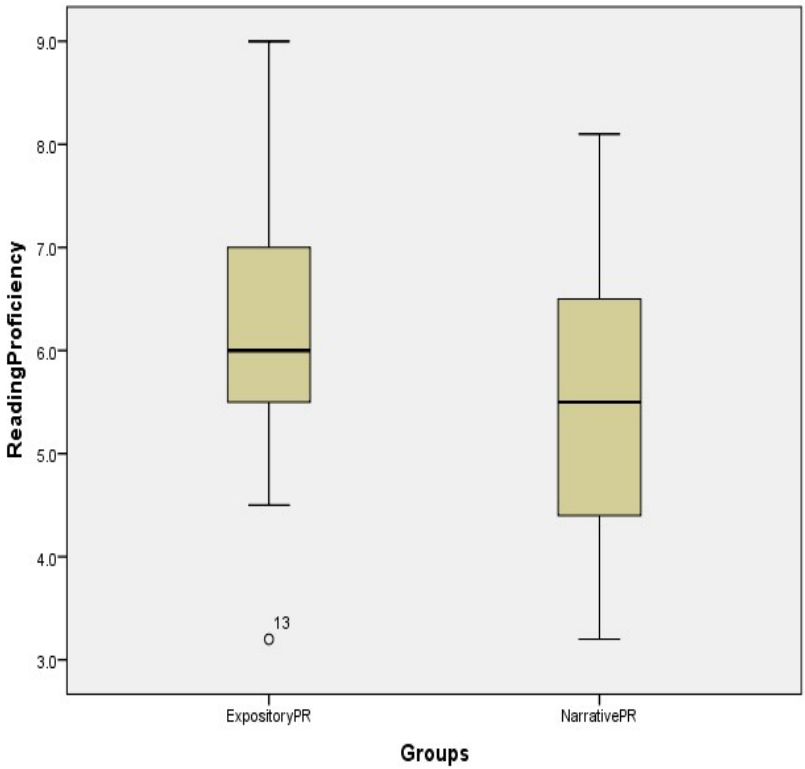
APPENDIX O1 – Histograms and Boxplots for the Reading Proficiency Test – With Outlier



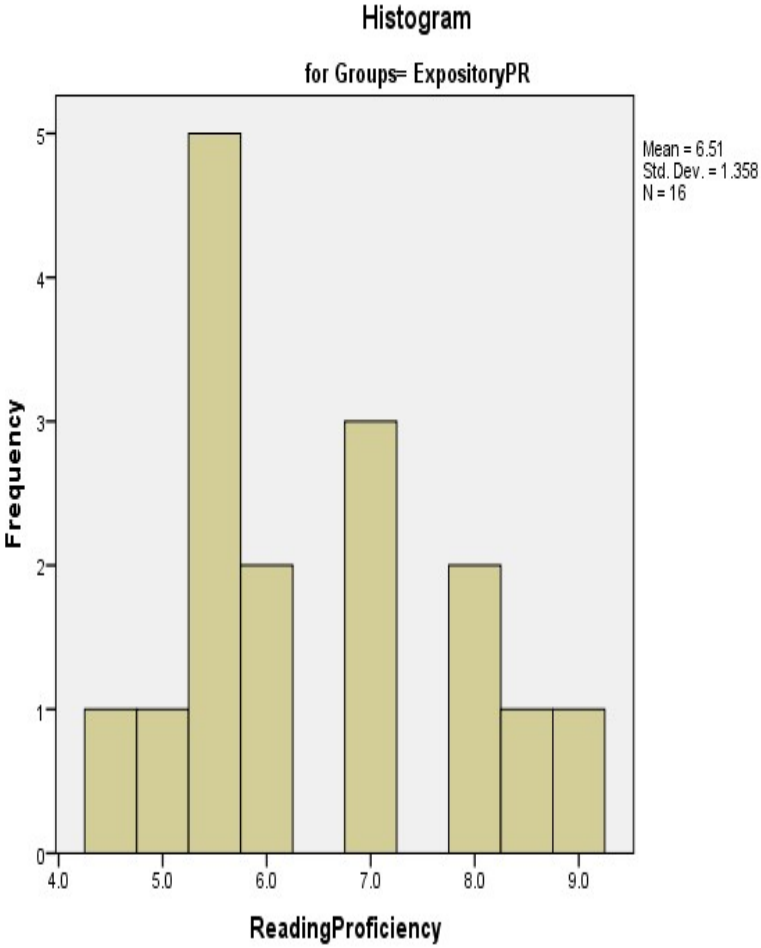

Normal Q-Q Plot of ReadingProficiency
for Groups= ExpositoryPR
Expected Normal
2
1
0
-1
-2
-3
2
4
6
8
10
Observed Value

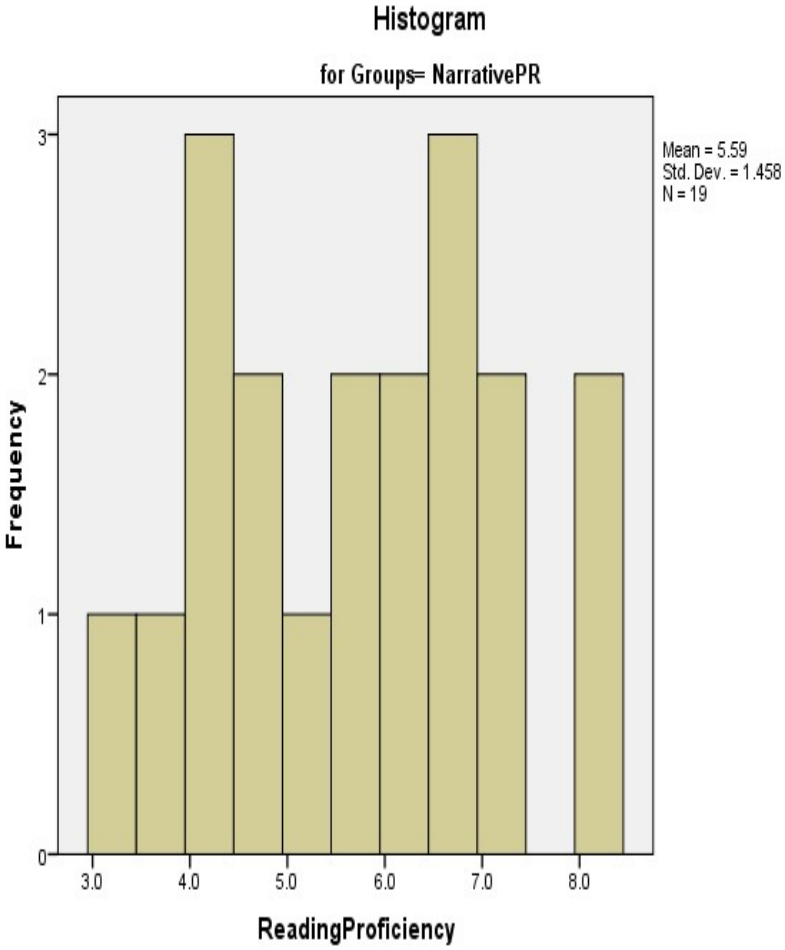

Histogram
for Groups= NarrativePR
Mean = 5.59
Std. Dev. = 1.458
N = 19
Frequency
0
1
2
3
3.0
4.0
5.0
6.0
7.0
8.0
ReadingProficiency

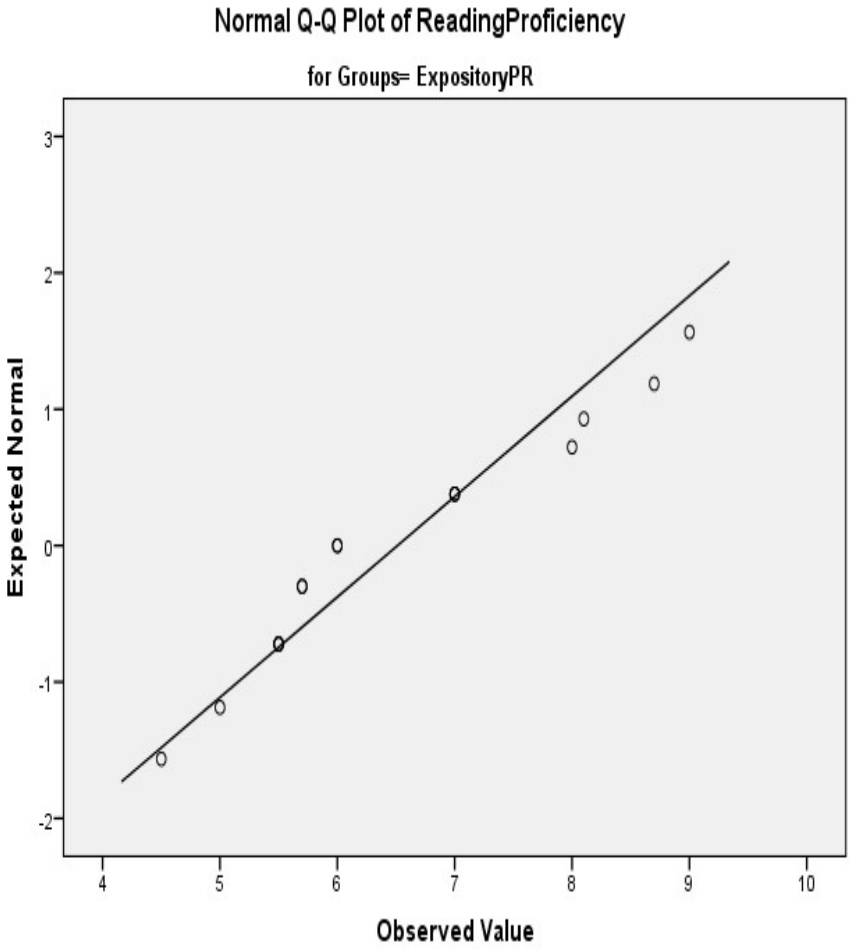

Normal Q-Q Plot of ReadingProficiency
for Groups= NarrativePR
Expected Normal
Observed Value
2
1
0
-1
-2
2
4
6
8

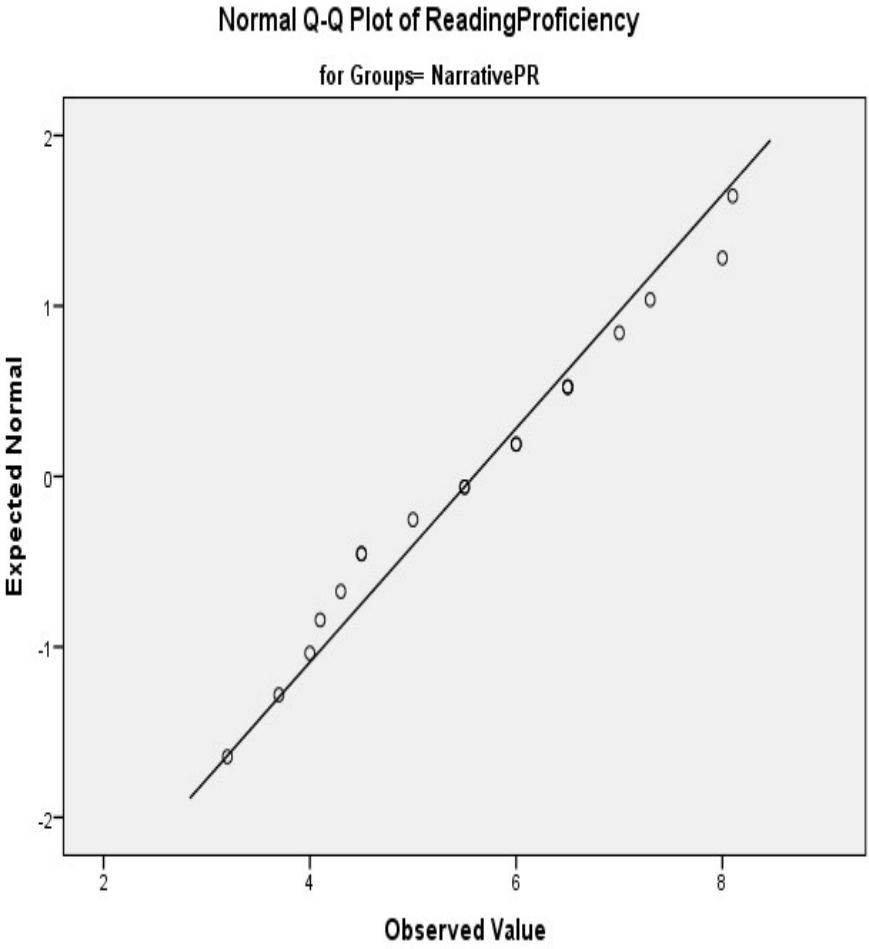

ReadingProficiency
9.0
8.0
7.0
6.0
5.0
4.0
3.0
13
ExpositoryPR
NarrativePR
Groups

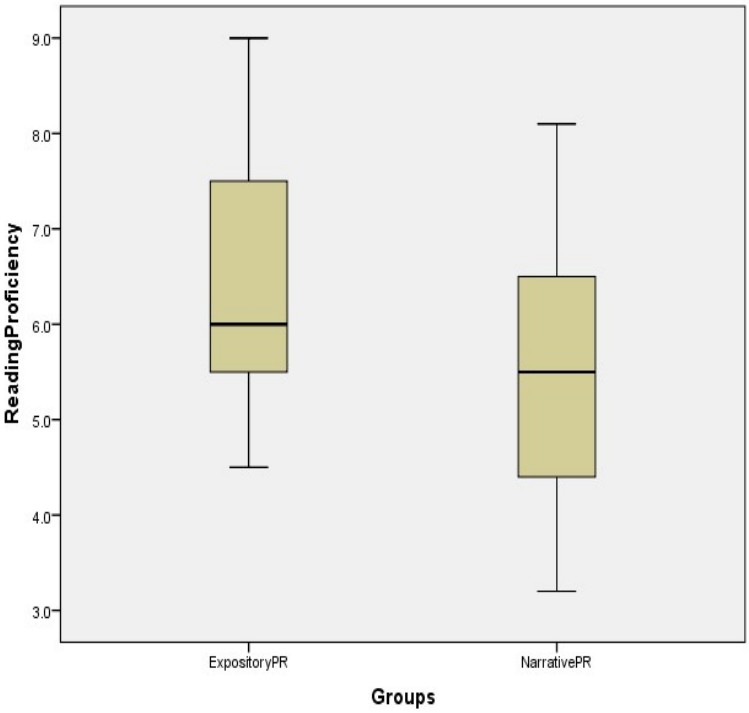
APPENDIX O2 – Histograms and Boxplots for the Reading Proficiency Test – Without Outlier



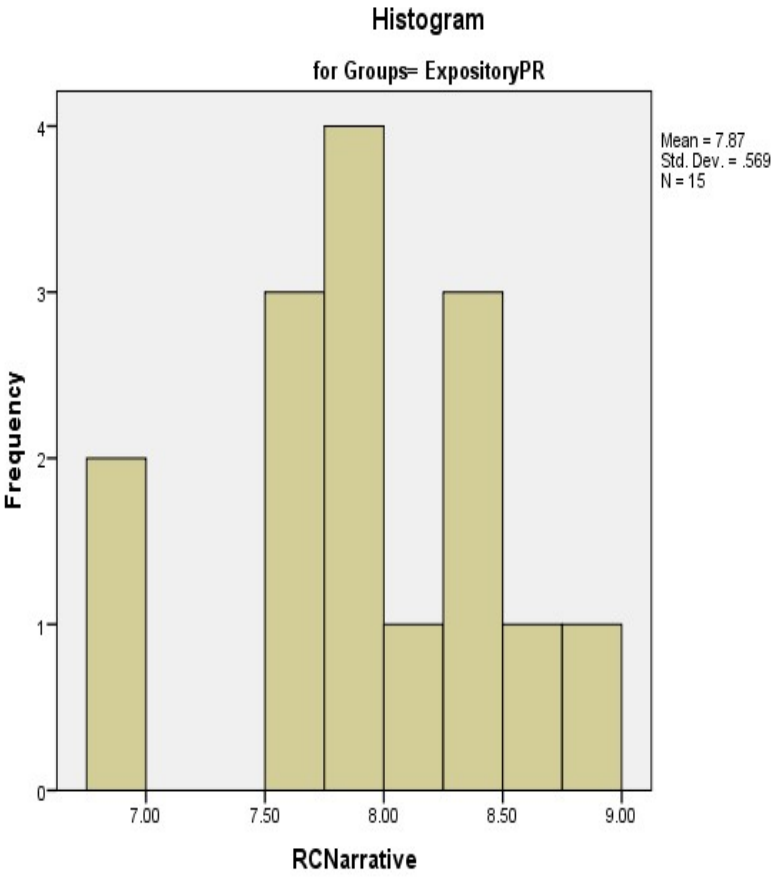

Histogram
for Groups= NarrativePR
Mean = 5.59
Std. Dev. = 1.458
N = 19
Frequency
0
1
2
3
3.0
4.0
5.0
6.0
7.0
8.0
ReadingProficiency

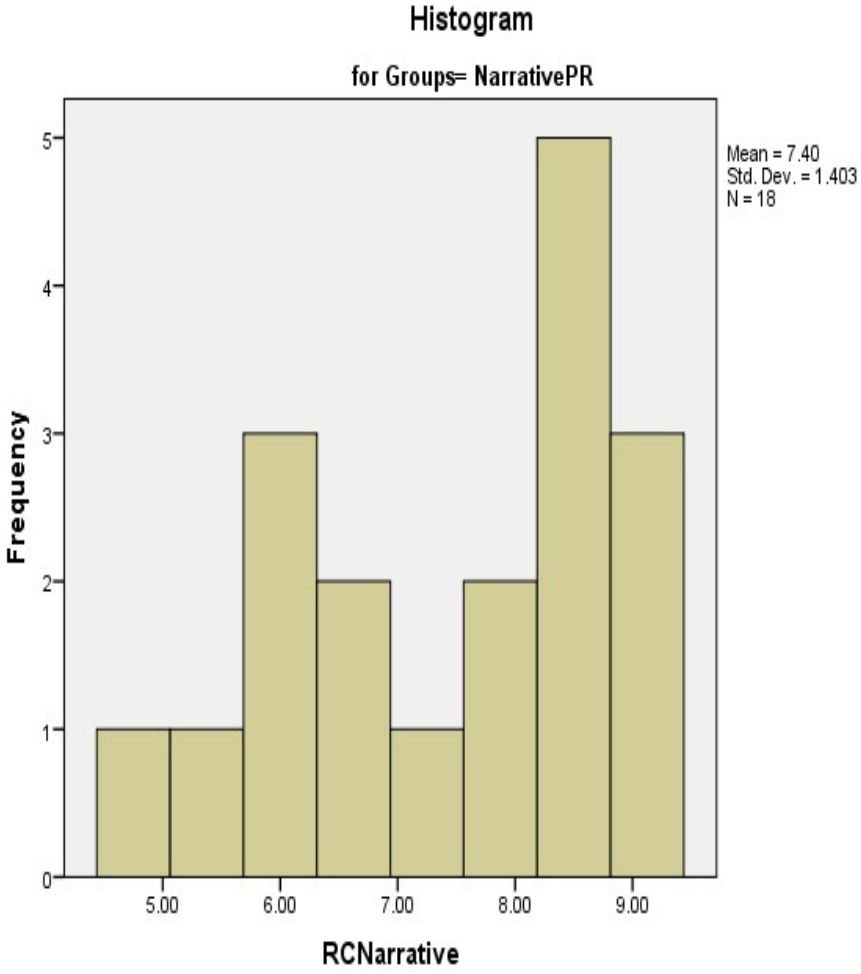

Normal Q-Q Plot of ReadingProficiency
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
4
5
6
7
8
9
10

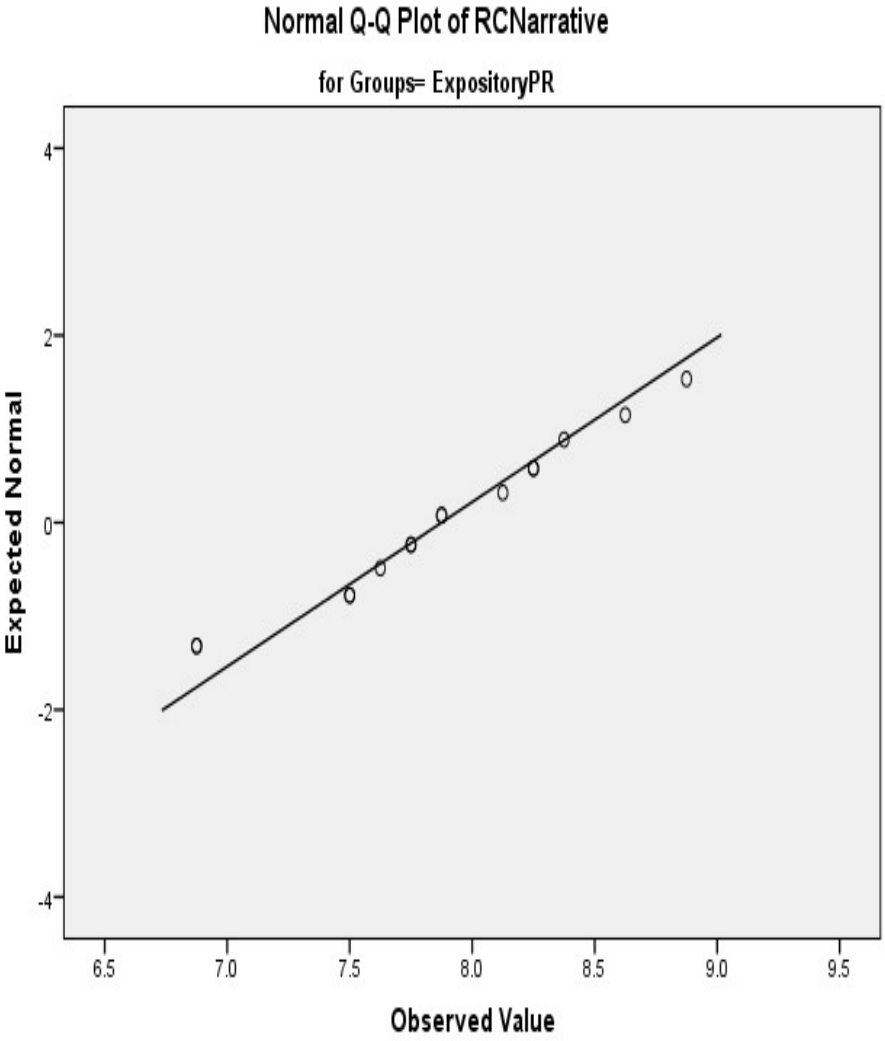

Normal Q-Q Plot of ReadingProficiency
for Groups= NarrativePR
Expected Normal
2
1
0
-1
-2
2
4
6
8
Observed Value

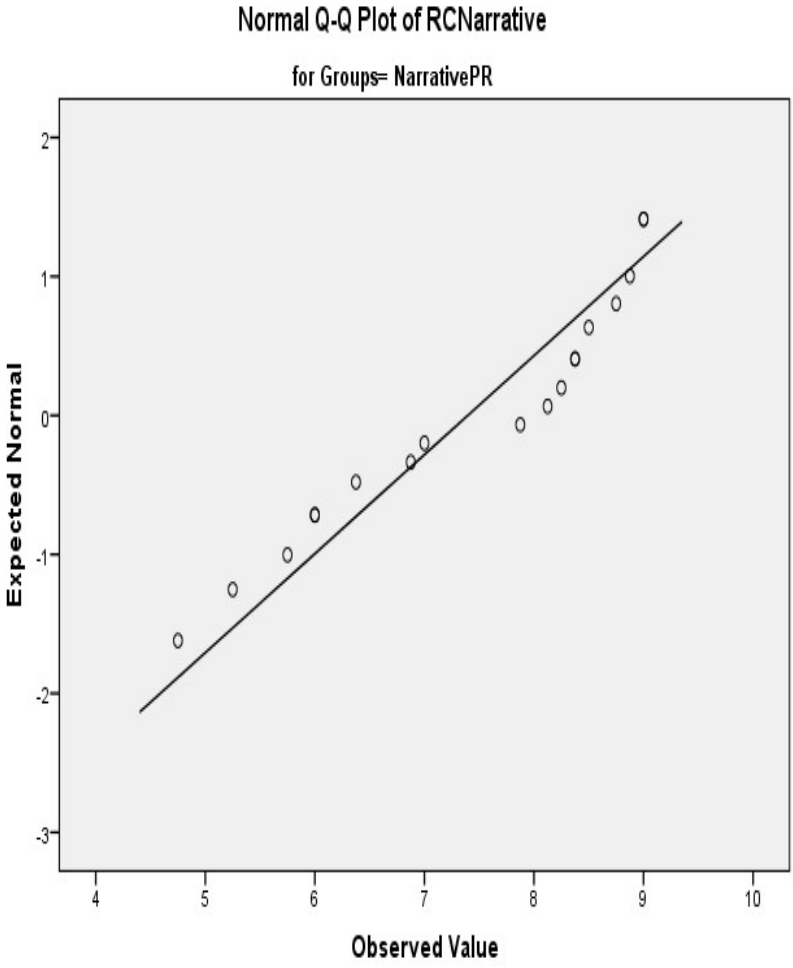

9.0
8.0
7.0
6.0
5.0
4.0
3.0
ReadingProficiency
ExpositoryPR
NarrativePR
Groups

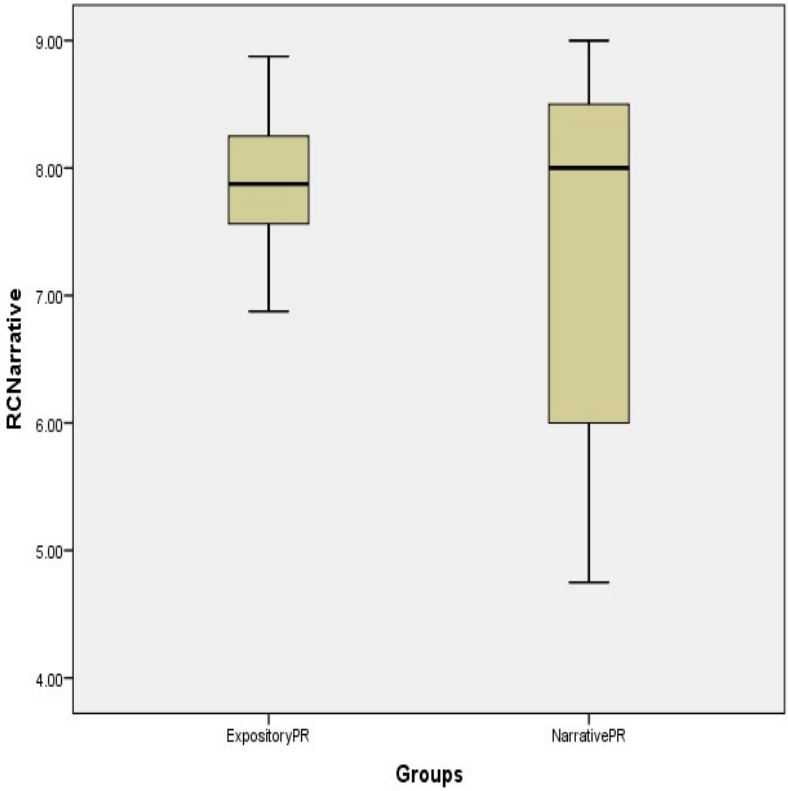
APPENDIX P1 – Histograms and Boxplots of the Reading Comprehension Test – With Outlier

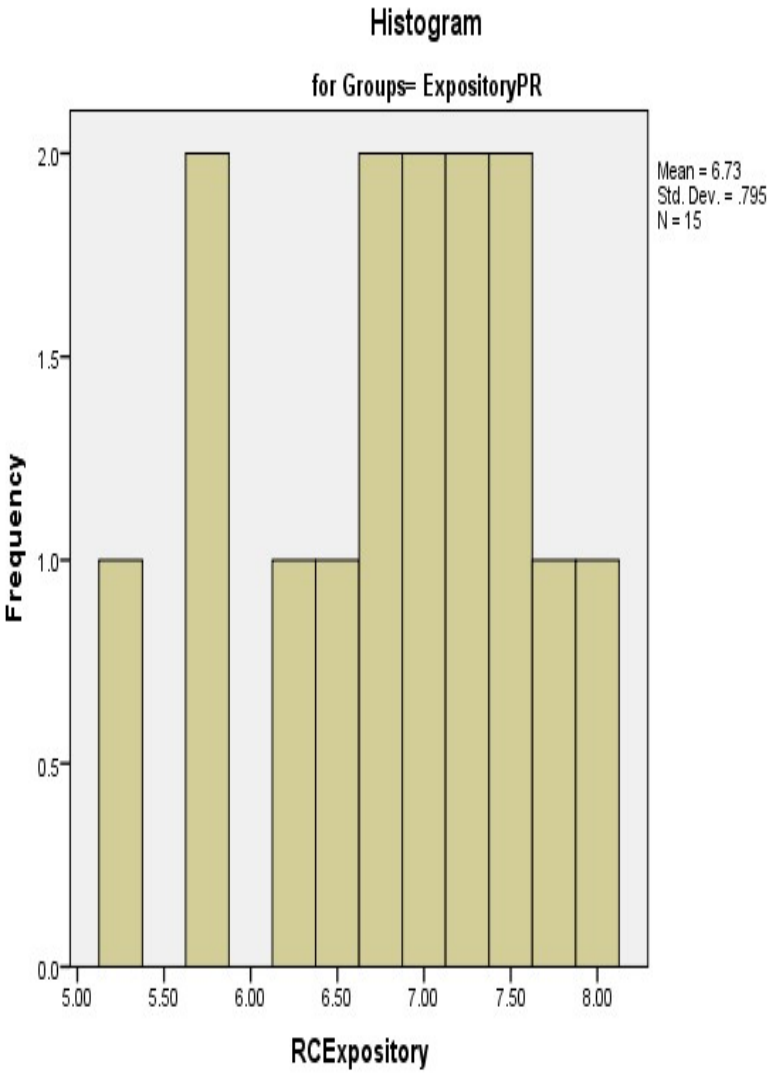


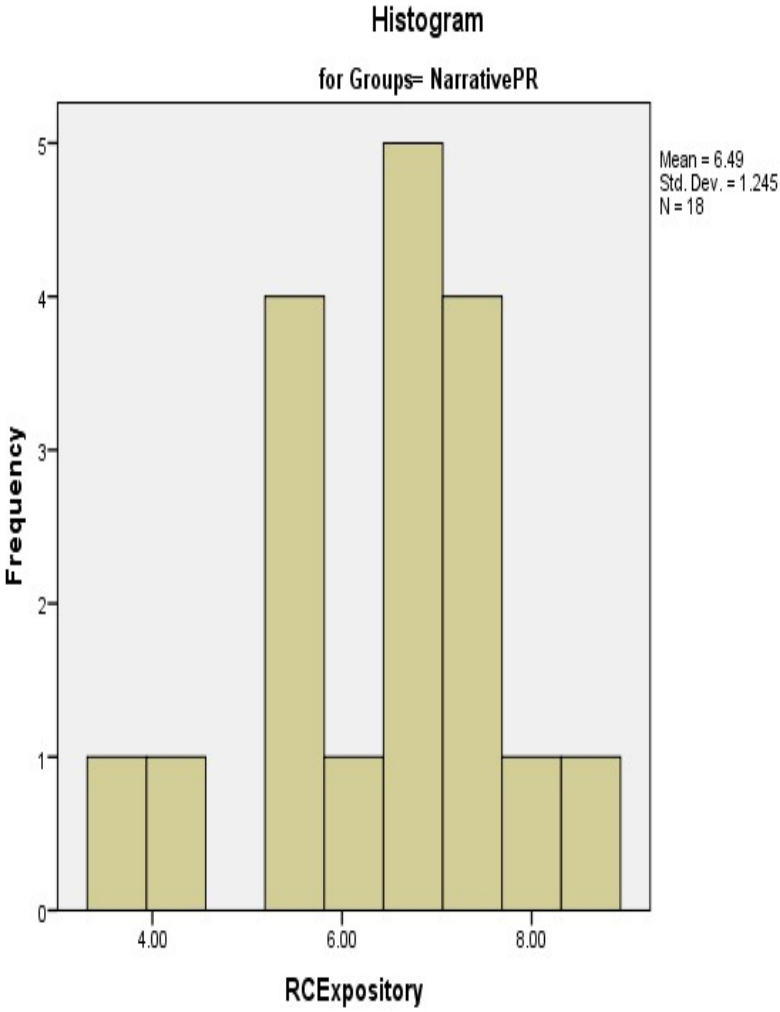

Histogram
for Groups= NarrativePR
Mean = 7.40
Std. Dev. = 1.403
N = 18
Frequency
0
1
2
3
4
5
5.00
6.00
7.00
8.00
9.00
RCNarrative

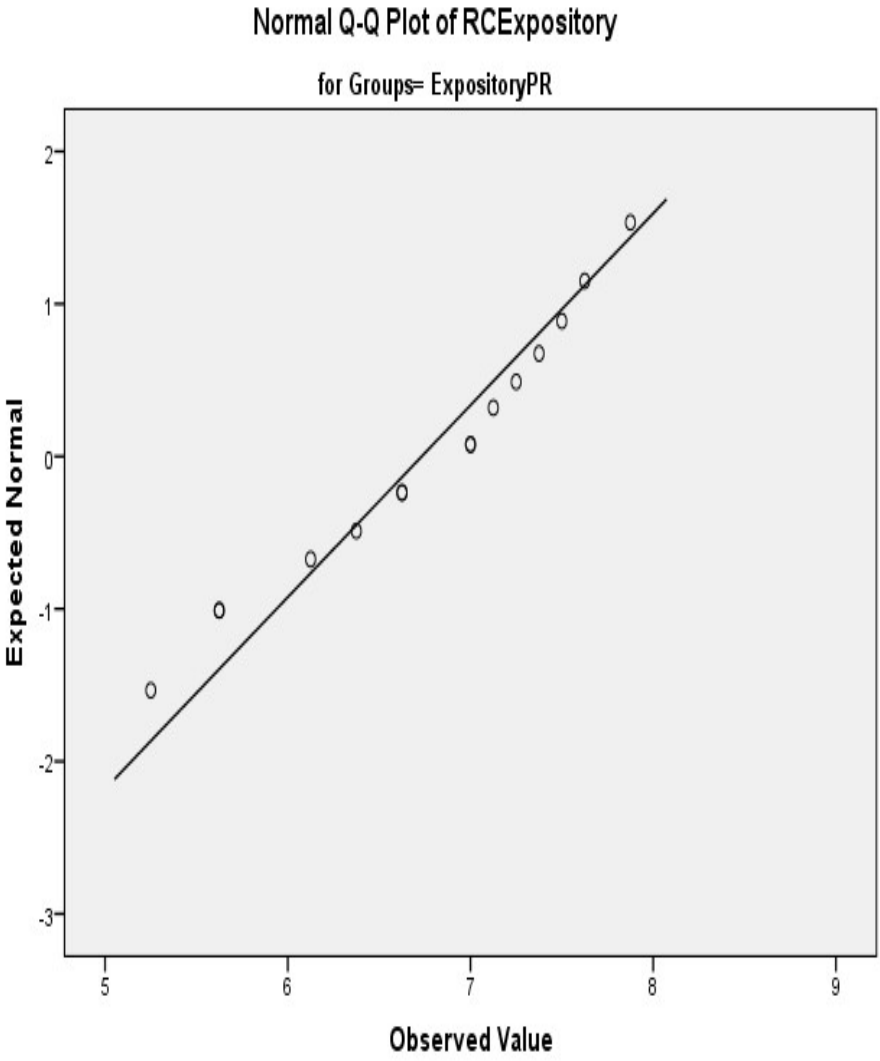

Normal Q-Q Plot of RCNarrative
for Groups= ExpositoryPR
Expected Normal
4
2
0
-2
-4
6.5
7.0
7.5
8.0
8.5
9.0
9.5
Observed Value

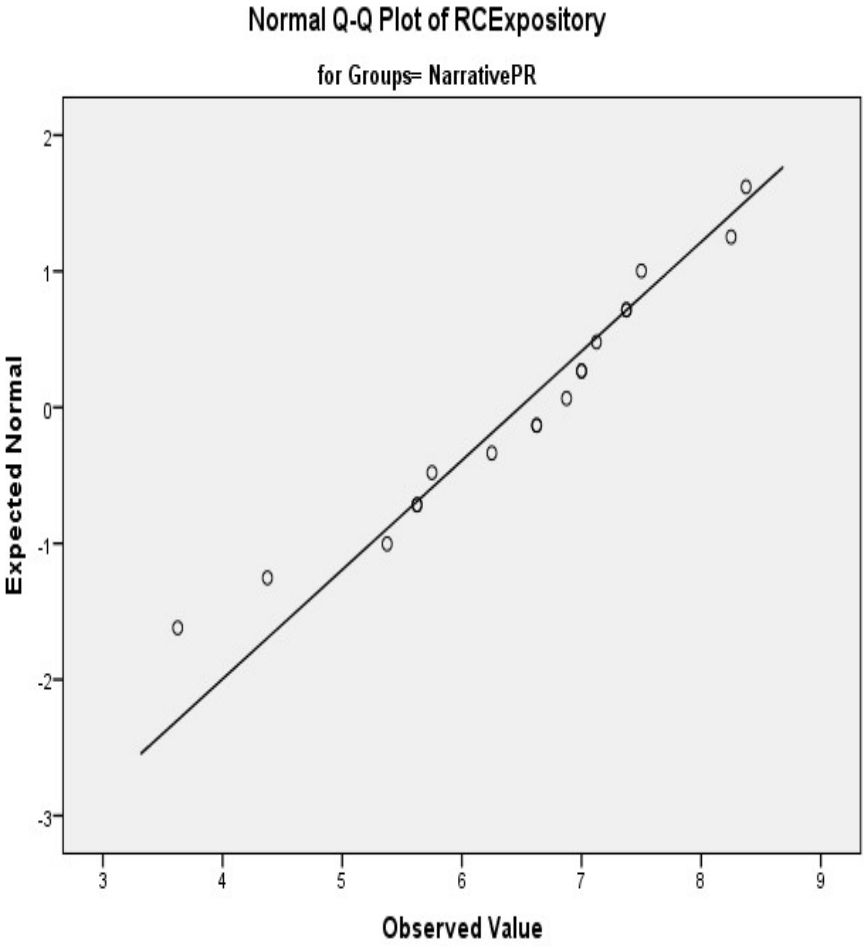

Normal Q-Q Plot of RCNarrative
for Groups= NarrativePR
Expected Normal
2
1
0
-1
-2
-3
4
5
6
7
8
9
10
Observed Value

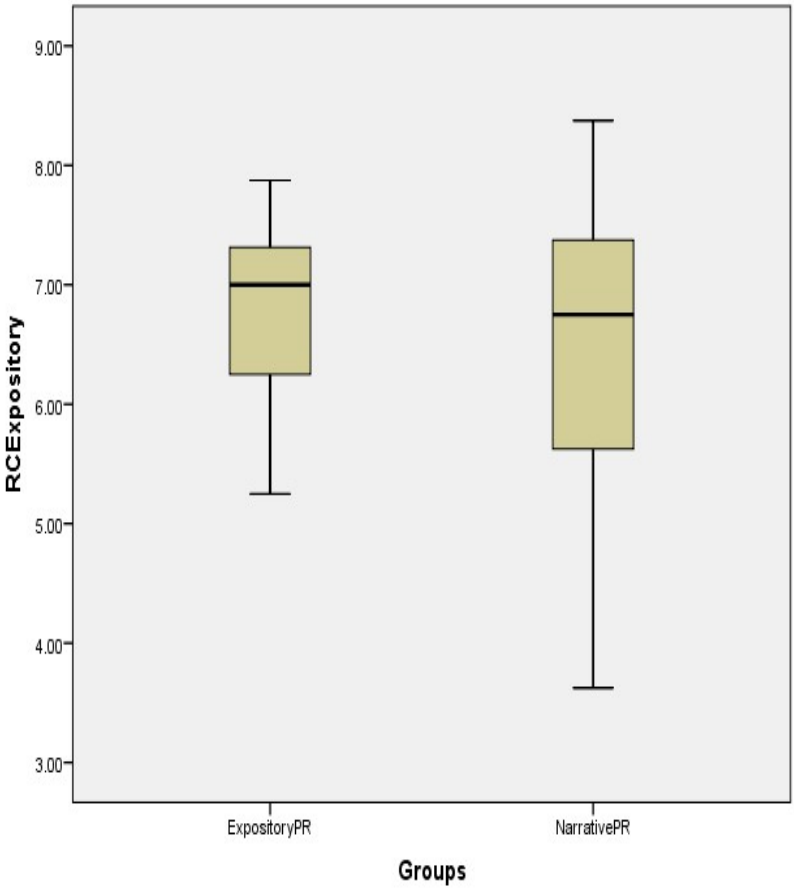

9.00
8.00
7.00
6.00
5.00
4.00
RCNarrative
ExpositoryPR
NarrativePR
Groups


Histogram
for Groups= ExpositoryPR
Mean = 6.73
Std. Dev. = .795
N = 15
Frequency
0.0
0.5
1.0
1.5
2.0
5.00
5.50
6.00
6.50
7.00
7.50
8.00
RCExpository

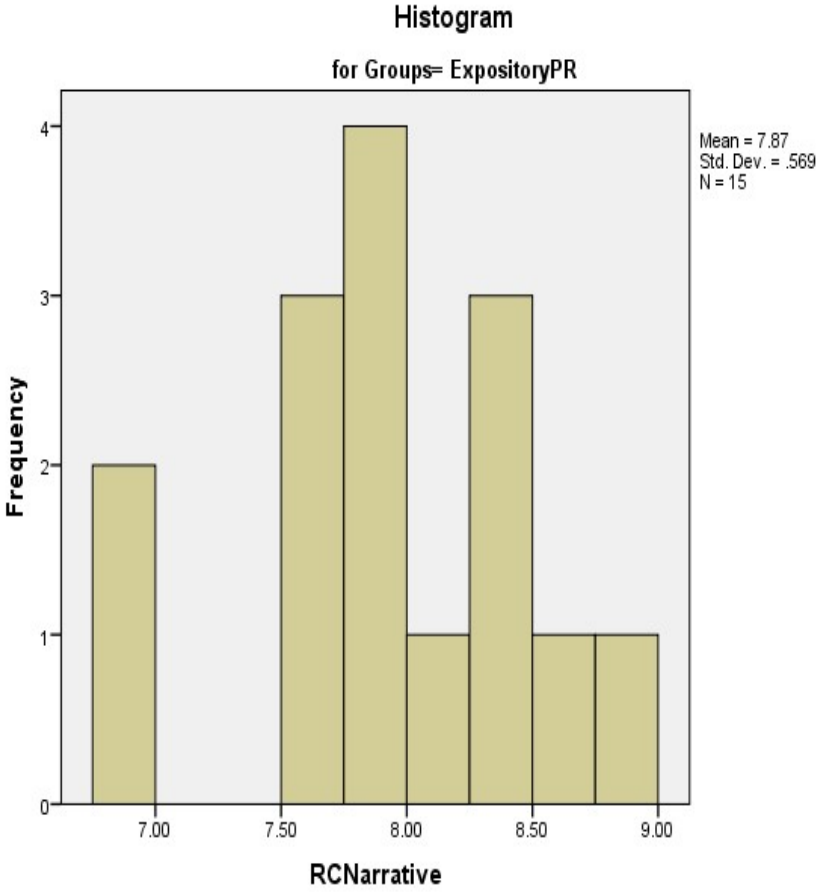

Histogram
for Groups= NarrativePR
Mean = 6.49
Std. Dev. = 1.245
N = 18
Frequency
0
1
2
3
4
5
4.00
6.00
8.00
RCExpository

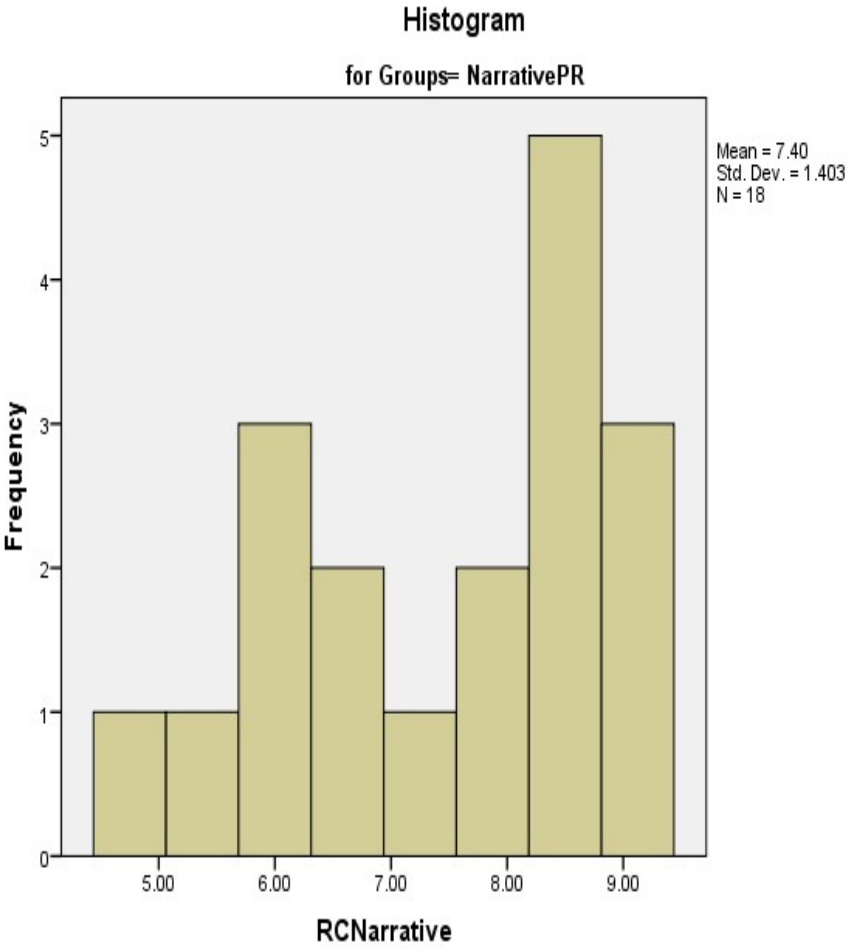

Normal Q-Q Plot of RCExpository
for Groups= ExpositoryPR
Expected Normal
2
1
0
-1
-2
-3
5
6
7
8
9
Observed Value

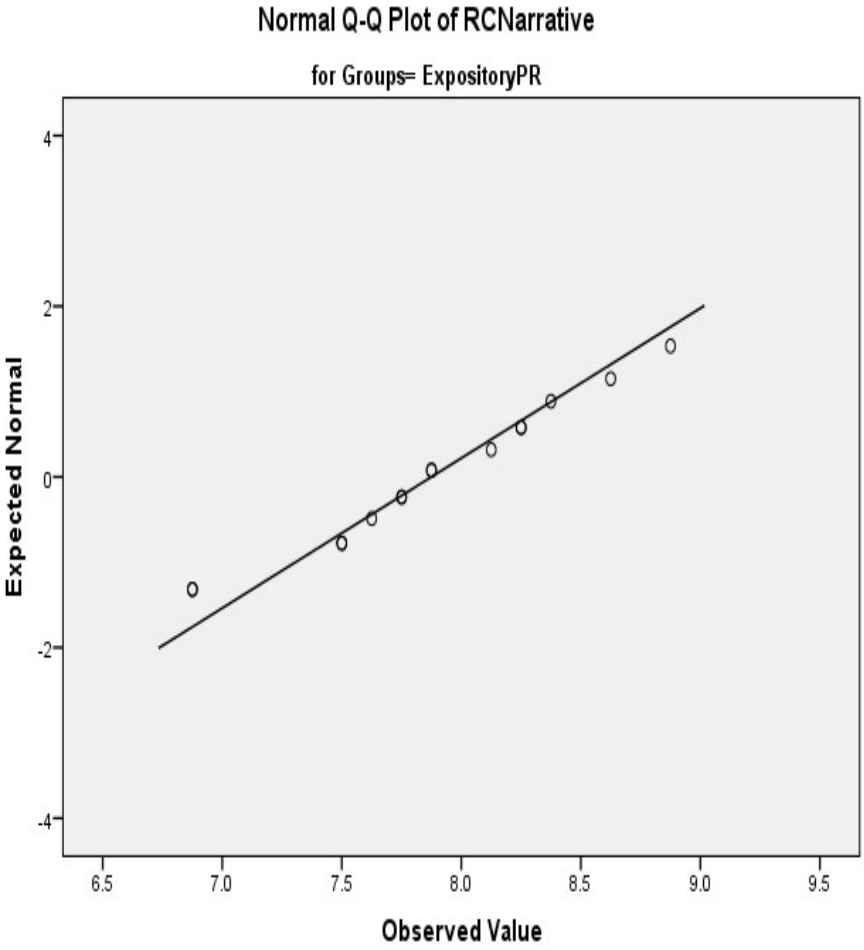

Normal Q-Q Plot of RCExpository
for Groups= NarrativePR
Expected Normal
Observed Value
2
1
0
-1
-2
-3
3
4
5
6
7
8
9

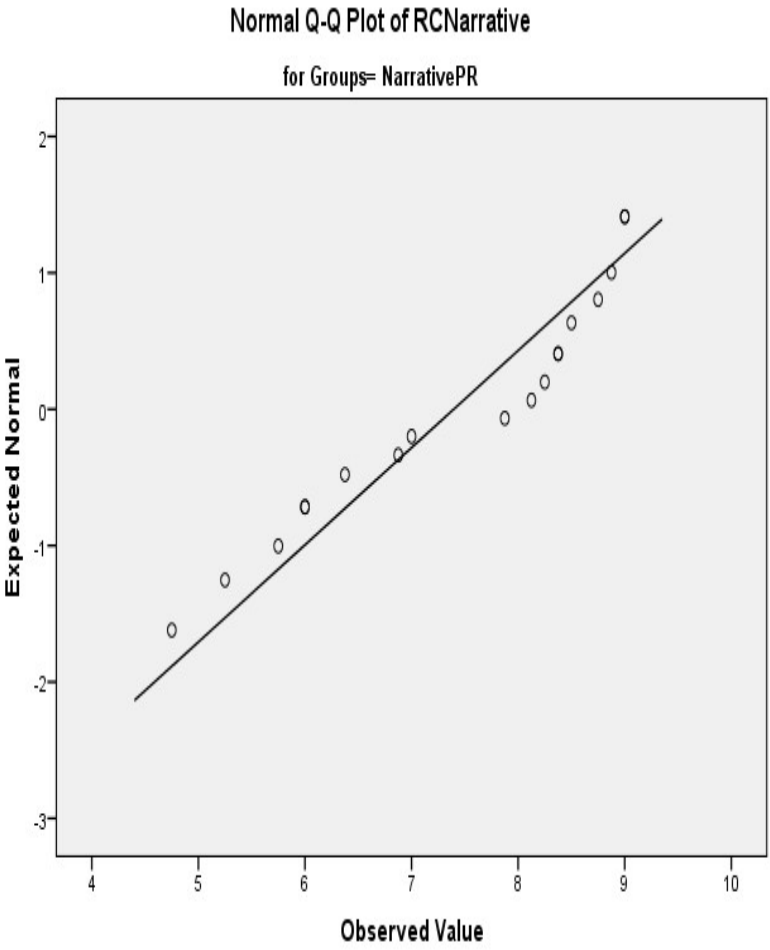

9.00
8.00
7.00
6.00
5.00
4.00
3.00
RCExpository
ExpositoryPR
NarrativePR
Groups

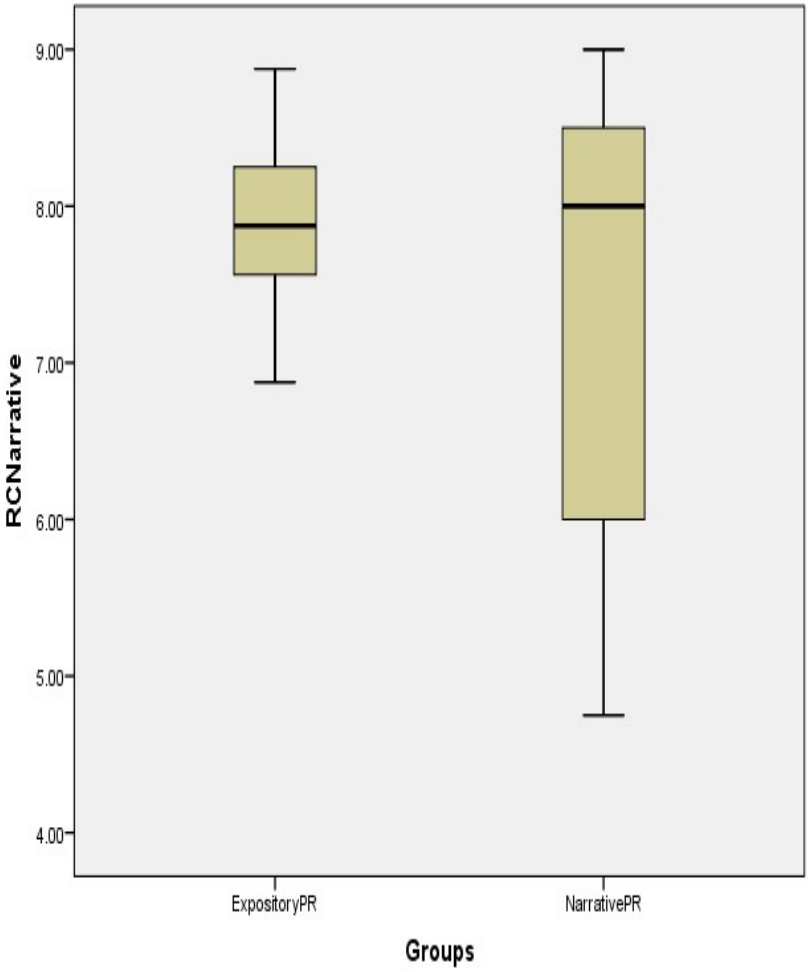
APPENDIX P2 – Histograms and Boxplots of the Reading Comprehension Test – Without Outlier

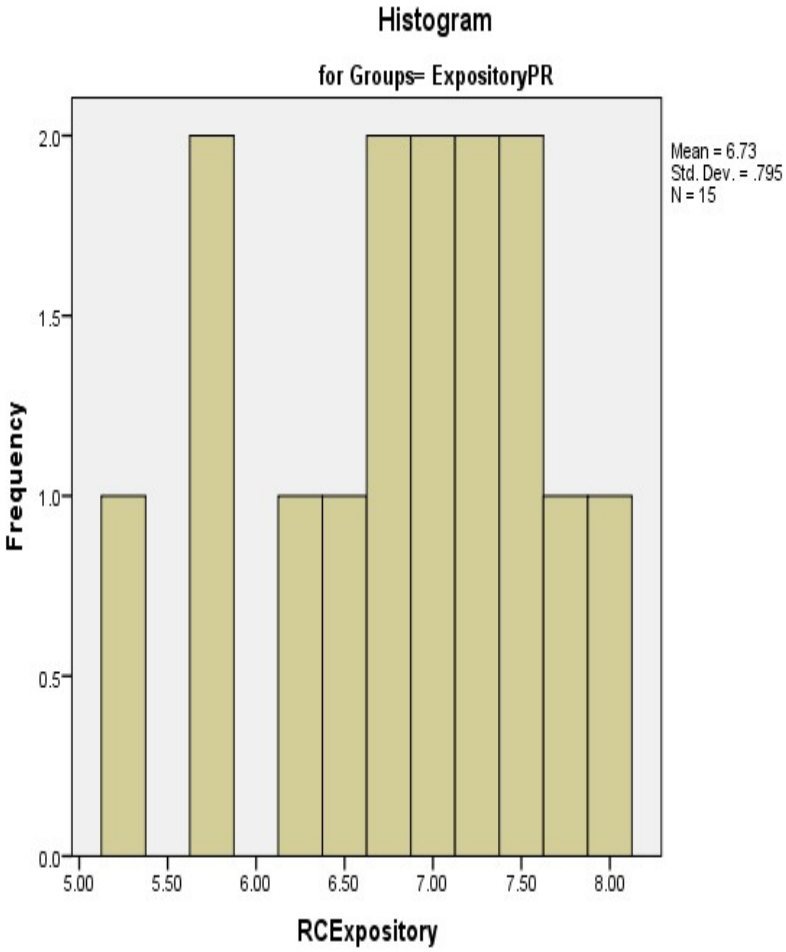


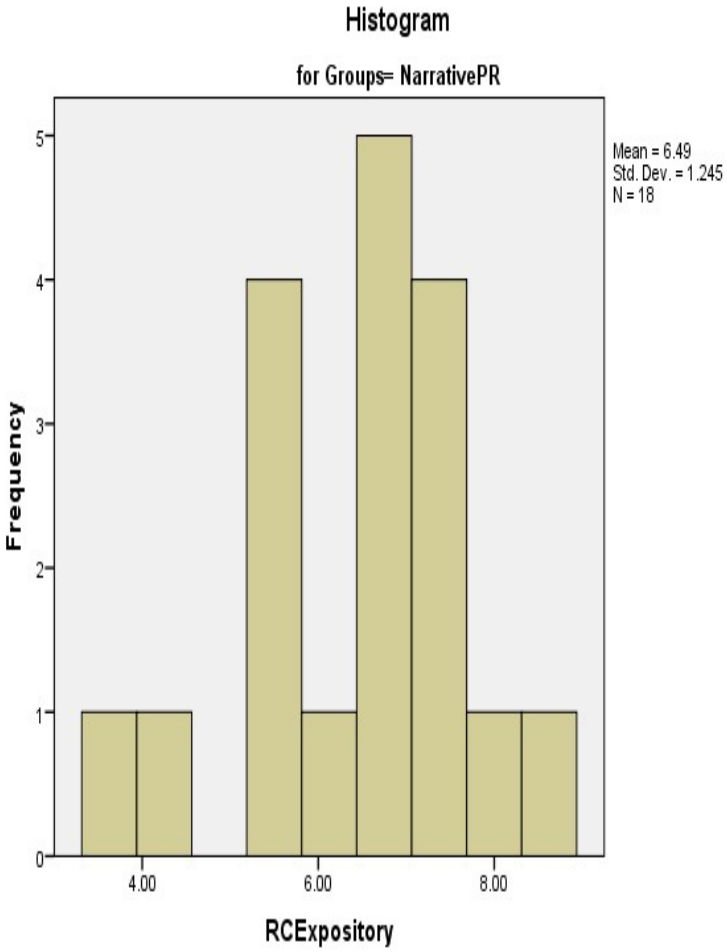

Histogram
for Groups= NarrativePR
Mean = 7.40
Std. Dev. = 1.403
N = 18
Frequency
0
1
2
3
4
5
5.00
6.00
7.00
8.00
9.00
RCNarrative

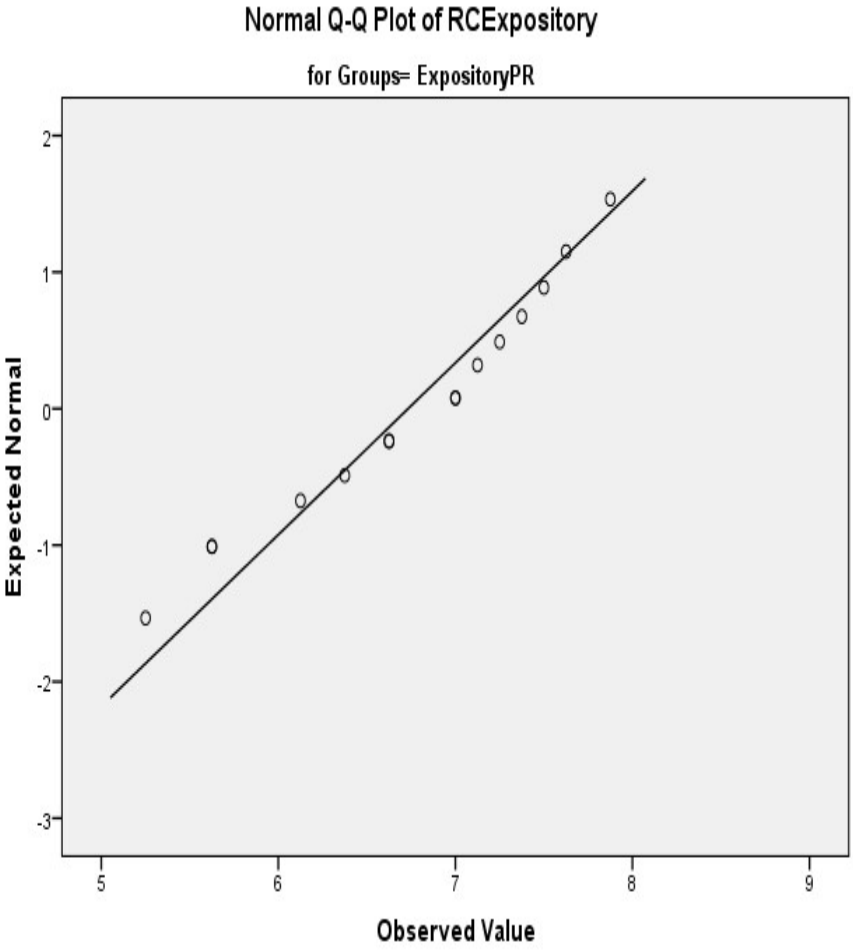

Normal Q-Q Plot of RCNarrative
for Groups= ExpositoryPR
Expected Normal
4
2
0
-2
-4
6.5
7.0
7.5
8.0
8.5
9.0
9.5
Observed Value

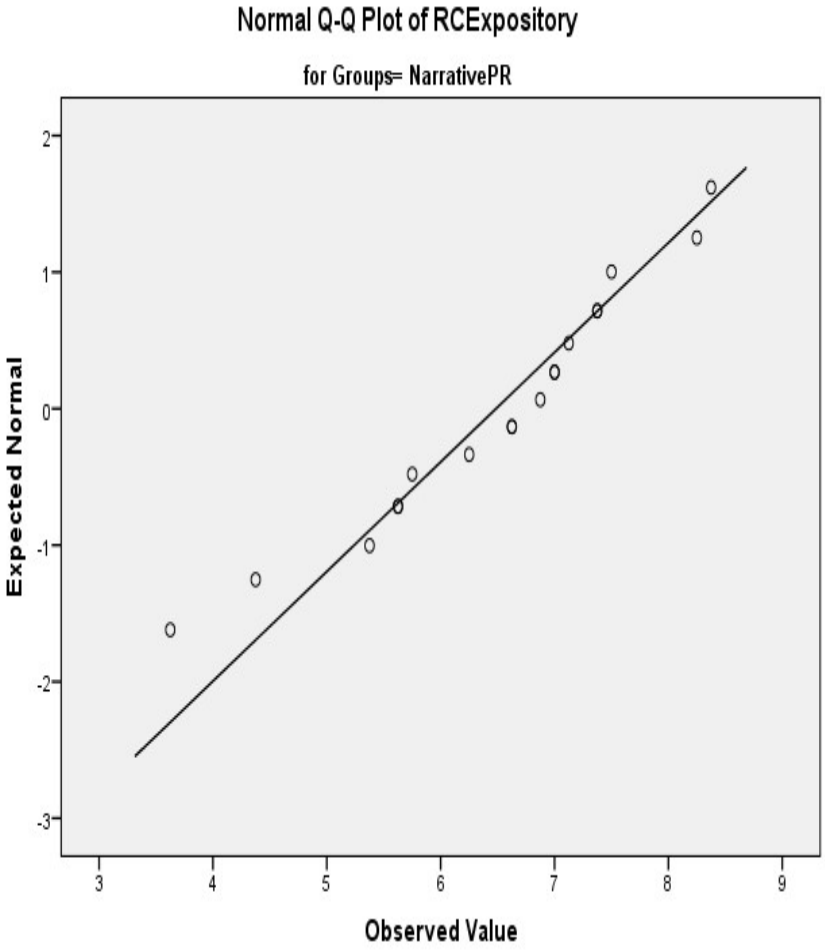

Normal Q-Q Plot of RCNarrative
for Groups= NarrativePR
Expected Normal
2
1
0
-1
-2
-3
4
5
6
7
8
9
10
Observed Value

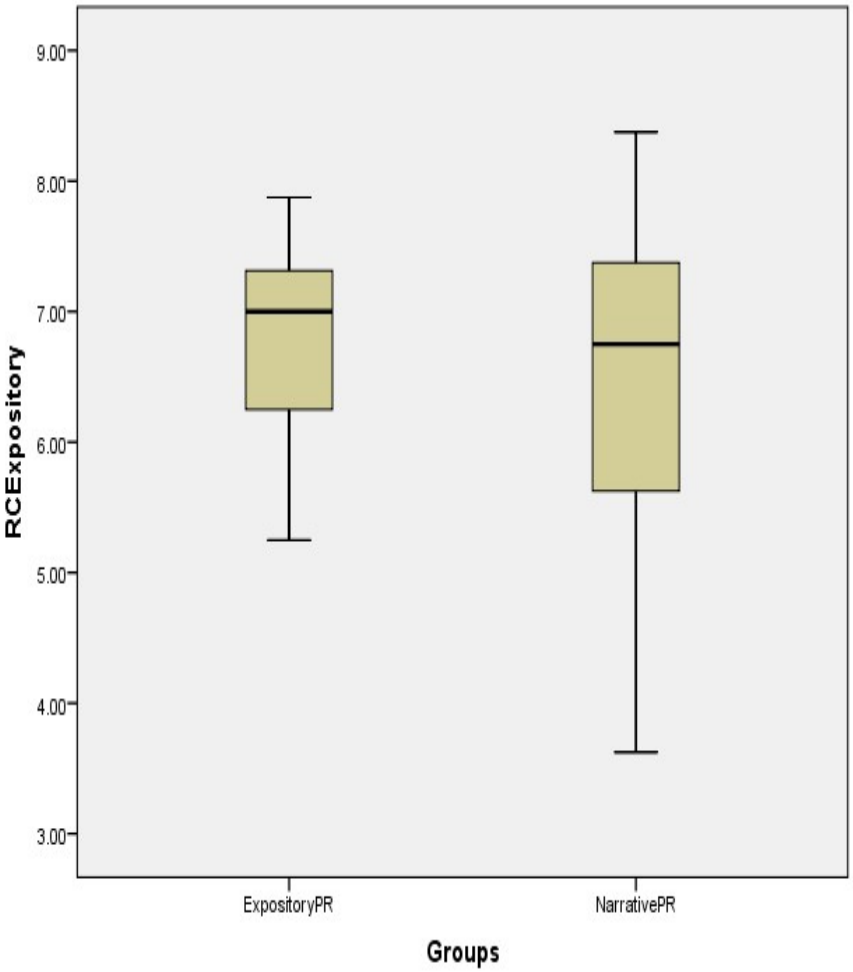

9.00
8.00
7.00
6.00
5.00
4.00
RCNarrative
ExpositoryPR
NarrativePR
Groups


Histogram
for Groups= ExpositoryPR
Mean = 6.73
Std. Dev. = .795
N = 15
Frequency
2.0
1.5
1.0
0.5
0.0
5.00
5.50
6.00
6.50
7.00
7.50
8.00
RCExpository

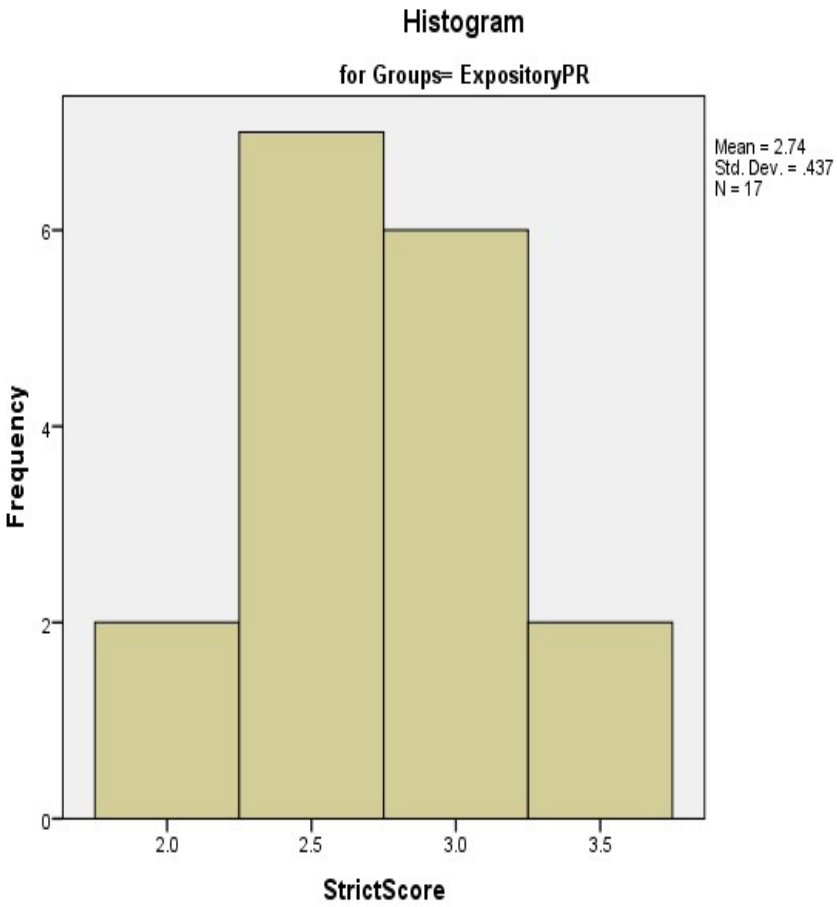

Histogram
for Groups= NarrativePR
Mean = 6.49
Std. Dev. = 1.245
N = 18
Frequency
0
1
2
3
4
5
4.00
6.00
8.00
RCExpository

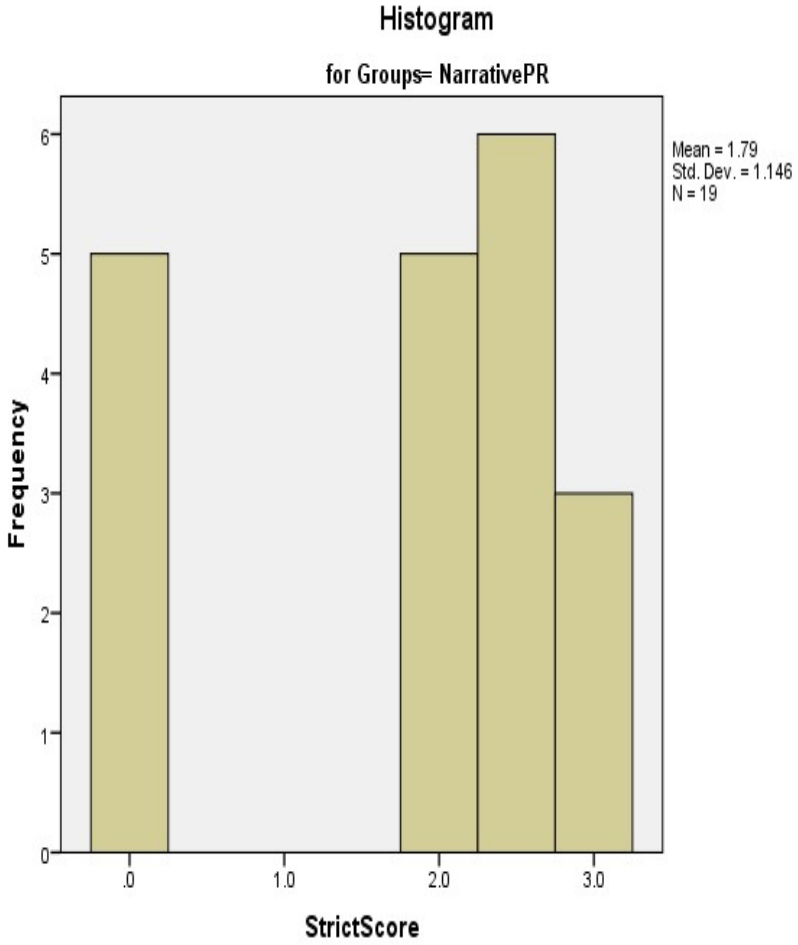

Normal Q-Q Plot of RCExpository
for Groups= ExpositoryPR
Expected Normal
Observed Value
2
1
0
-1
-2
-3
5
6
7
8
9

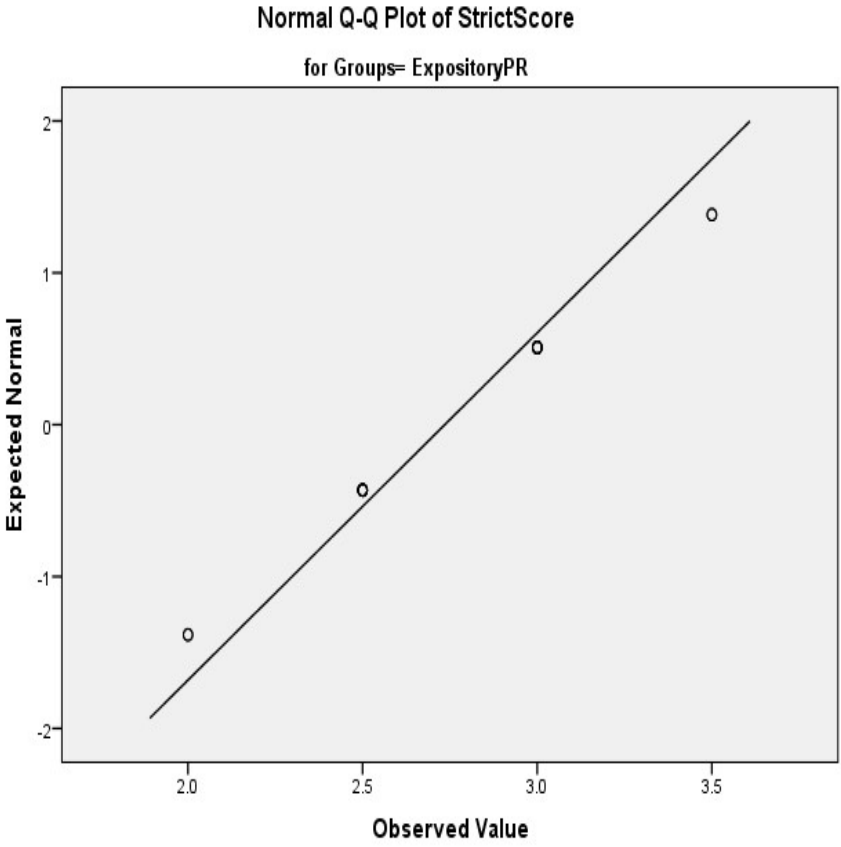

Normal Q-Q Plot of RCExpository
for Groups= NarrativePR
Expected Normal
Observed Value
2
1
0
-1
-2
-3
3
4
5
6
7
8
9

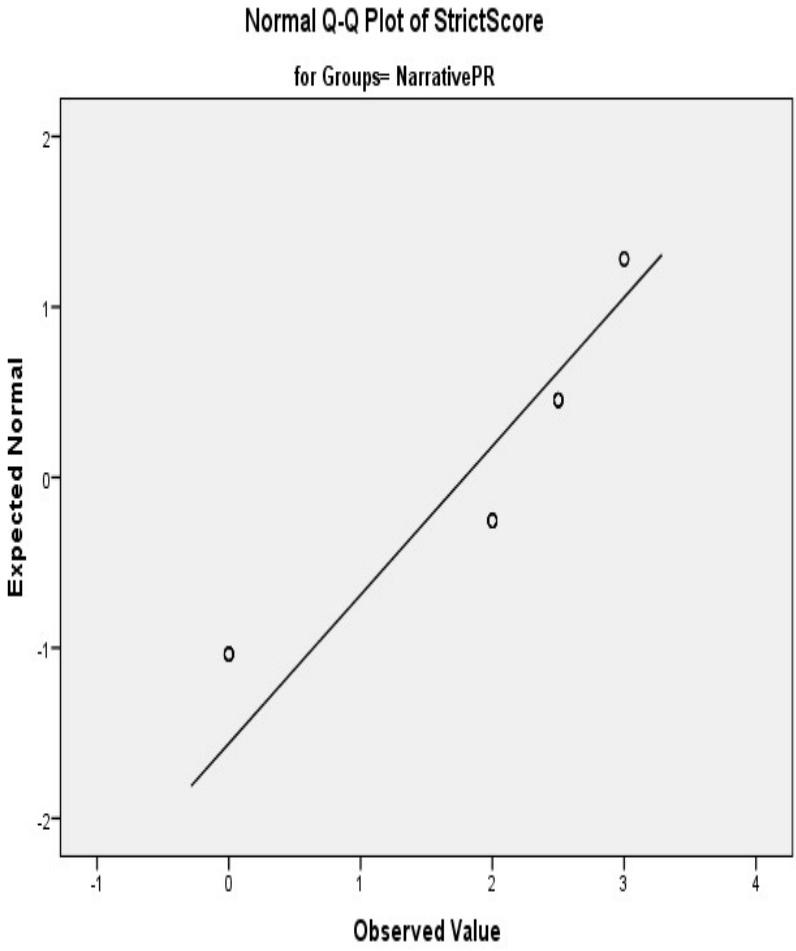

9.00
8.00
7.00
6.00
5.00
4.00
3.00
RCExpository
ExpositoryPR
NarrativePR
Groups

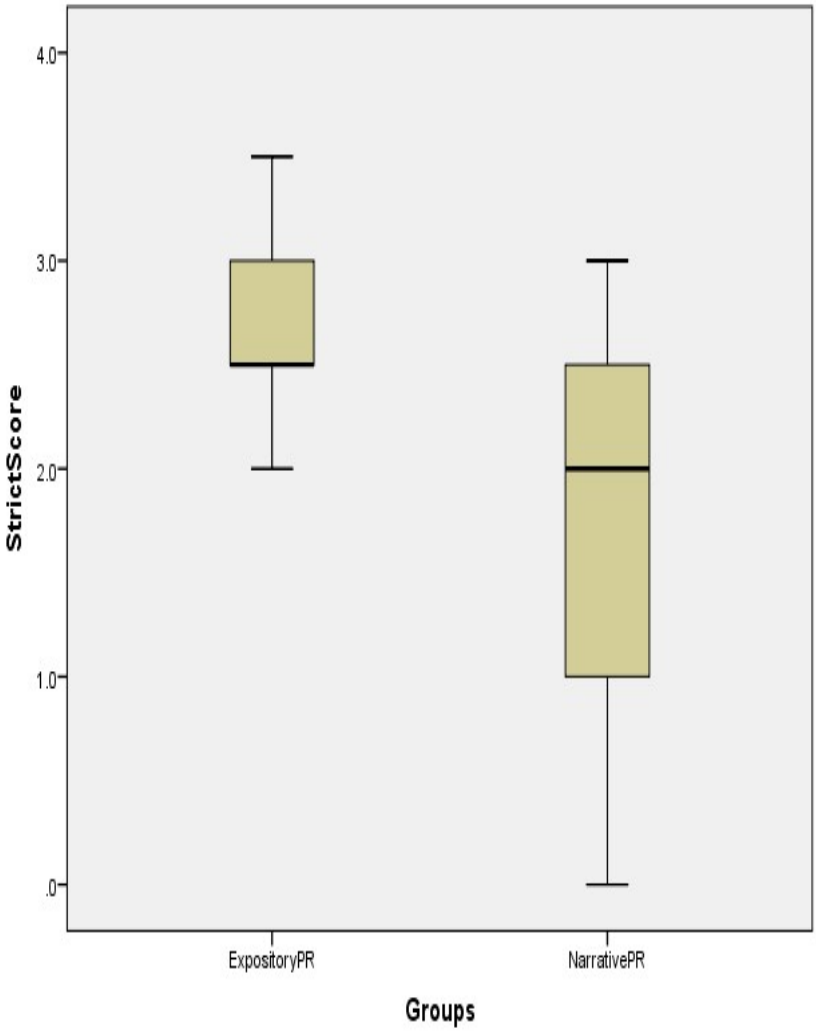
APPENDIX Q1 – Histograms and Boxplots of the Reading Span Test – Strict and Lenient

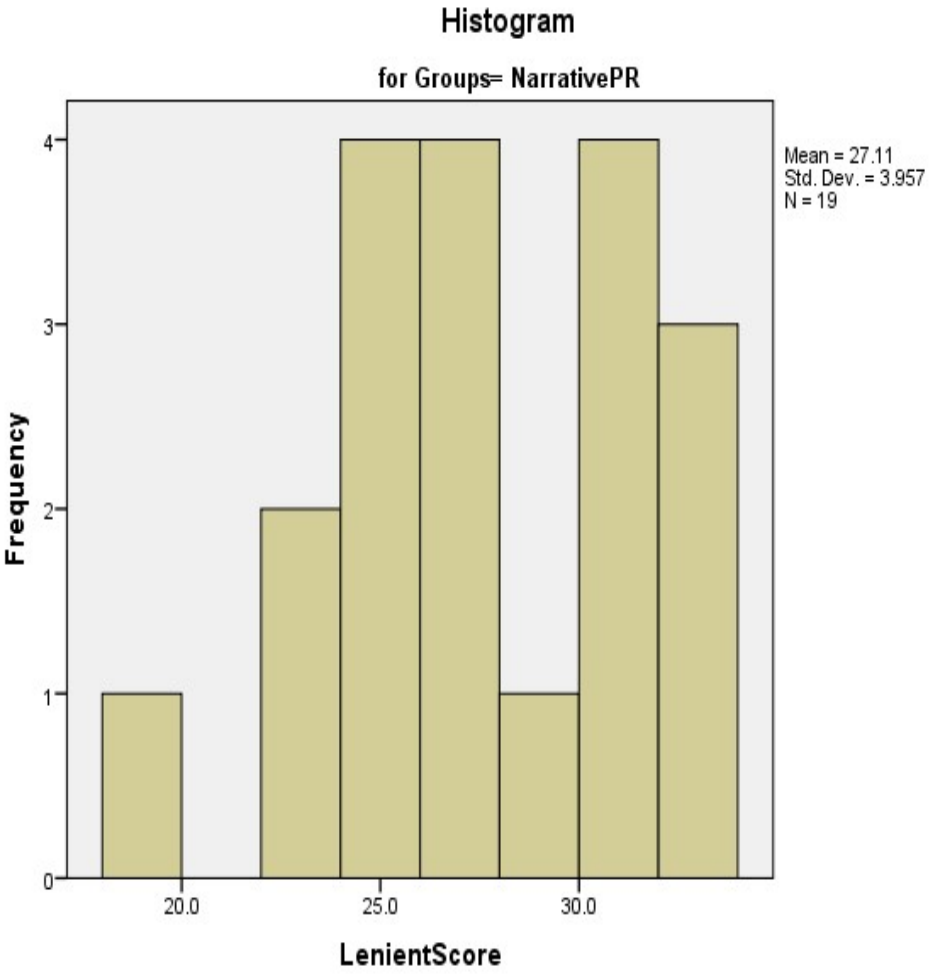


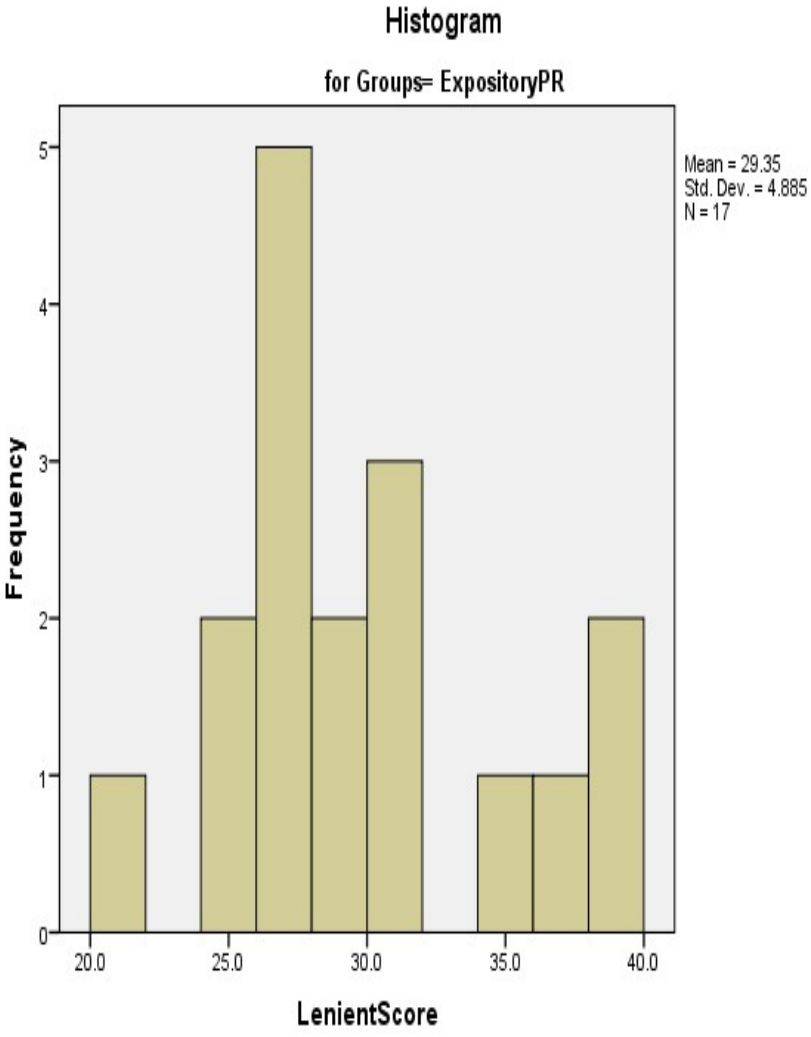

Histogram
for Groups= NarrativePR
Mean = 1.79
Std. Dev. = 1.146
N = 19
Frequency
0
1
2
3
4
5
6
.0
1.0
2.0
3.0
StrictScore

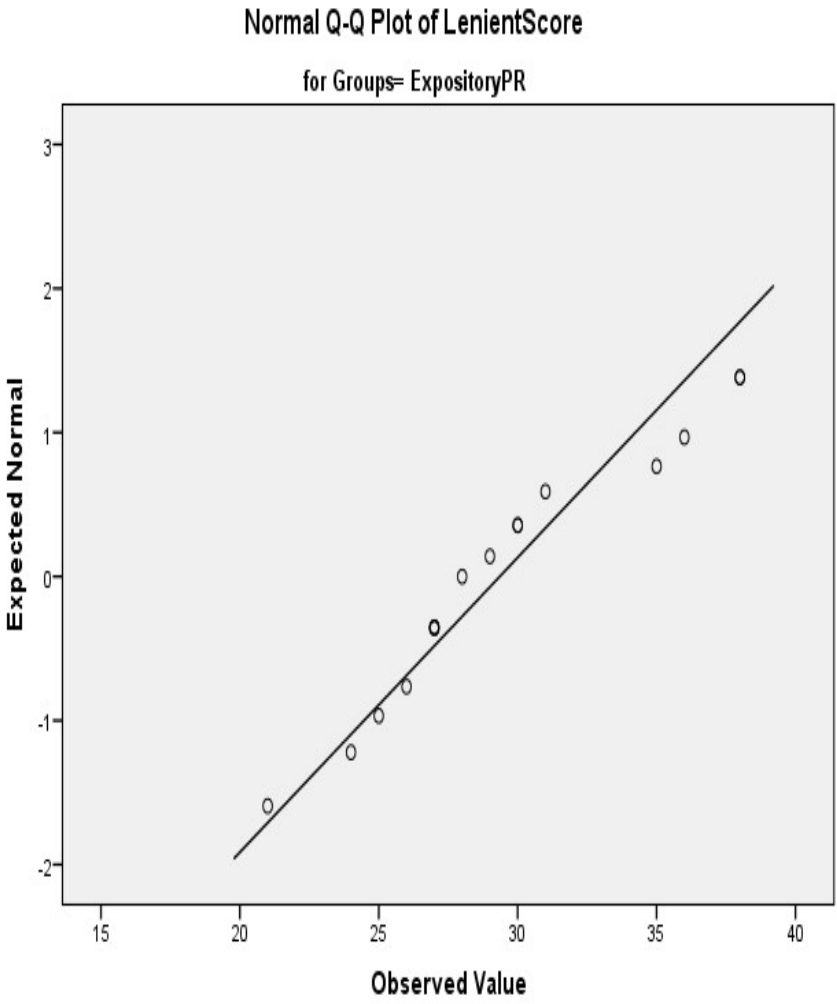

Normal Q-Q Plot of StrictScore
for Groups= ExpositoryPR
Expected Normal
2
1
0
-1
-2
2.0
2.5
3.0
3.5
Observed Value

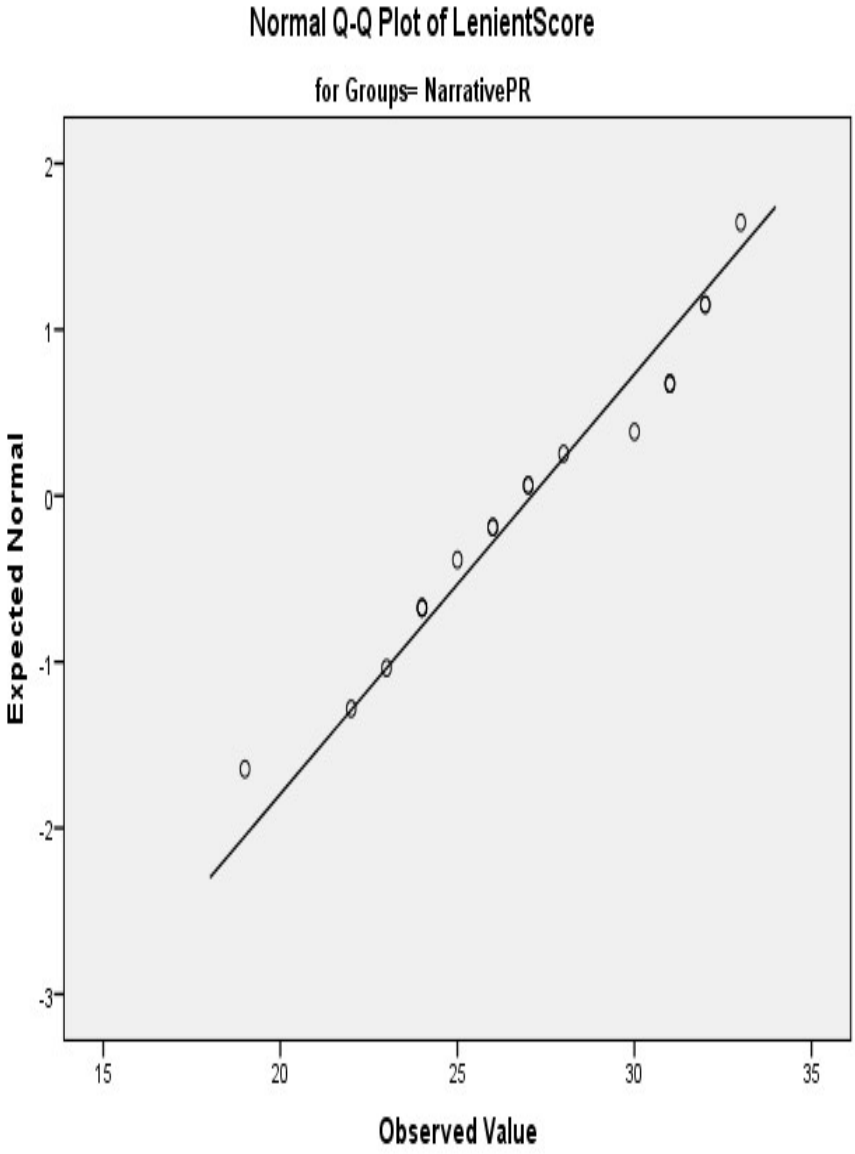

Normal Q-Q Plot of StrictScore
for Groups= NarrativePR
Expected Normal
Observed Value
2
1
0
-1
-2
-1
0
1
2
3
4

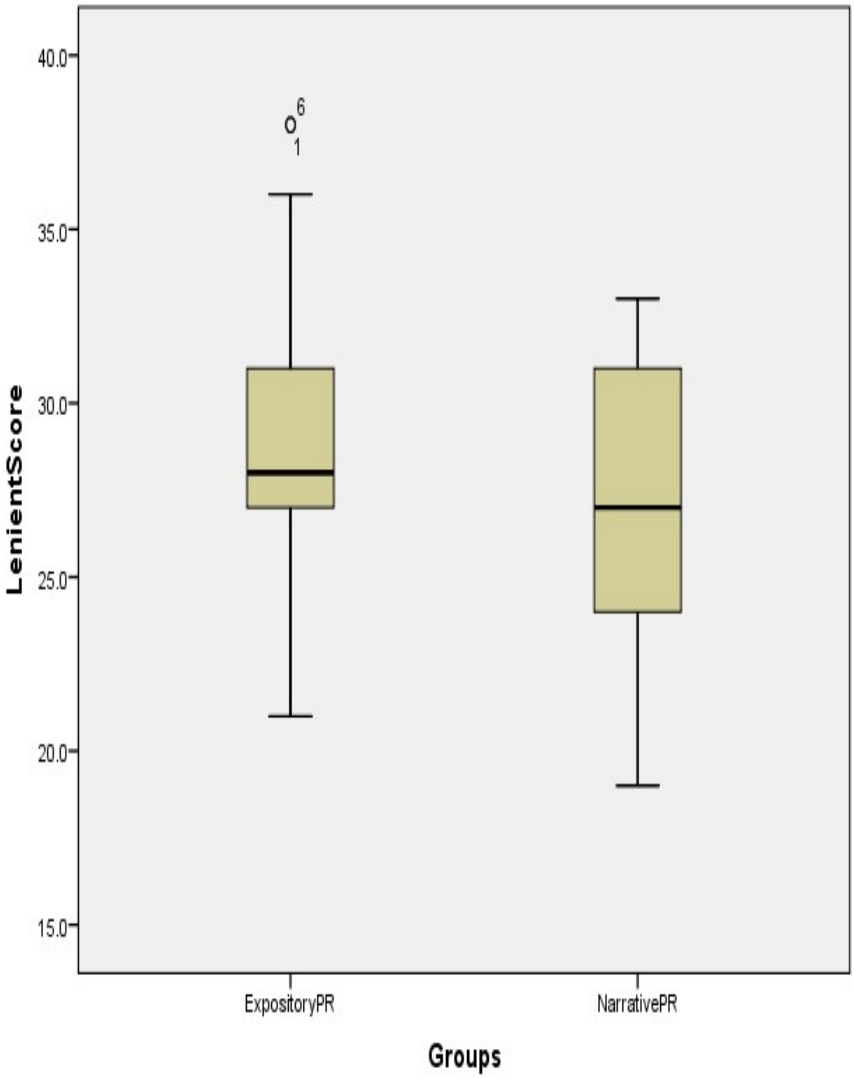

4.0
3.0
2.0
1.0
.0
StrictScore
ExpositoryPR
NarrativePR
Groups


Histogram
for Groups= NarrativePR
Mean = 27.11
Std. Dev. = 3.957
N = 19
Frequency
0
1
2
3
4
20.0
25.0
30.0
LenientScore

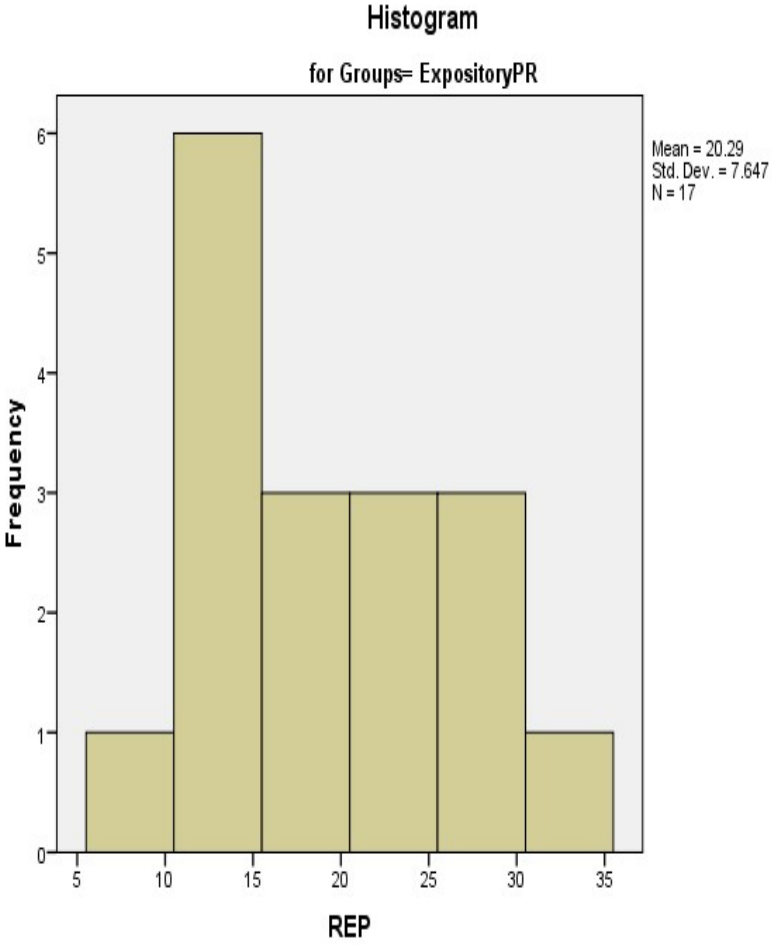

Histogram
for Groups= ExpositoryPR
Mean = 29.35
Std. Dev. = 4.885
N = 17
Frequency
0
1
2
3
4
5
20.0
25.0
30.0
35.0
40.0
LenientScore

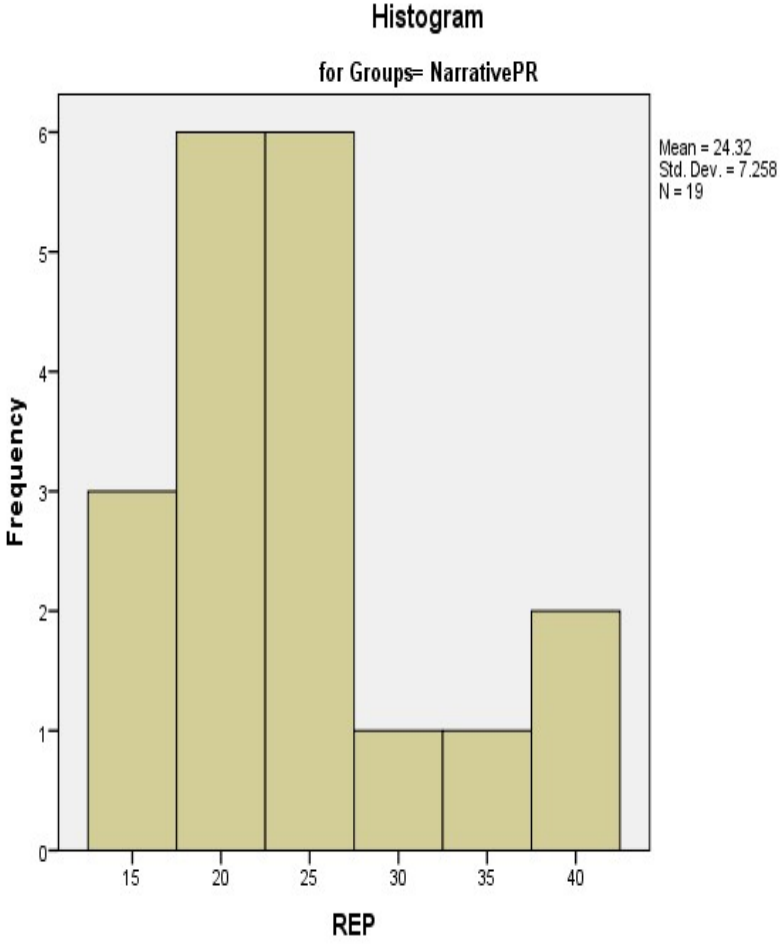

Normal Q-Q Plot of LenientScore
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
15
20
25
30
35
40

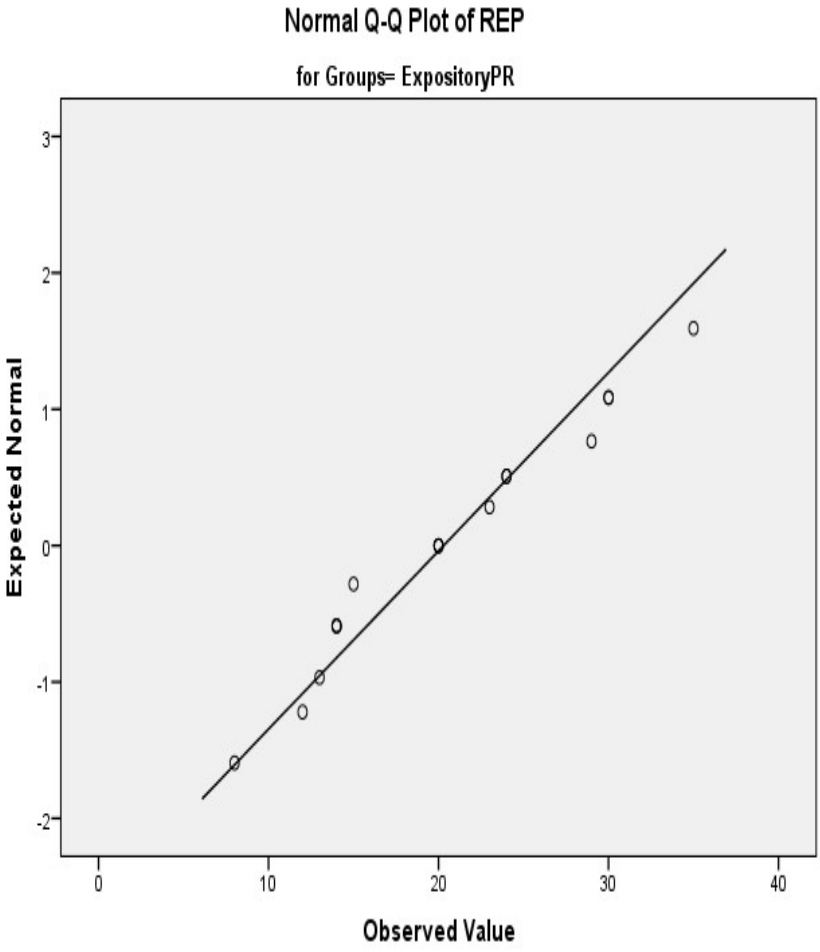

Normal Q-Q Plot of LenientScore
for Groups= NarrativePR
Expected Normal
2
1
0
-1
-2
-3
15
20
25
30
35
Observed Value

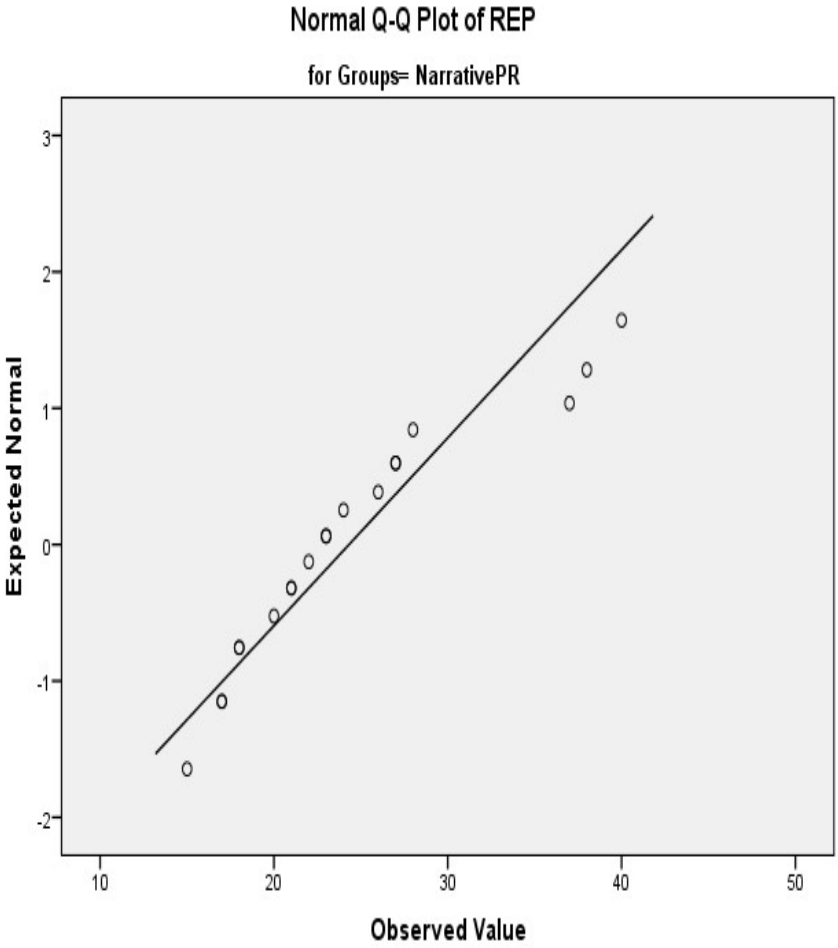

40.0
35.0
30.0
25.0
20.0
15.0
LenientScore
6
1
ExpositoryPR
NarrativePR
Groups

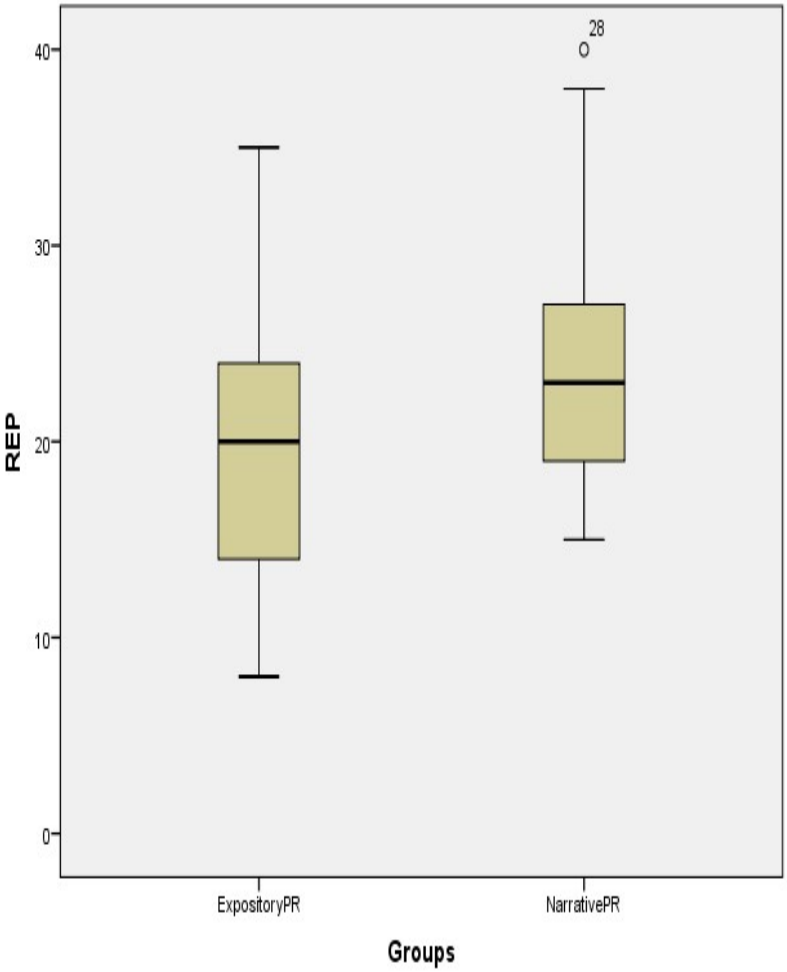
APPENDIX R1 – Histograms and Boxplots of Inference Generation for the Expository Text

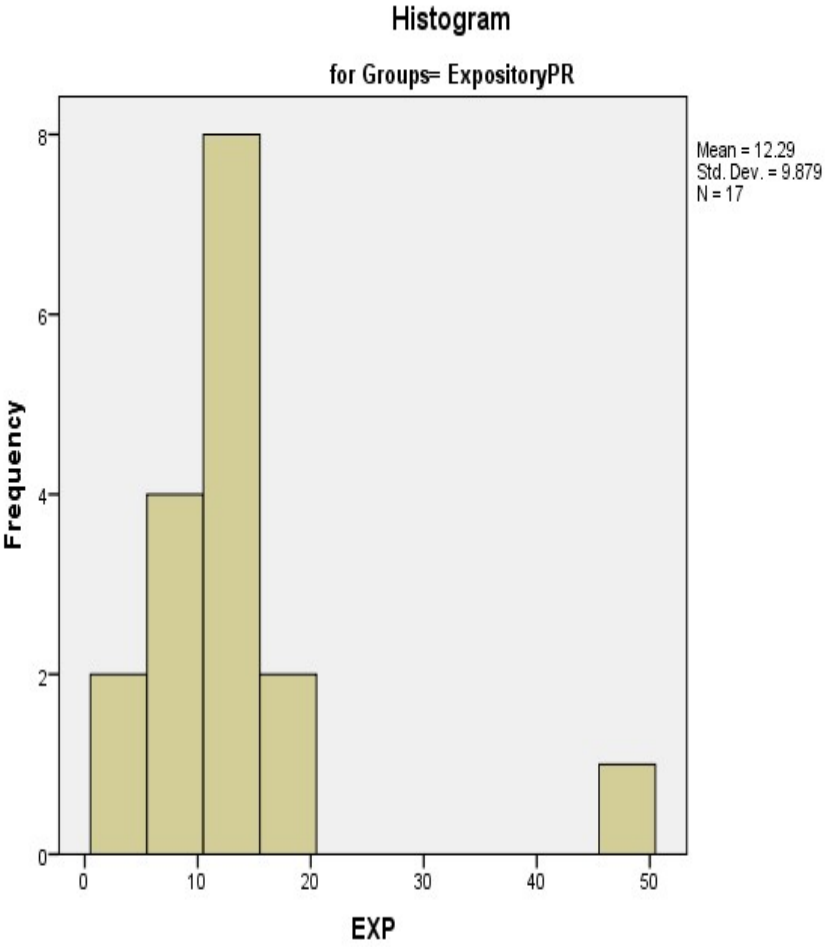


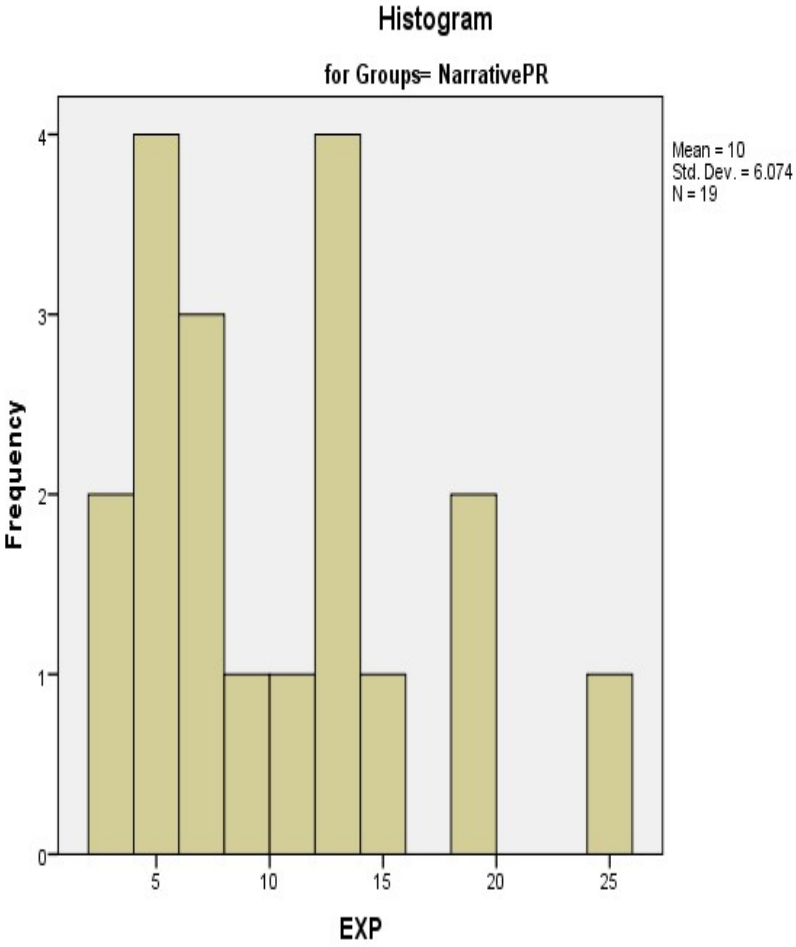

Histogram
for Groups= NarrativePR
Mean = 24.32
Std. Dev. = 7.258
N = 19
Frequency
0
1
2
3
4
5
6
15
20
25
30
35
40
REP

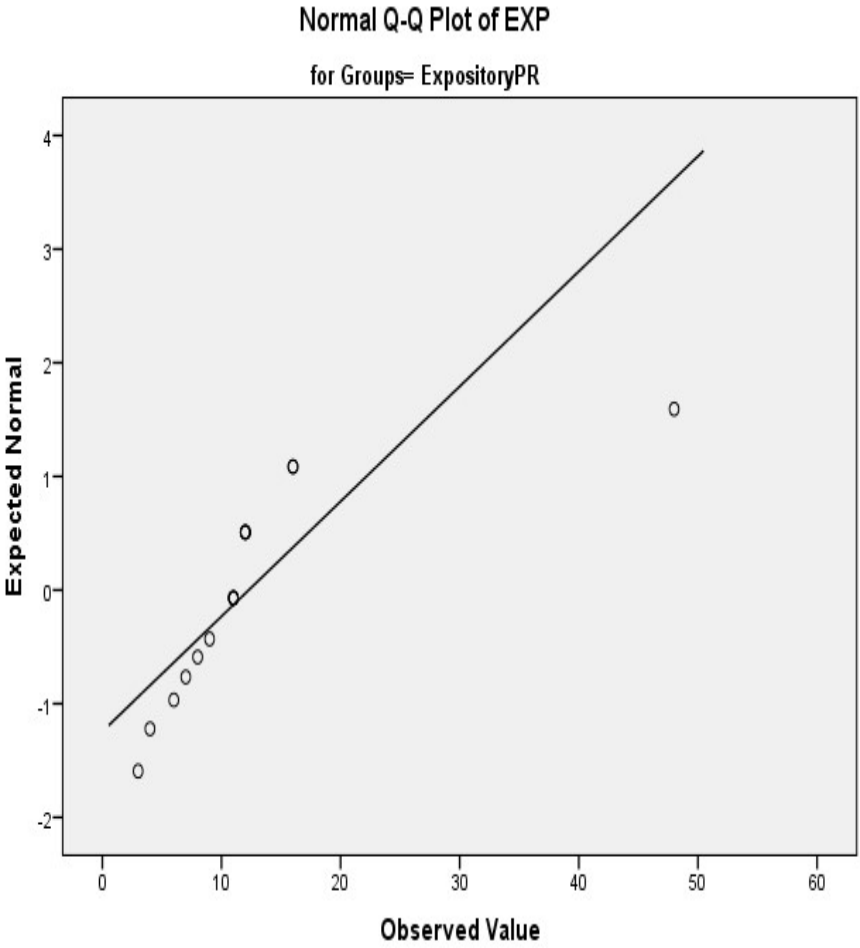

Normal Q-Q Plot of REP
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
10
20
30
40

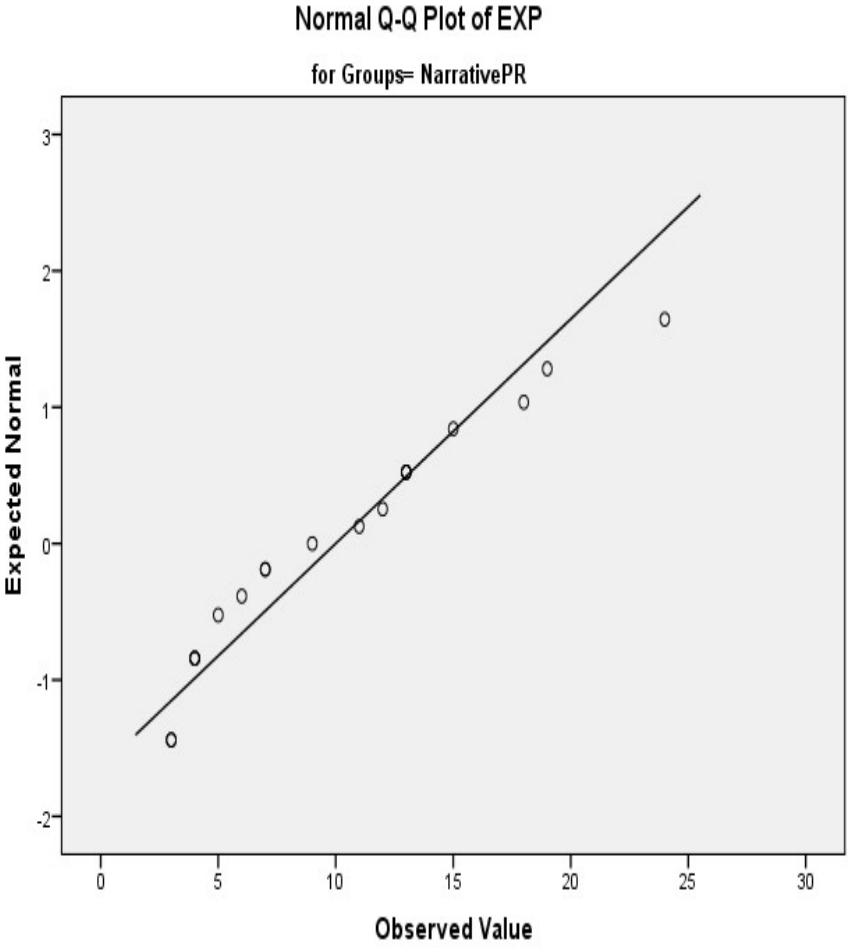

Normal Q-Q Plot of REP
for Groups= NarrativePR
Expected Normal
Observed Value
3
2
1
0
-1
-2
10
20
30
40
50

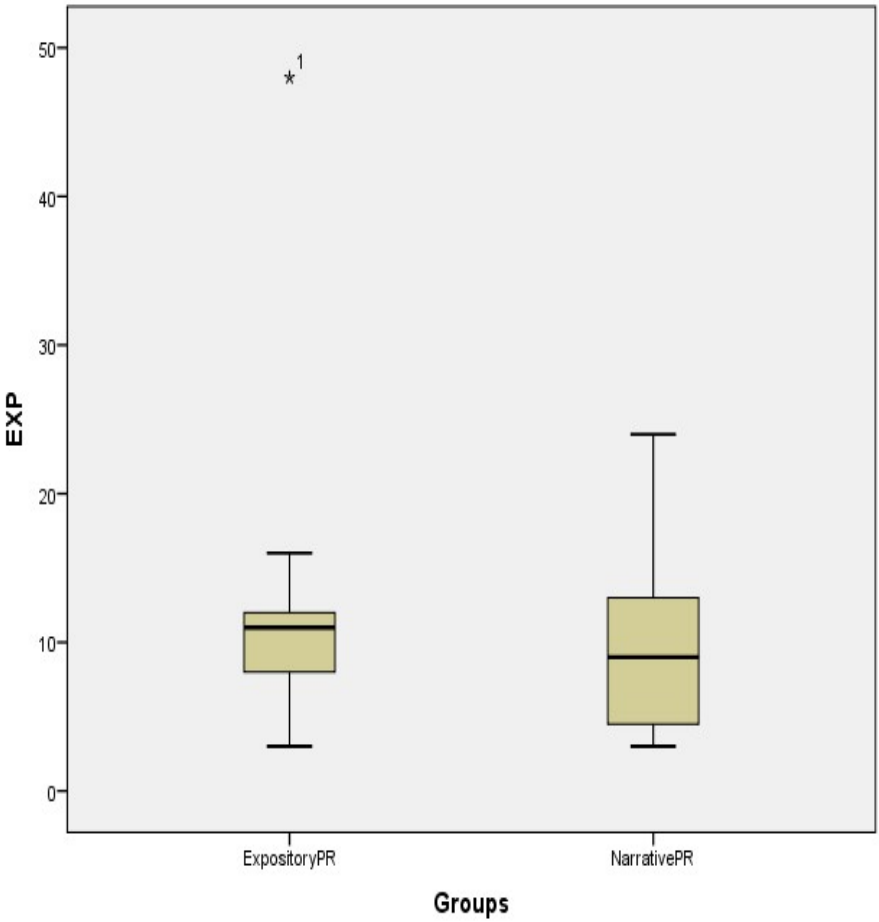

28
40
30
20
10
0
REP
ExpositoryPR
NarrativePR
Groups

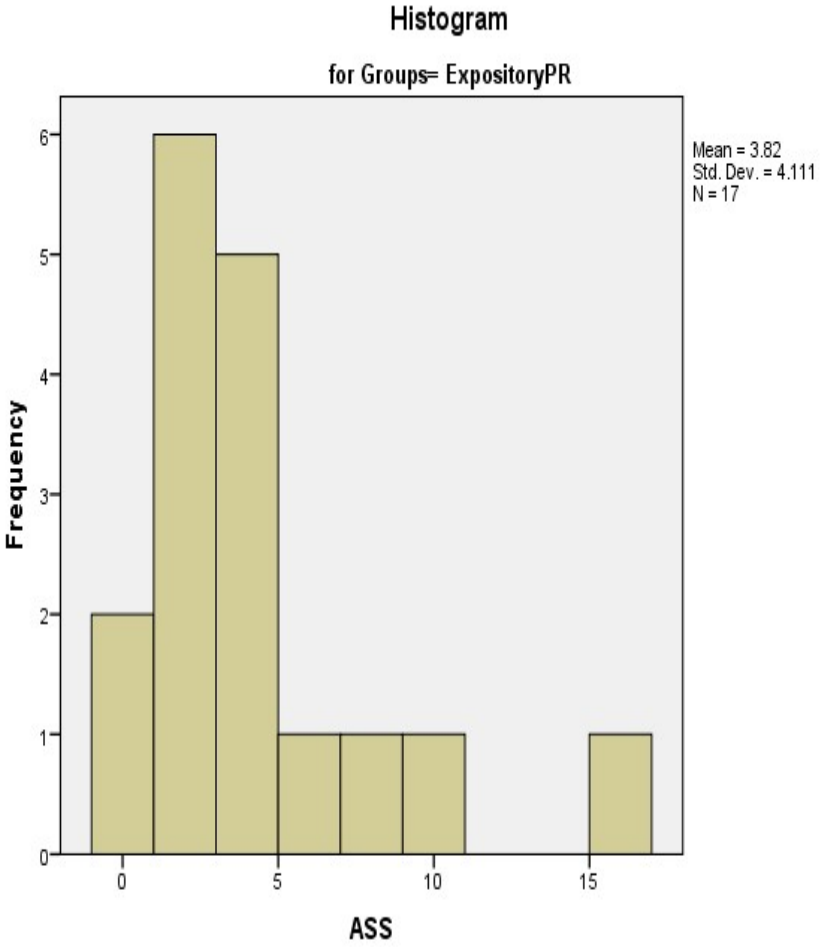

Histogram
for Groups= ExpositoryPR
Mean = 12.29
Std. Dev. = 9.879
N = 17
Frequency
0
2
4
6
8
0
10
20
30
40
50
EXP

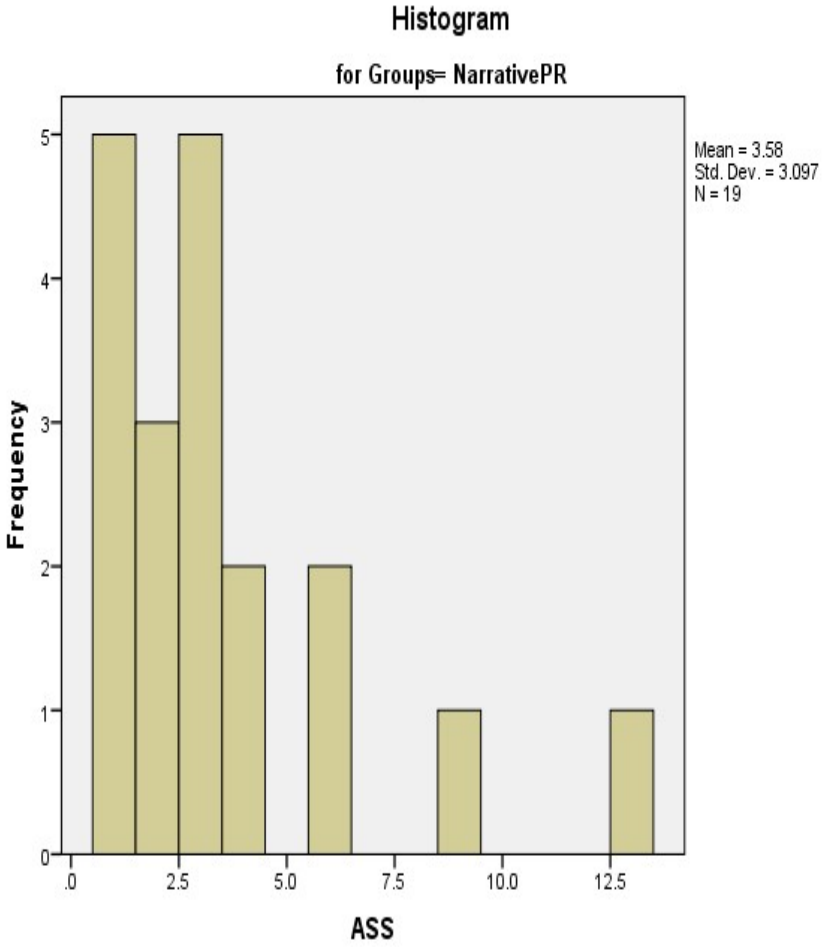

Histogram
for Groups= NarrativePR
Mean = 10
Std. Dev. = 6.074
N = 19
Frequency
0
1
2
3
4
5
10
15
20
25
EXP

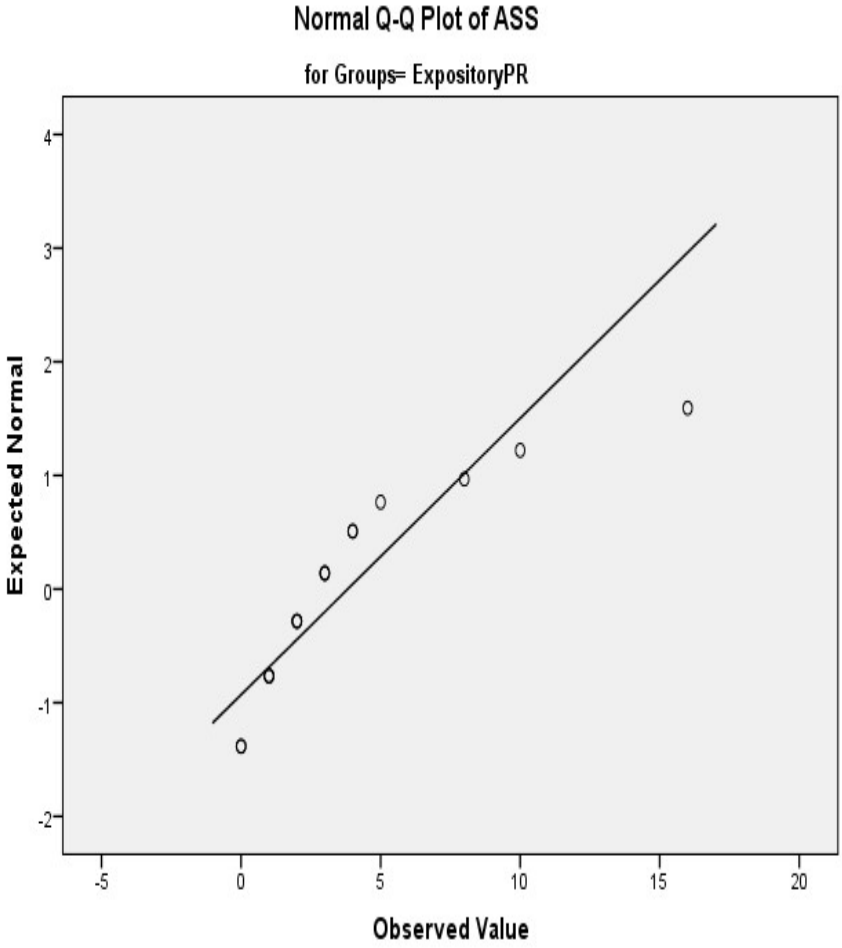

Normal Q-Q Plot of EXP
for Groups= ExpositoryPR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
0
10
20
30
40
50
60

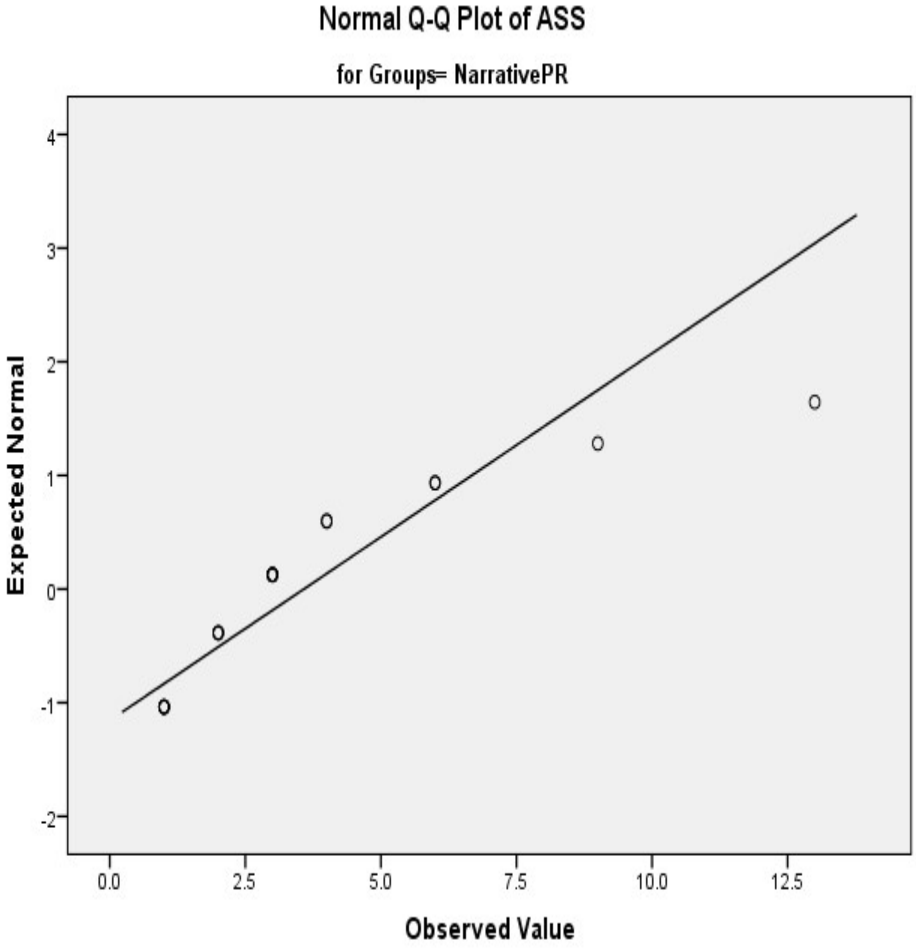

Normal Q-Q Plot of EXP
for Groups= NarrativePR
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
5
10
15
20
25
30

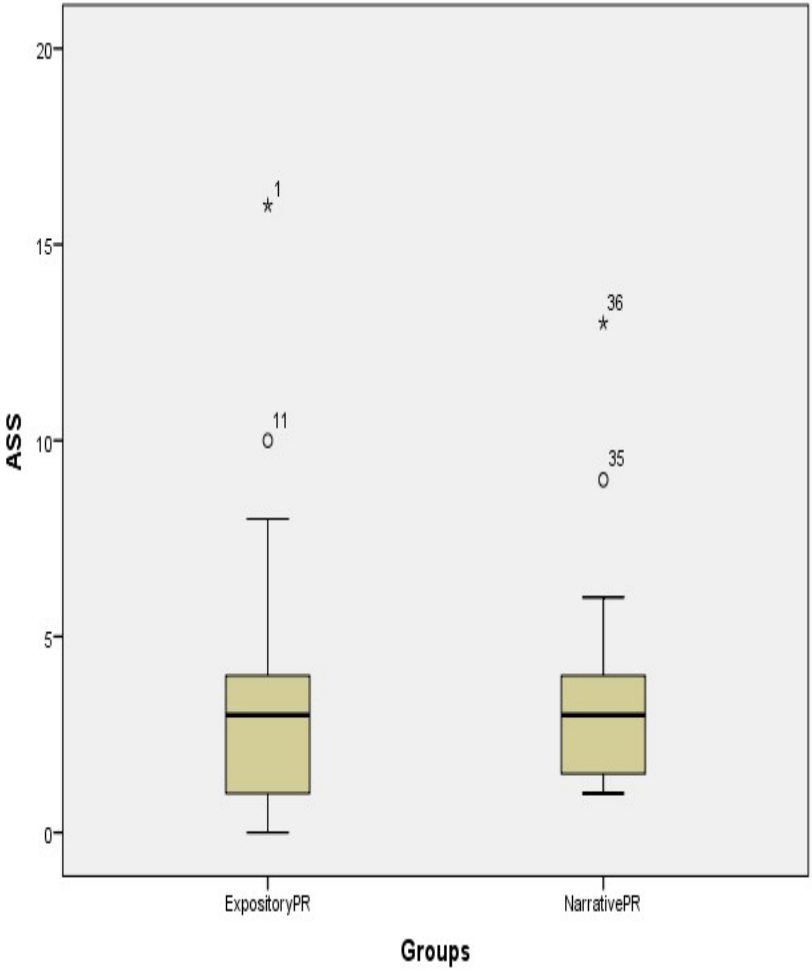

50
40
30
20
10
0
EXP
1
ExpositoryPR
NarrativePR
Groups

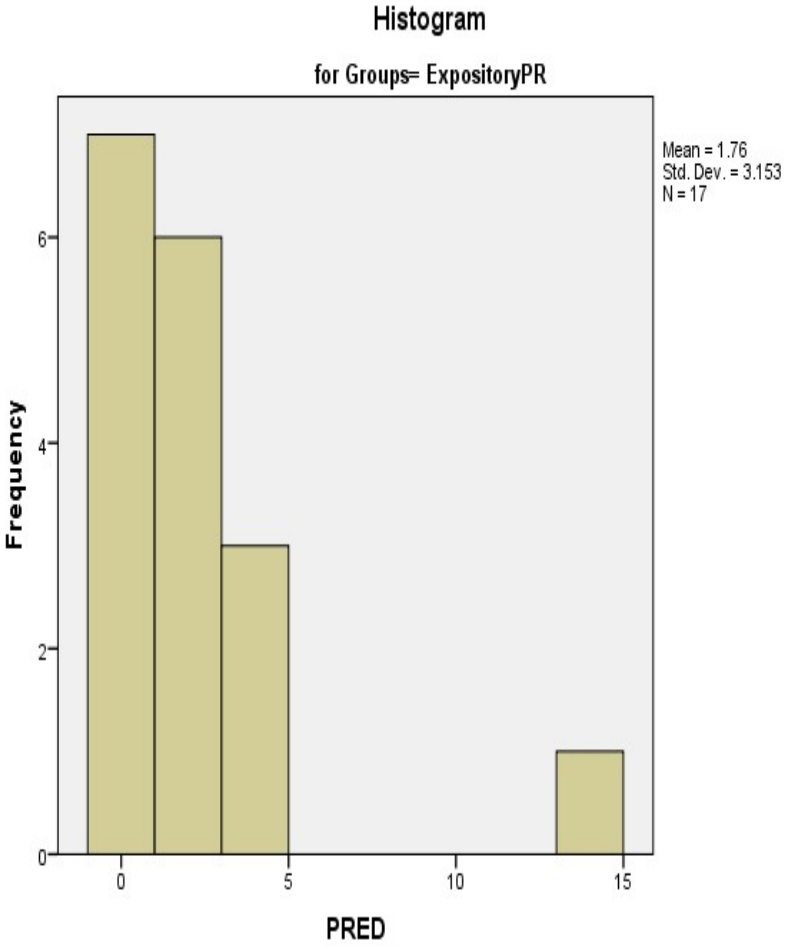

Histogram
for Groups= ExpositoryPR
Mean = 3.82
Std. Dev. = 4.111
N = 17
Frequency
0
1
2
3
4
5
6
0
5
10
15
ASS

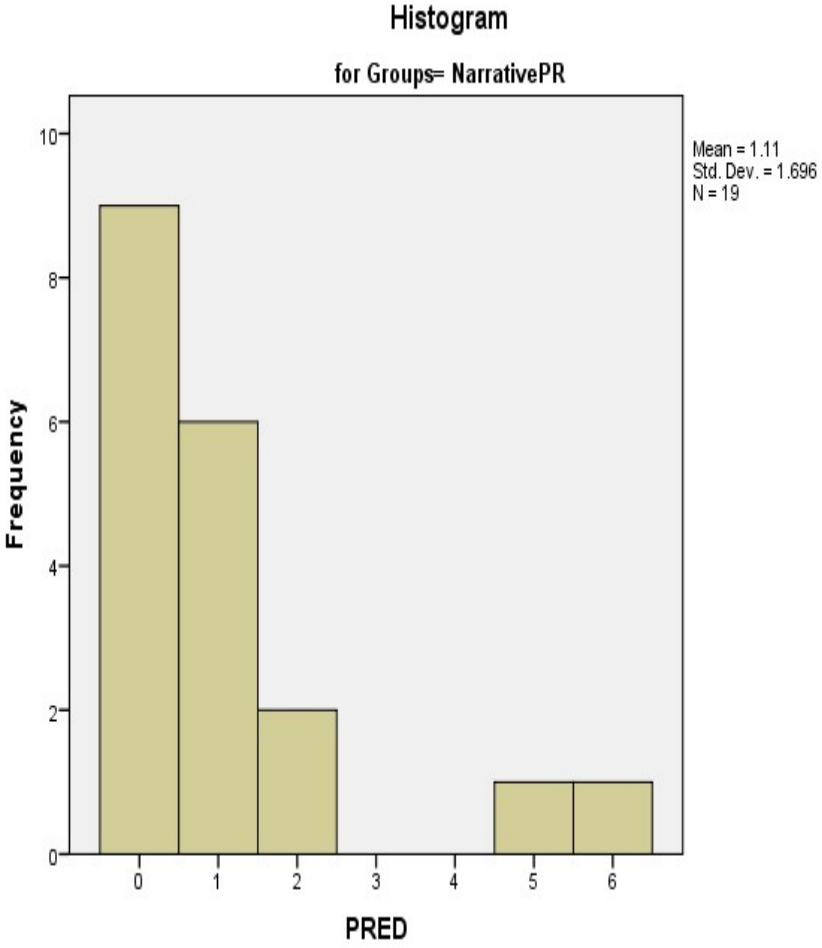

Histogram
for Groups= NarrativePR
Mean = 3.58
Std. Dev. = 3.097
N = 19
Frequency
0
1
2
3
4
5
.0
2.5
5.0
7.5
10.0
12.5
ASS

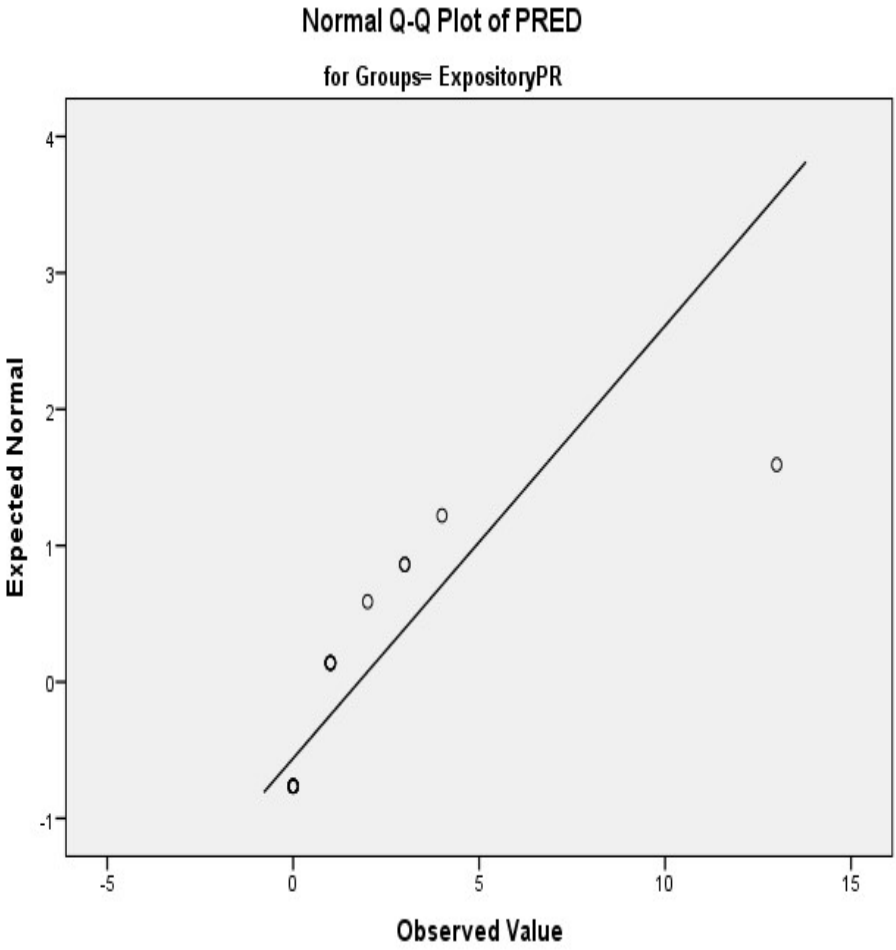

Normal Q-Q Plot of ASS
for Groups= ExpositoryPR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
-5
0
5
10
15
20

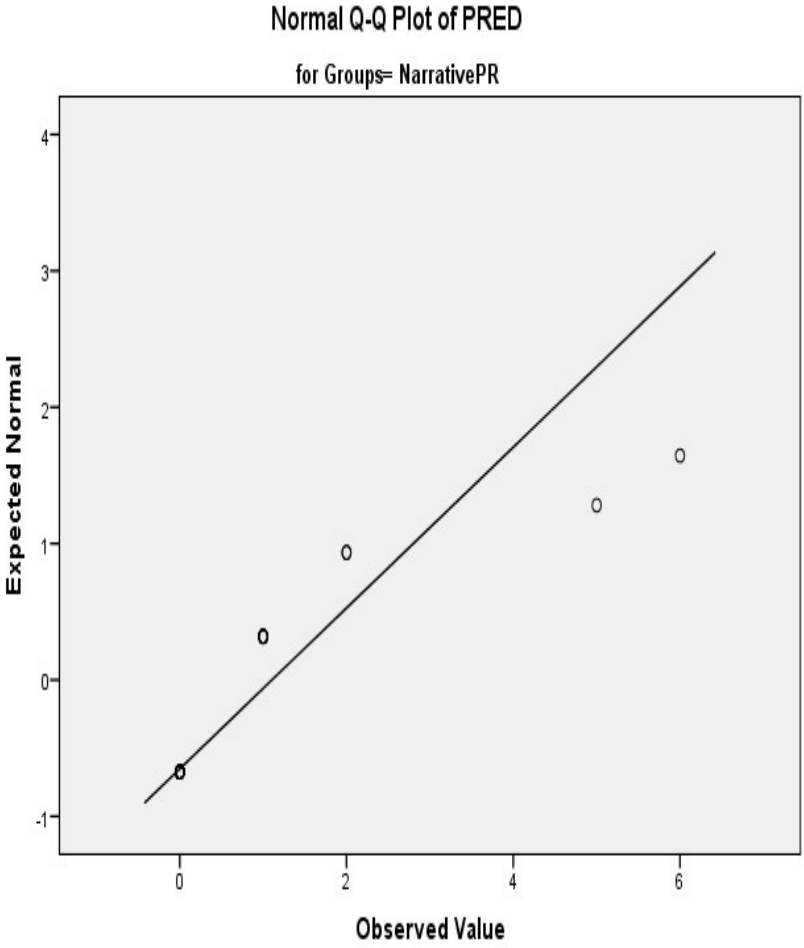

Normal Q-Q Plot of ASS
for Groups= NarrativePR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
0.0
2.5
5.0
7.5
10.0
12.5

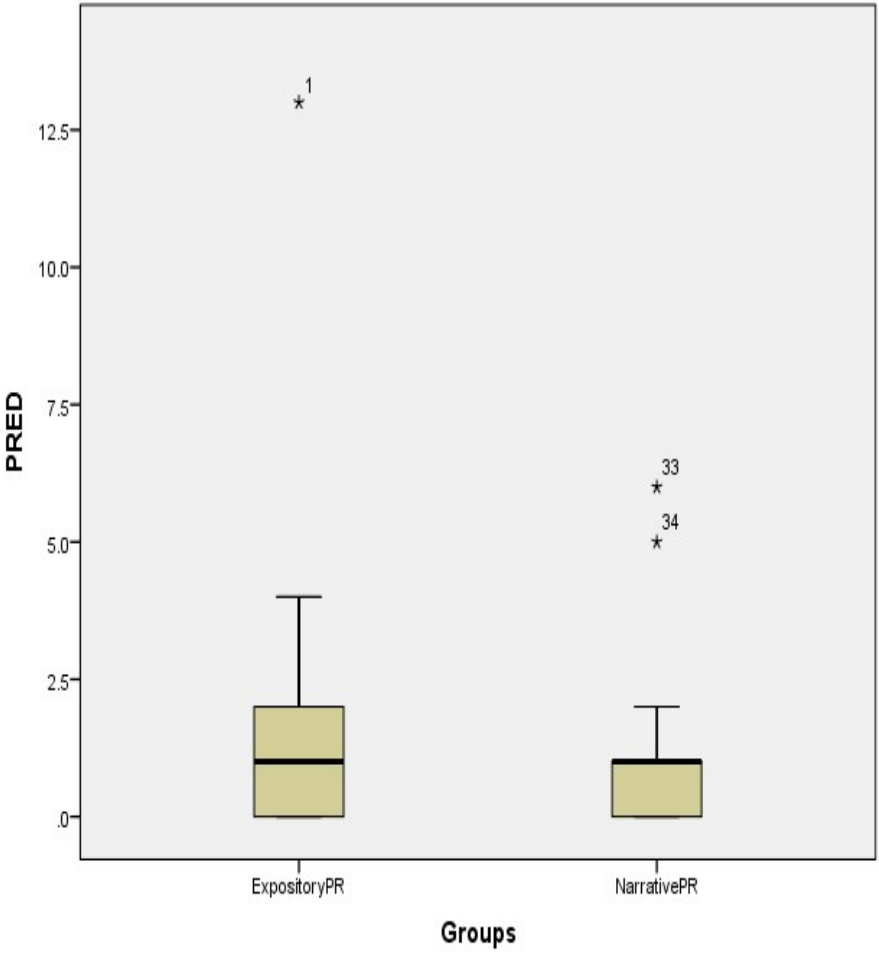

20
15
10
5
0
ASS
1
36
11
35
ExpositoryPR
NarrativePR
Groups

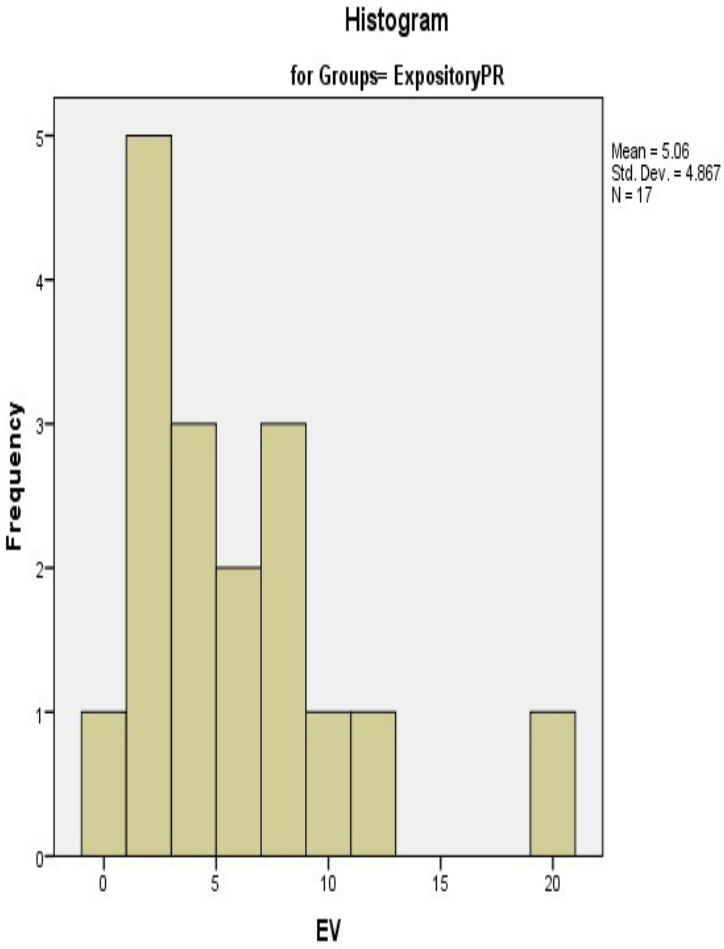

Histogram
for Groups= ExpositoryPR
Mean = 1.76
Std. Dev. = 3.153
N = 17
Frequency
0
2
4
6
0
5
10
15
PRED

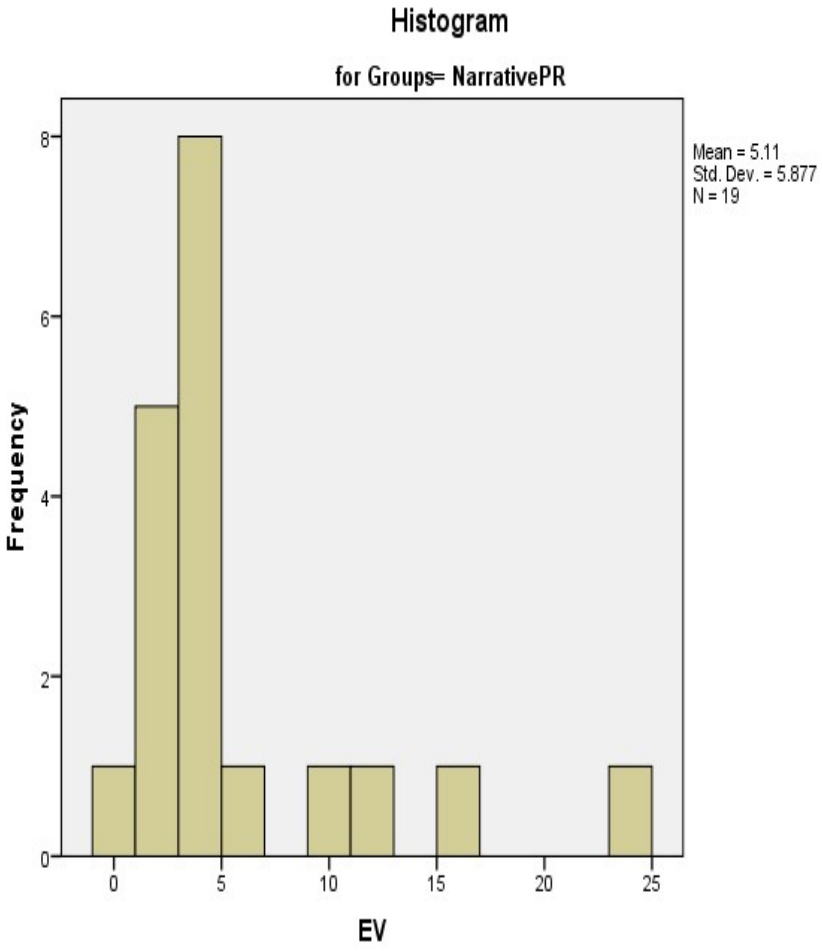

Histogram
for Groups= NarrativePR
Mean = 1.11
Std. Dev. = 1.696
N = 19
Frequency
10
8
6
4
2
0
0
1
2
3
4
5
6
PRED

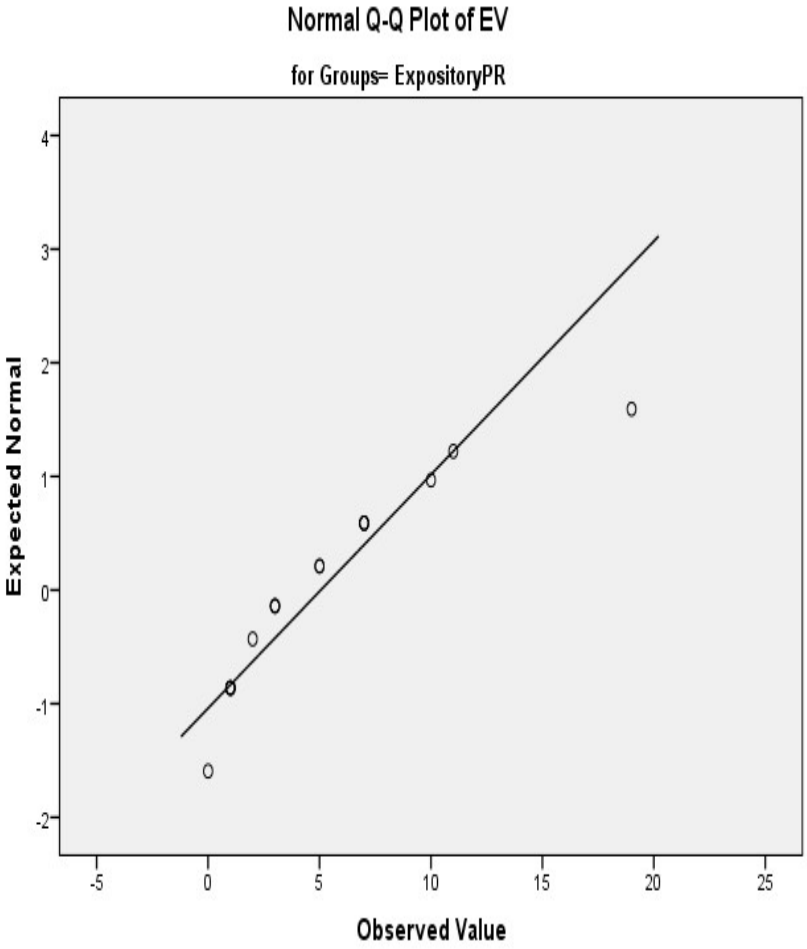

Normal Q-Q Plot of PRED
for Groups= ExpositoryPR
Expected Normal
Observed Value
4
3
2
1
0
-1
-5
0
5
10
15

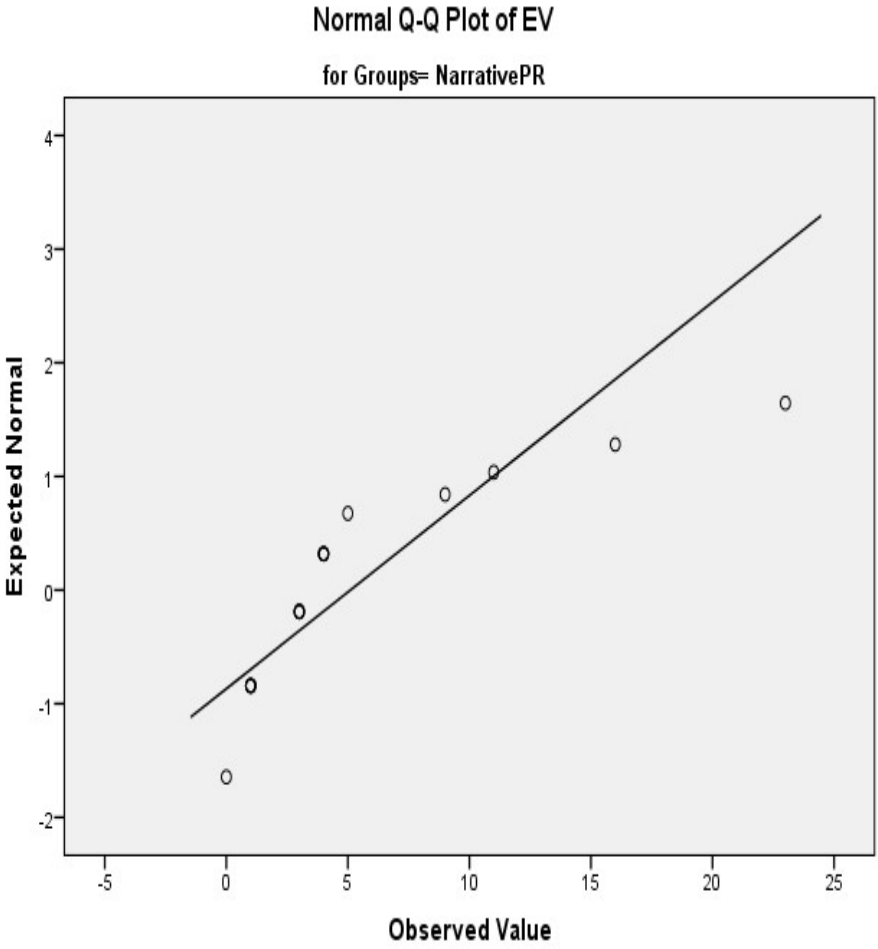

Normal Q-Q Plot of PRED
for Groups= NarrativePR
Expected Normal
Observed Value
4
3
2
1
0
-1
0
2
4
6

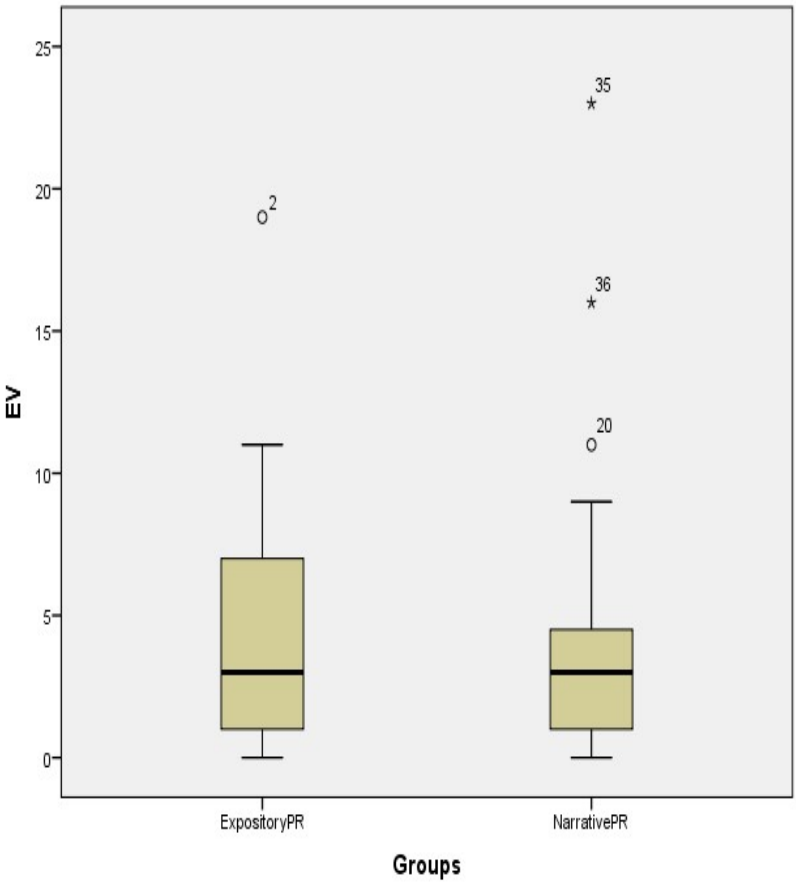

PRED
12.5
10.0
7.5
5.0
2.5
.0
1
33
34
ExpositoryPR
NarrativePR
Groups

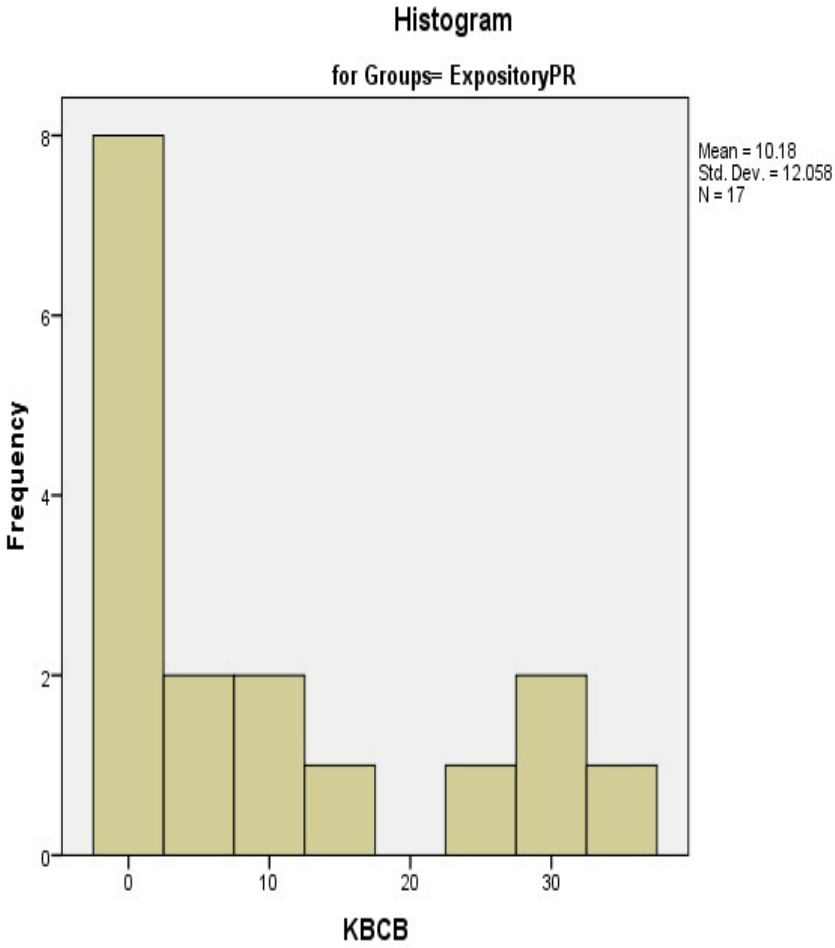

Histogram
for Groups= ExpositoryPR
Mean = 5.06
Std. Dev. = 4.867
N = 17
Frequency
EV
0
1
2
3
4
5
0
5
10
15
20

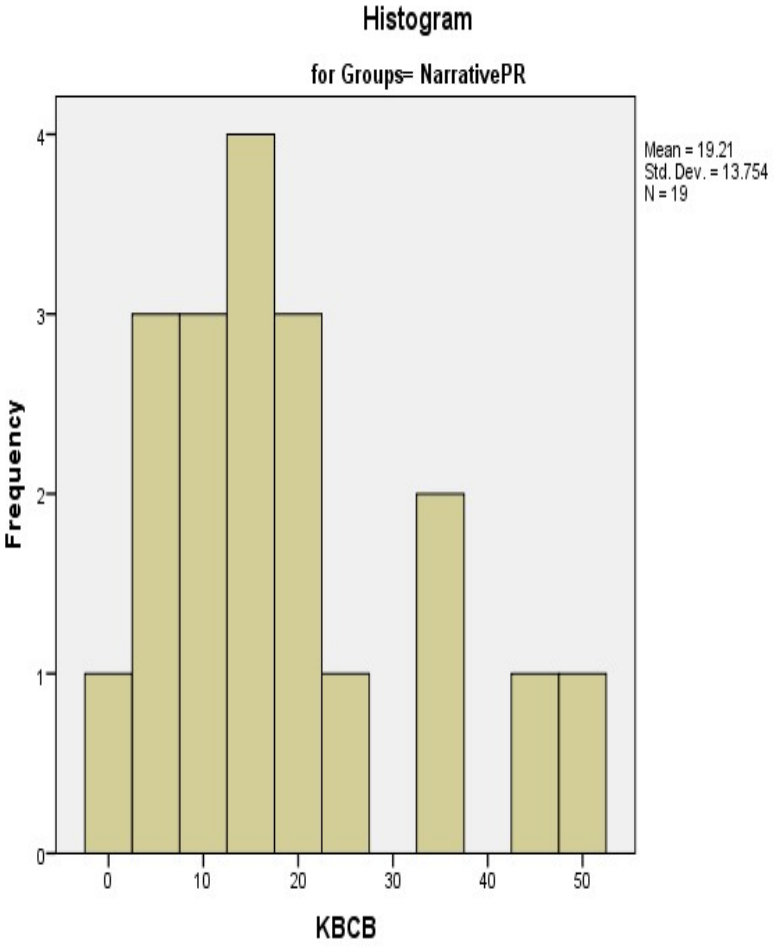

Histogram
for Groups= NarrativePR
Mean = 5.11
Std. Dev. = 5.877
N = 19
Frequency
EV
0
2
4
6
8
0
5
10
15
20
25

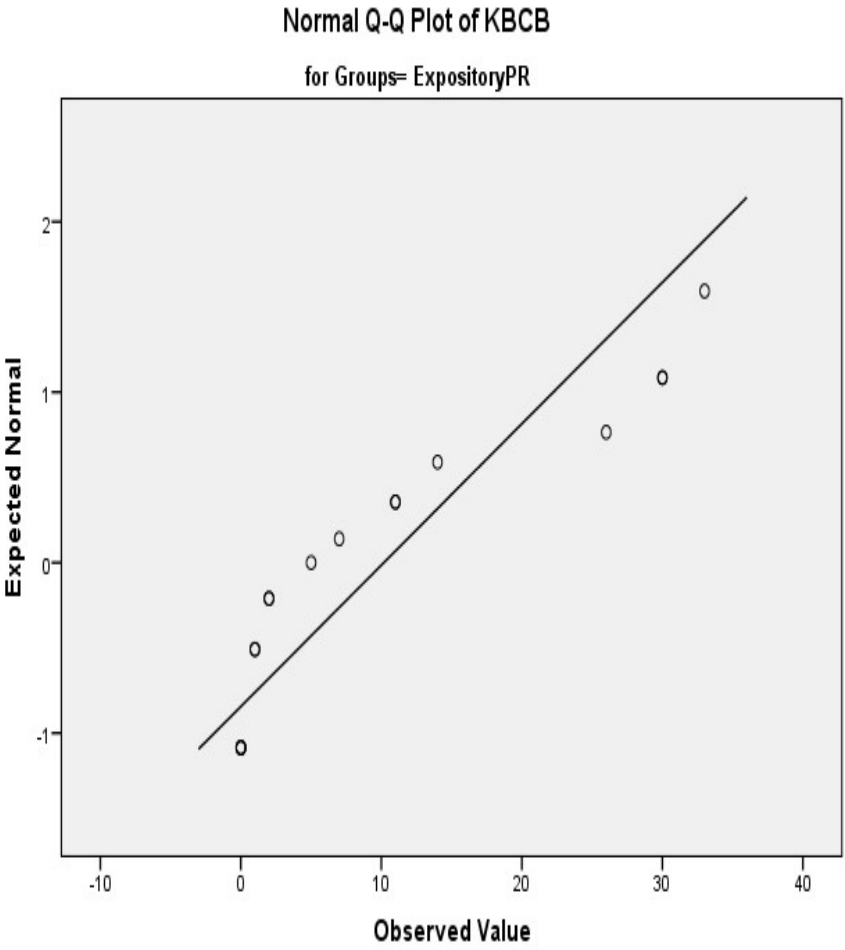

Normal Q-Q Plot of EV
for Groups= ExpositoryPR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
-5
0
5
10
15
20
25

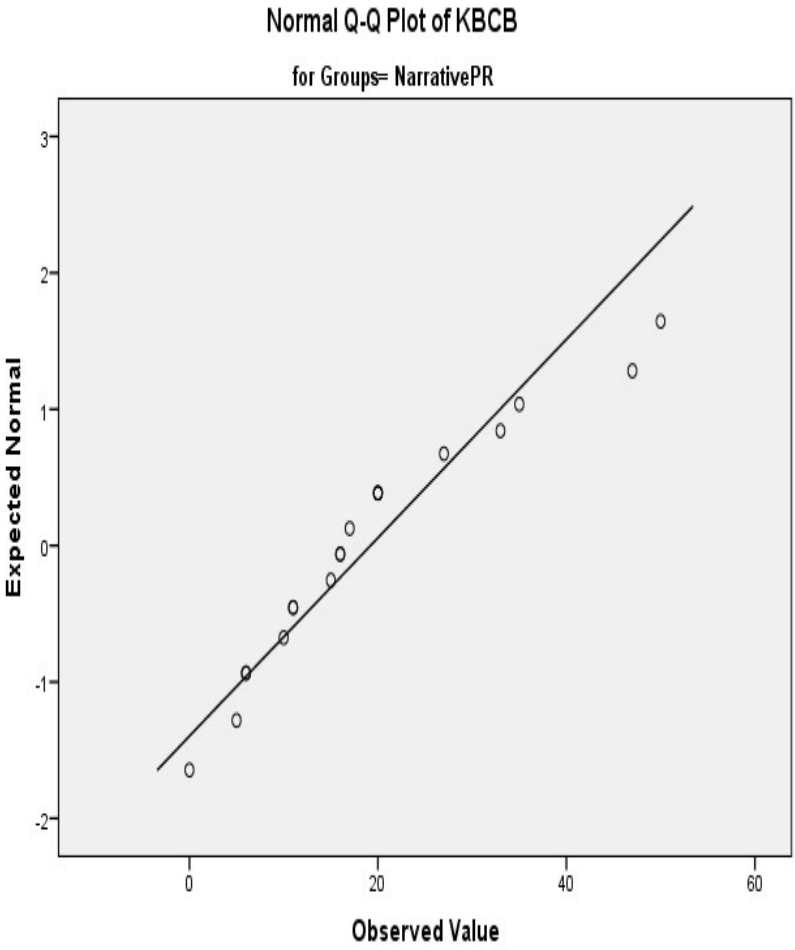

Normal Q-Q Plot of EV
for Groups= NarrativePR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
-5
0
5
10
15
20
25

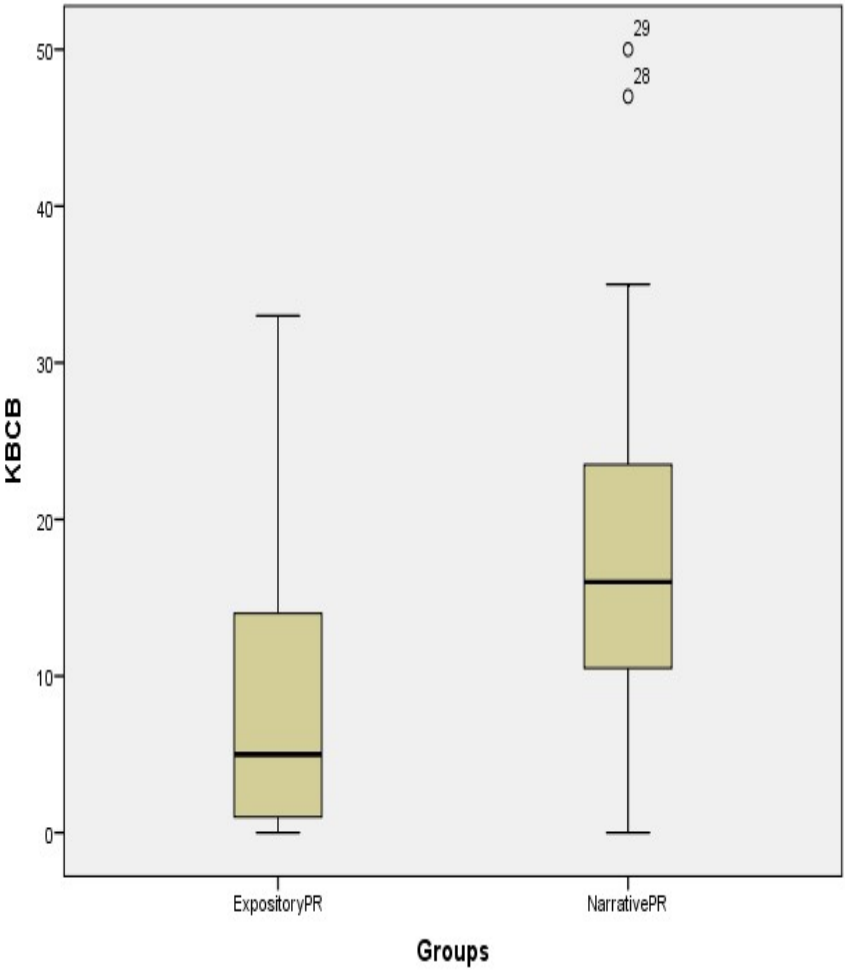

25
20
15
10
5
0
EV
35
36
20
2
ExpositoryPR
NarrativePR
Groups

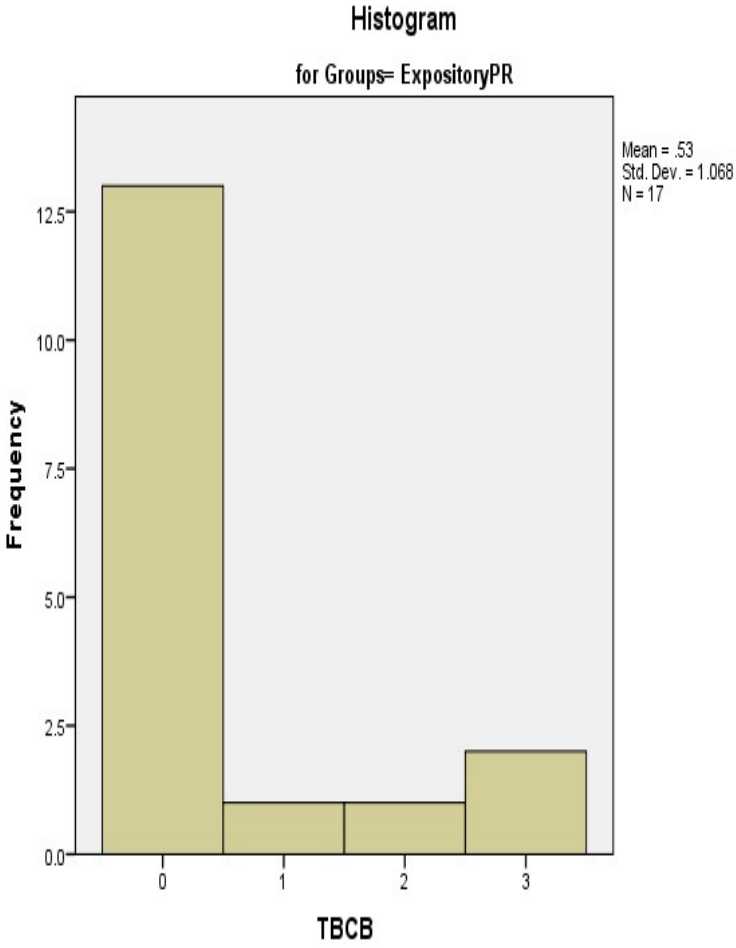

Histogram
for Groups= ExpositoryPR
Mean = 10.18
Std. Dev. = 12.058
N = 17
Frequency
0
2
4
6
8
0
10
20
30
KBCB

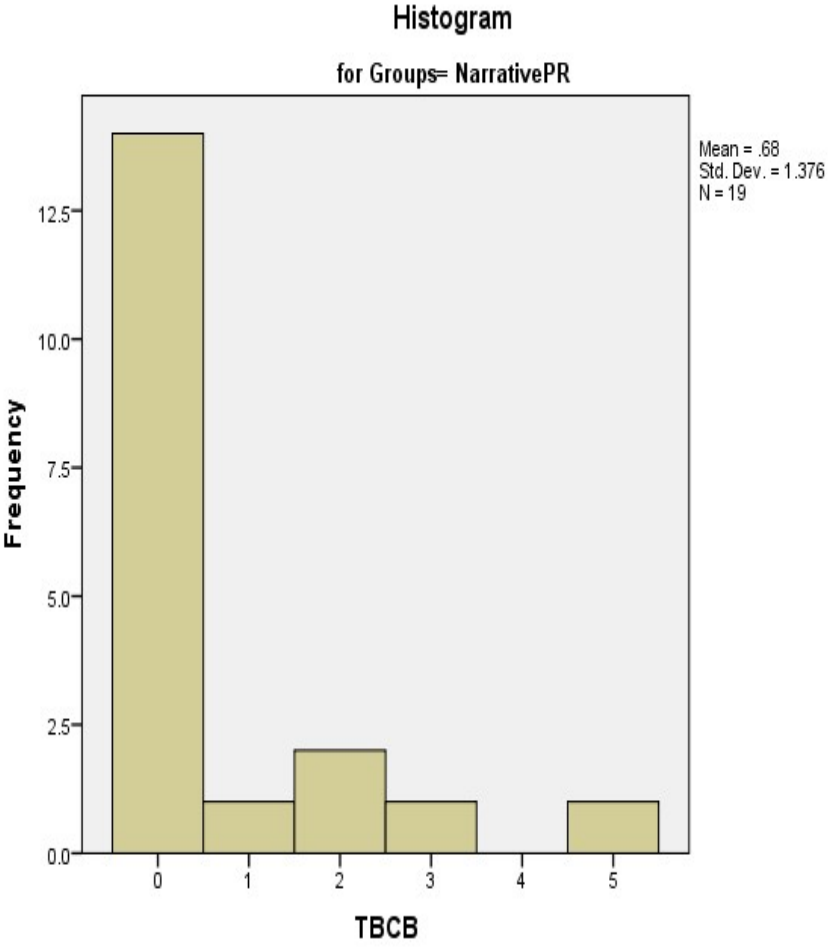

Histogram
for Groups= NarrativePR
Mean = 19.21
Std. Dev. = 13.754
N = 19
Frequency
0
1
2
3
4
0
10
20
30
40
50
KBCB

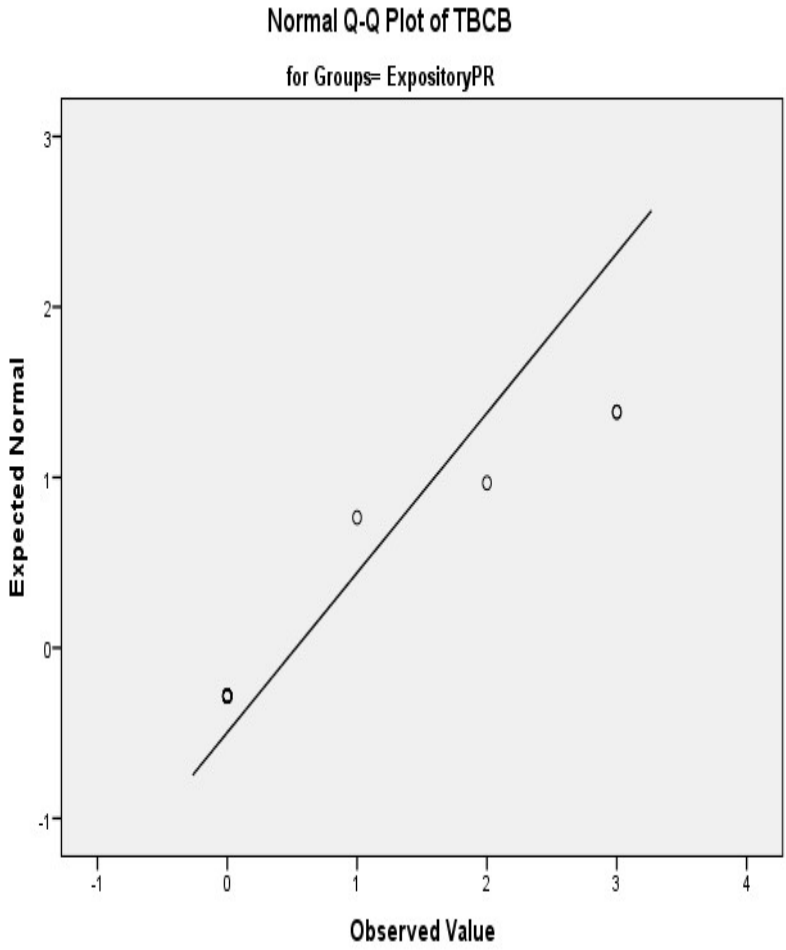

Normal Q-Q Plot of KBCB
for Groups= ExpositoryPR
Expected Normal
2
1
0
-1
-10
0
10
20
30
40
Observed Value

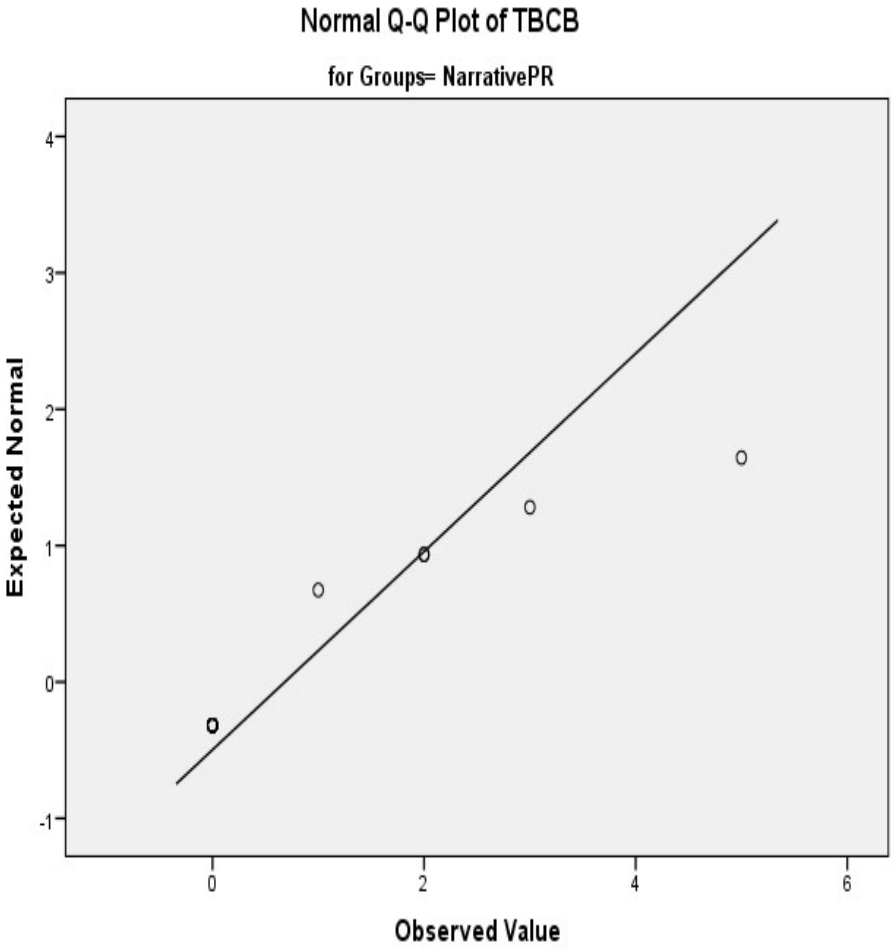

Normal Q-Q Plot of KBCB
for Groups= NarrativePR
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
20
40
60

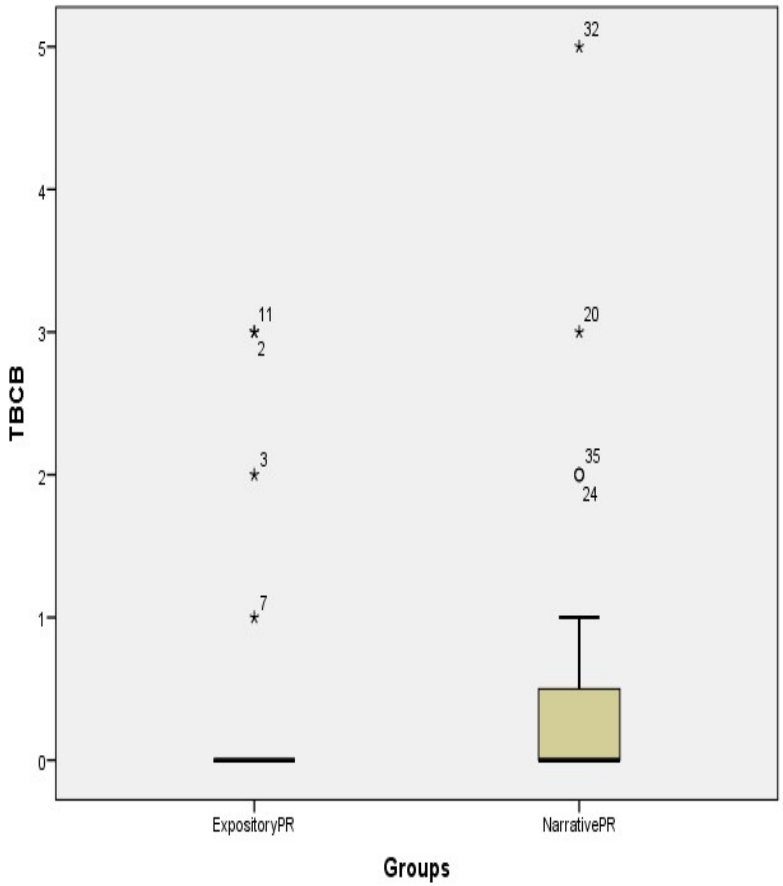

29
28
50
40
30
20
10
0
KBCB
ExpositoryPR
NarrativePR
Groups

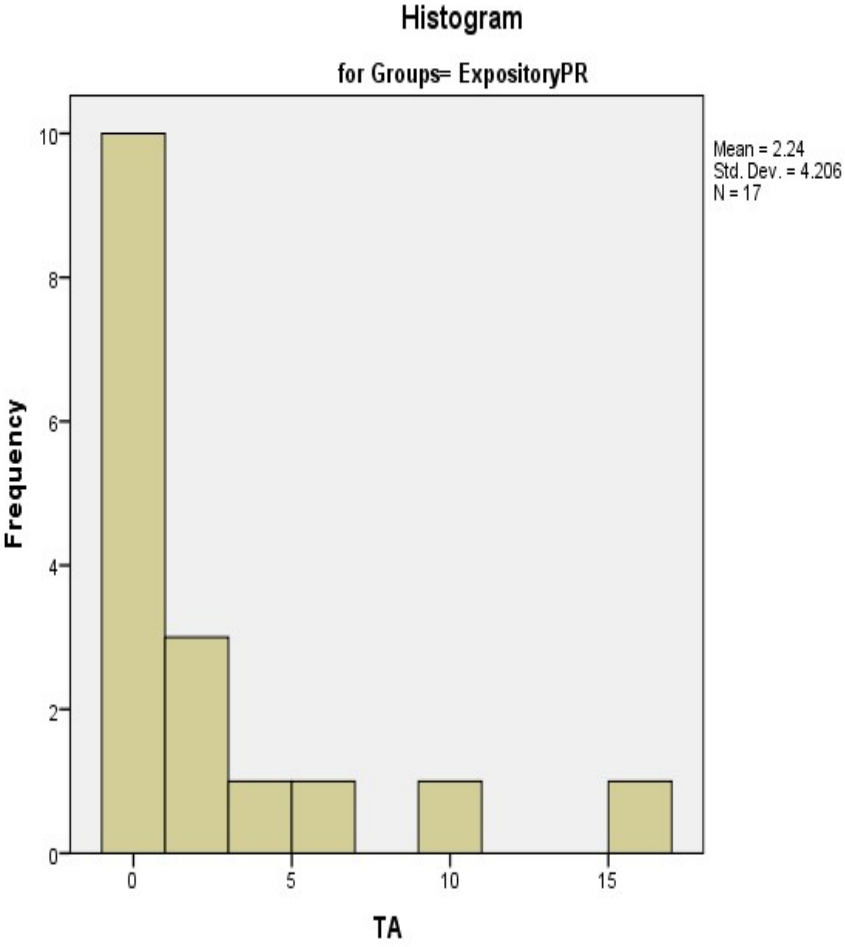

Histogram
for Groups= ExpositoryPR
Mean = .53
Std. Dev. = 1.068
N = 17
Frequency
12.5
10.0
7.5
5.0
2.5
0.0
0
1
2
3
TBCB

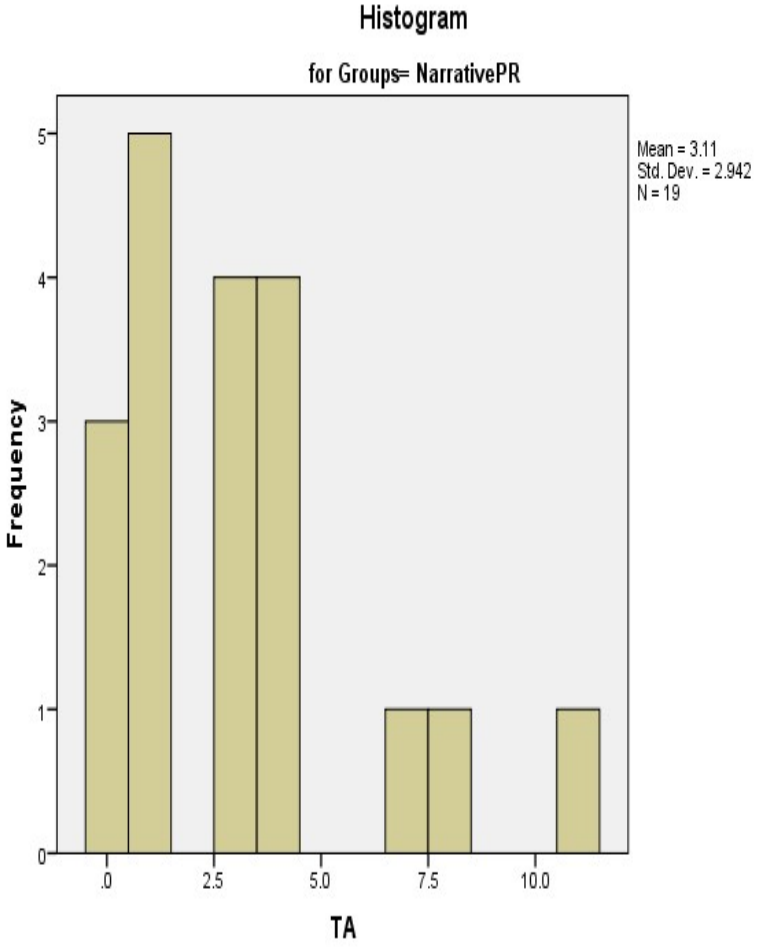

Histogram
for Groups= NarrativePR
Mean = .68
Std. Dev. = 1.376
N = 19
Frequency
12.5
10.0
7.5
5.0
2.5
0.0
0
1
2
3
4
5
TBCB

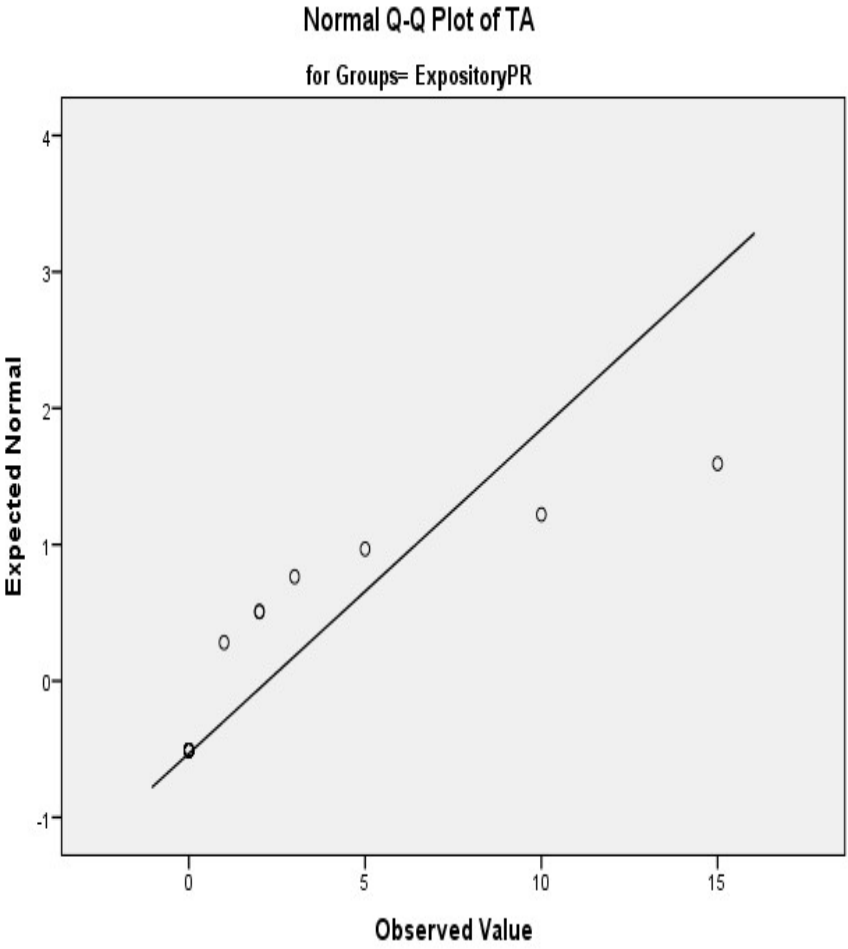

Normal Q-Q Plot of TBCB
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-1
0
1
2
3
4

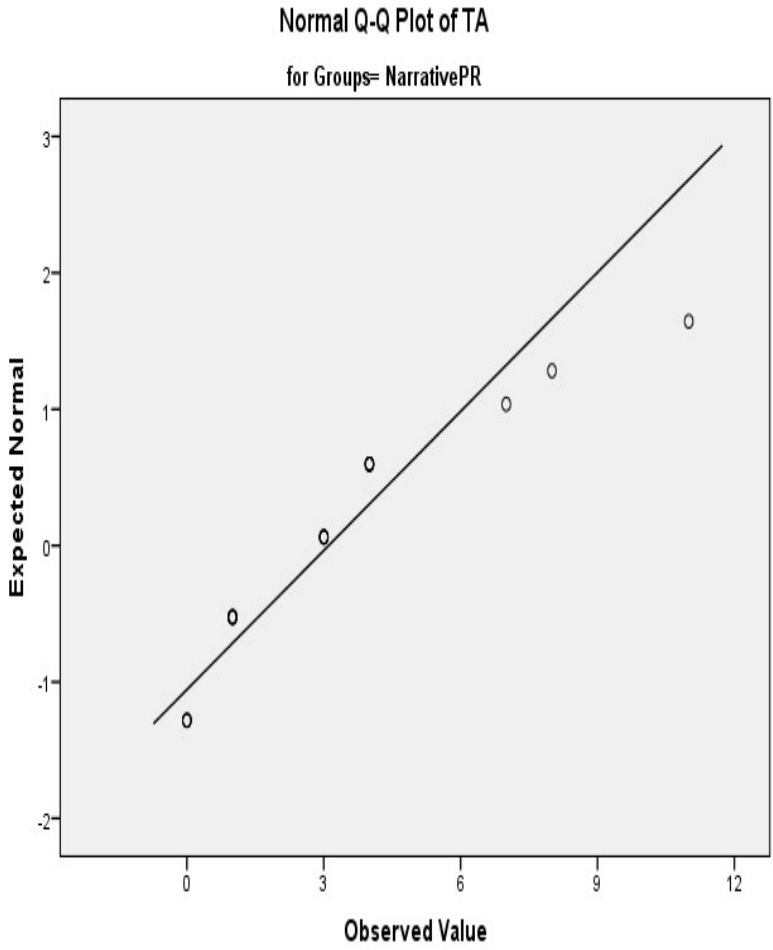

Normal Q-Q Plot of TBCB
for Groups= NarrativePR
Expected Normal
Observed Value
4
3
2
1
0
-1
0
2
4
6

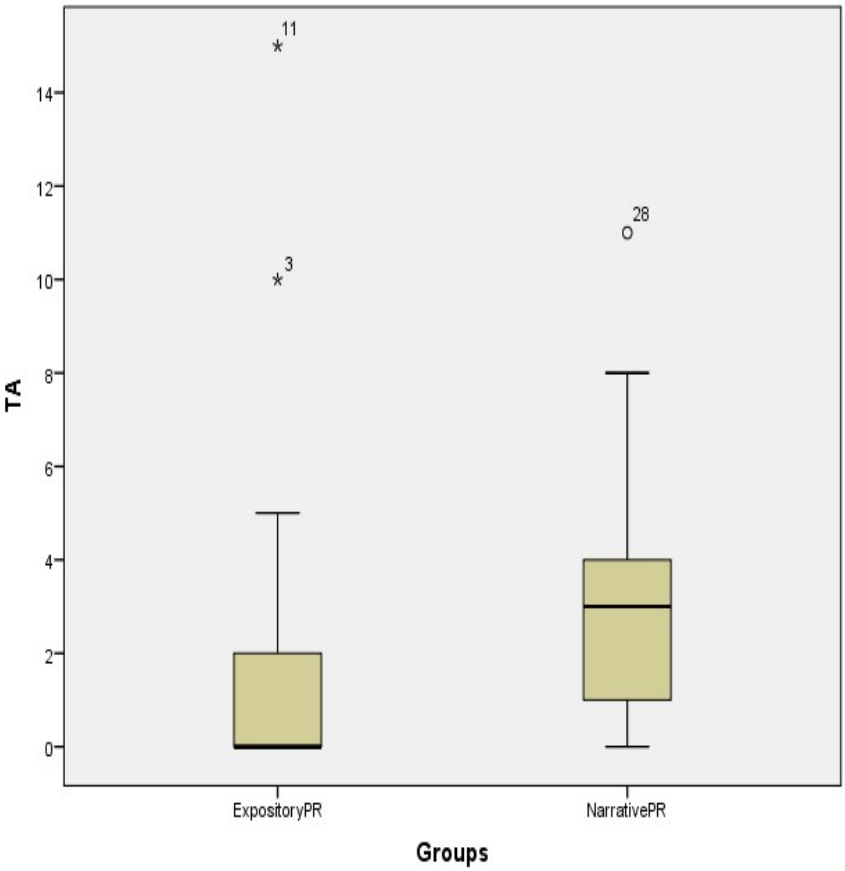

TBCB
5
4
3
2
1
0
32
11
2
20
3
35
24
7
ExpositoryPR
NarrativePR
Groups

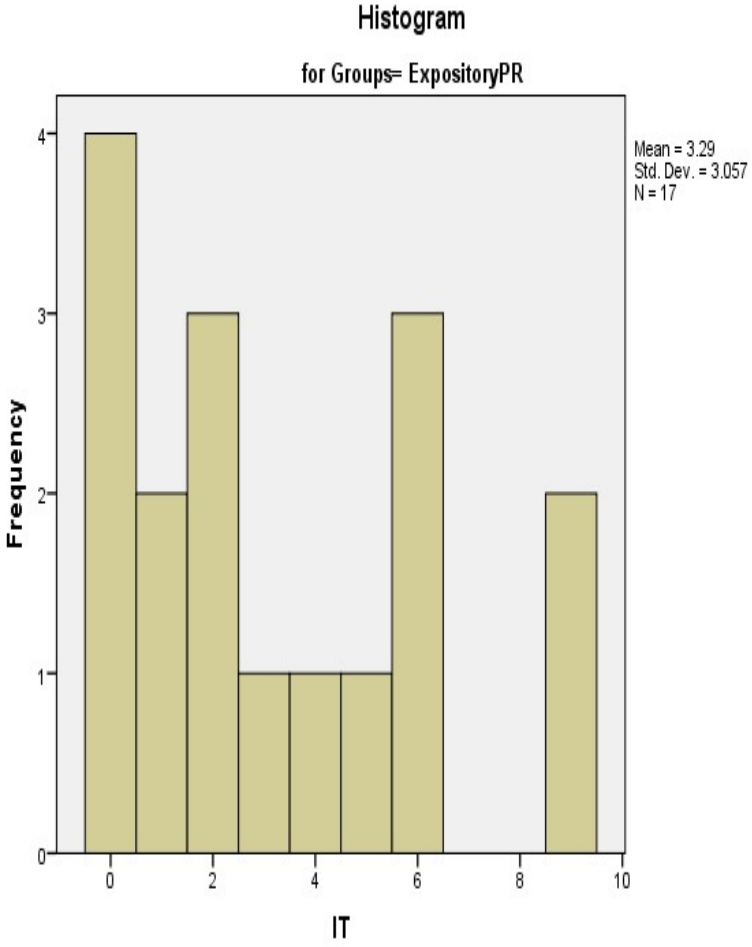

Histogram
for Groups= ExpositoryPR
Mean = 2.24
Std. Dev. = 4.206
N = 17
Frequency
TA
0
2
4
6
8
10
0
5
10
15

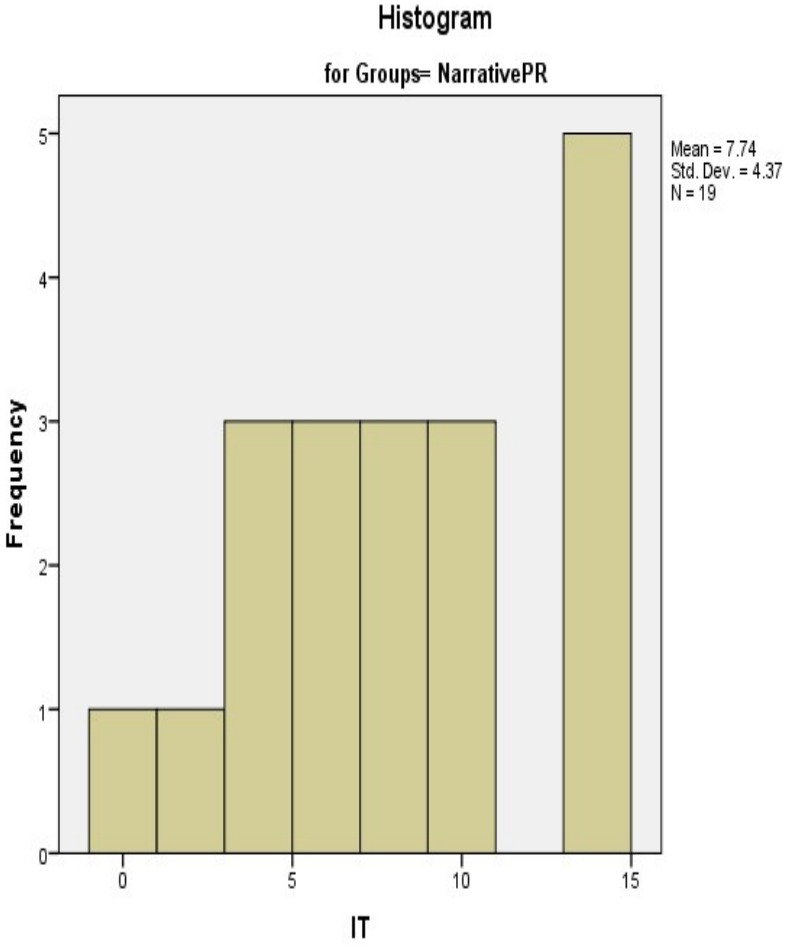

Histogram
for Groups= NarrativePR
Mean = 3.11
Std. Dev. = 2.942
N = 19
Frequency
0
1
2
3
4
5
.0
2.5
5.0
7.5
10.0
TA

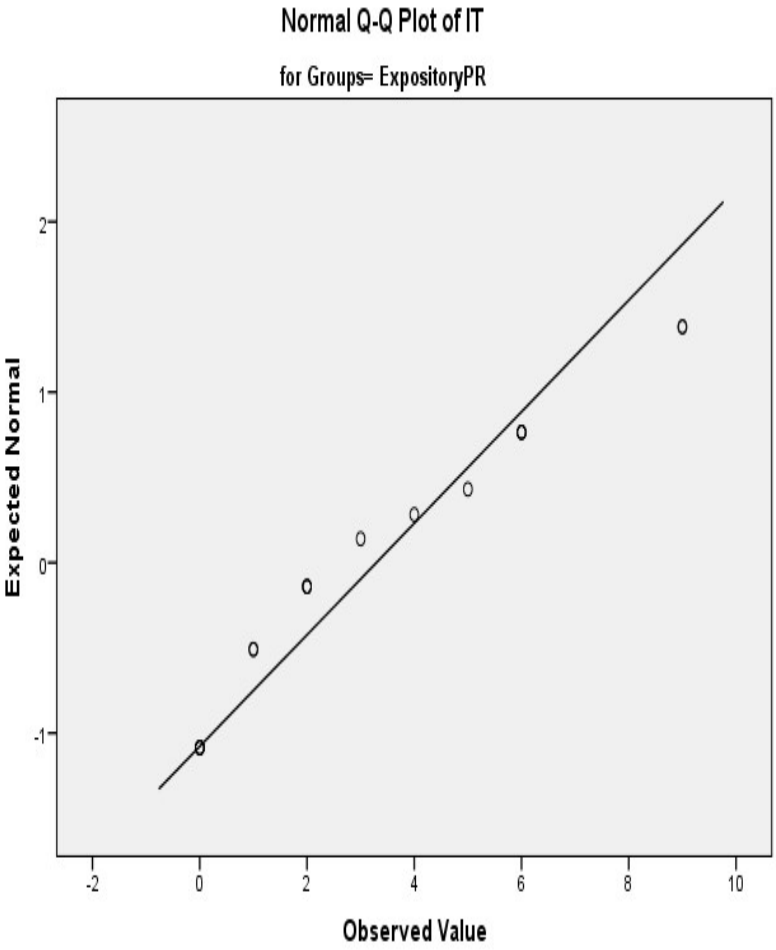

Normal Q-Q Plot of TA
for Groups= ExpositoryPR
Expected Normal
4
3
2
1
0
-1
0
5
10
15
Observed Value

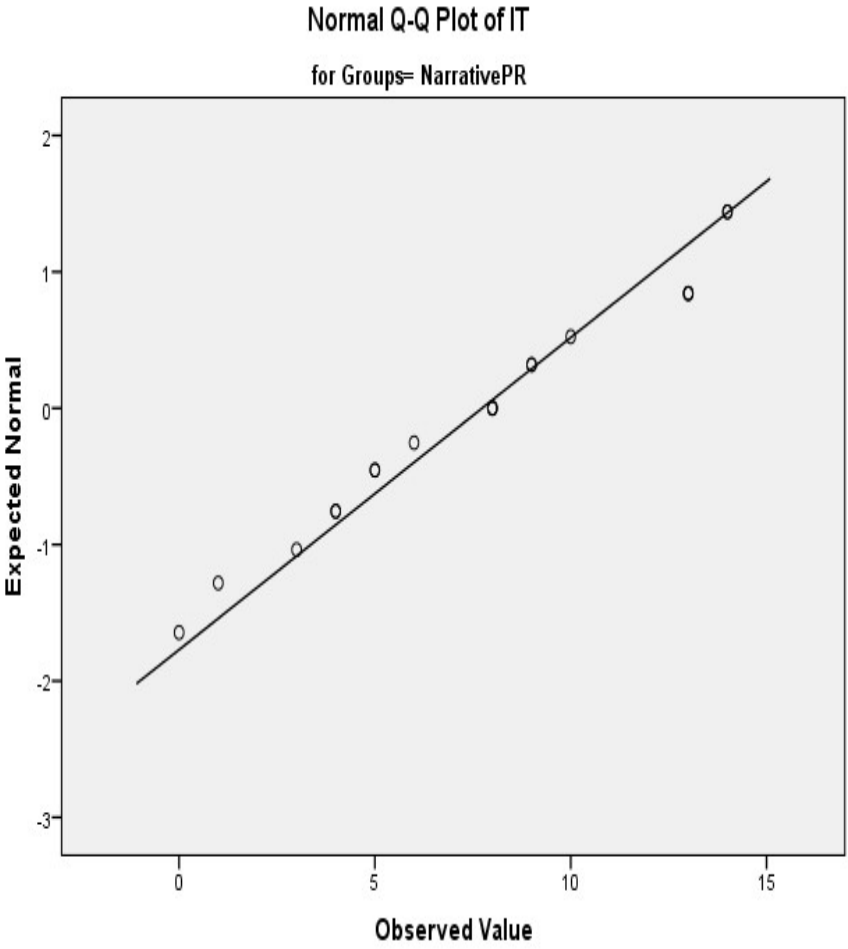

Normal Q-Q Plot of TA
for Groups= NarrativePR
Expected Normal
3
2
1
0
-1
-2
0
3
6
9
12
Observed Value

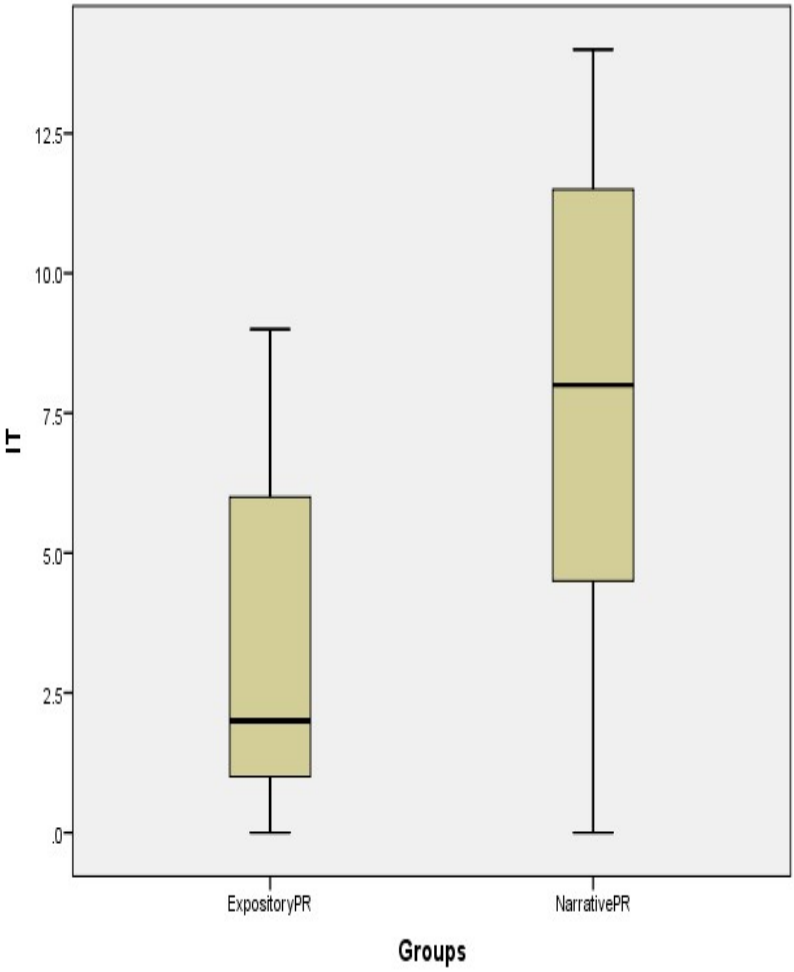

11
14
12
28
3
10
8
TA
6
4
2
0
ExpositoryPR
NarrativePR
Groups

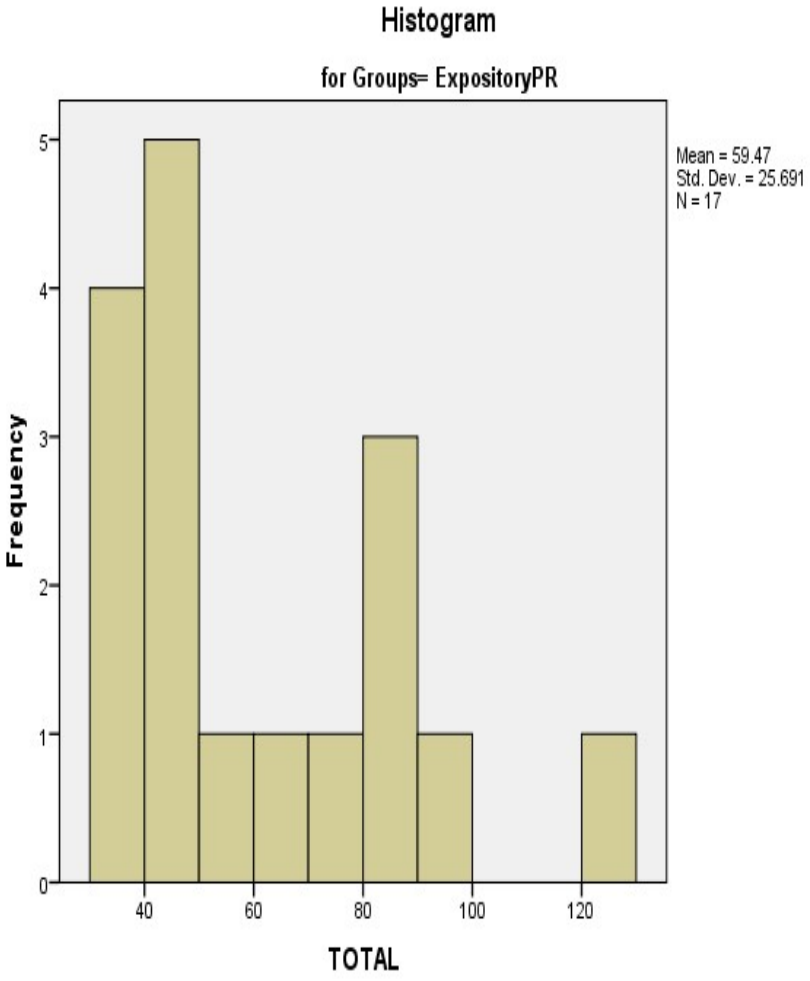

Histogram
for Groups= ExpositoryPR
Mean = 3.29
Std. Dev. = 3.057
N = 17
Frequency
IT
0
1
2
3
4
0
2
4
6
8
10

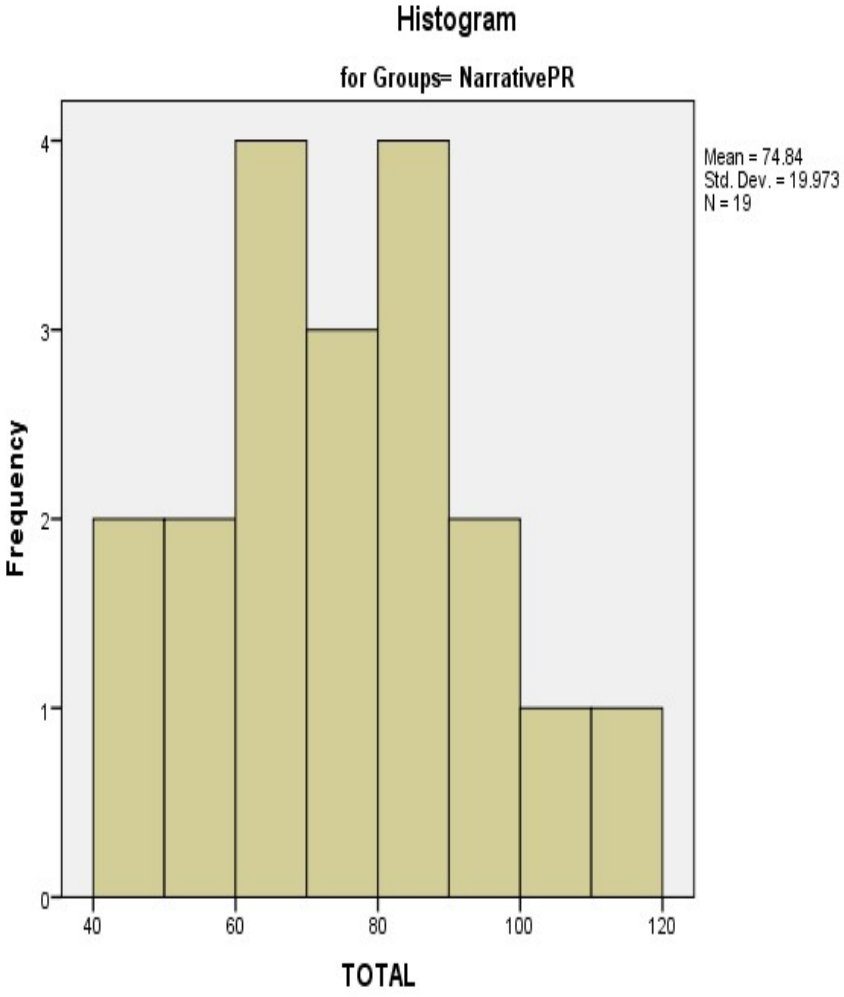

Histogram
for Groups= NarrativePR
Mean = 7.74
Std. Dev. = 4.37
N = 19
Frequency
0
1
2
3
4
5
0
5
10
15
IT

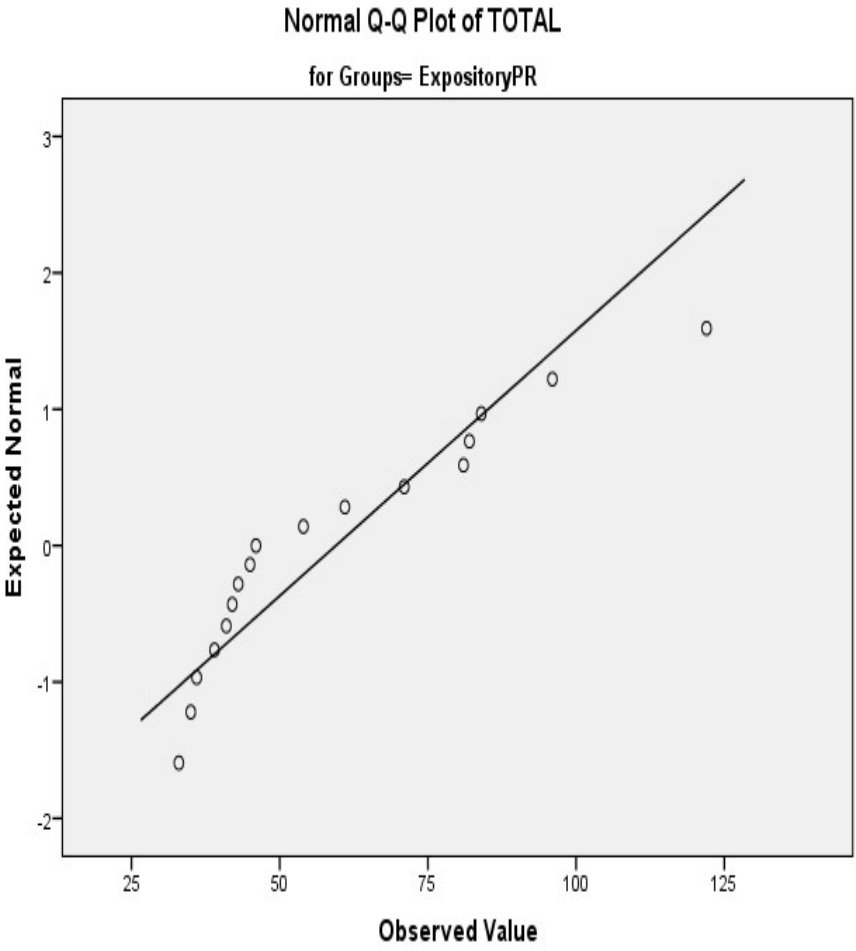

Normal Q-Q Plot of IT
for Groups= ExpositoryPR
Expected Normal
Observed Value
2
1
0
-1
-2
0
2
4
6
8
10

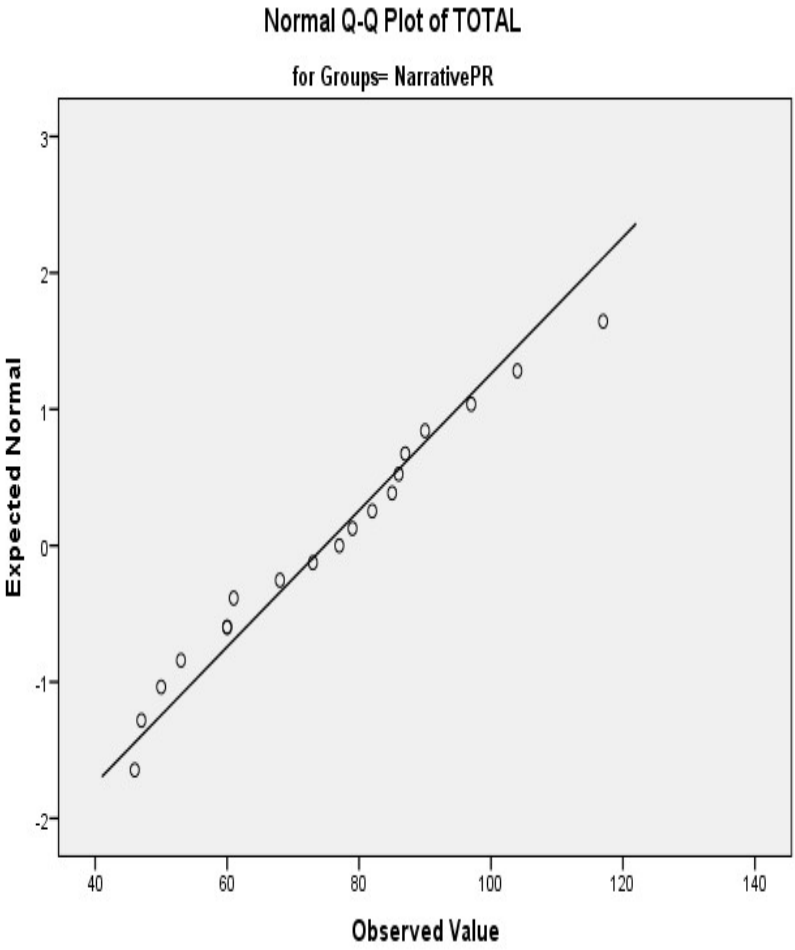

Normal Q-Q Plot of IT
for Groups= NarrativePR
Expected Normal
Observed Value
2
1
0
-1
-2
-3
0
5
10
15

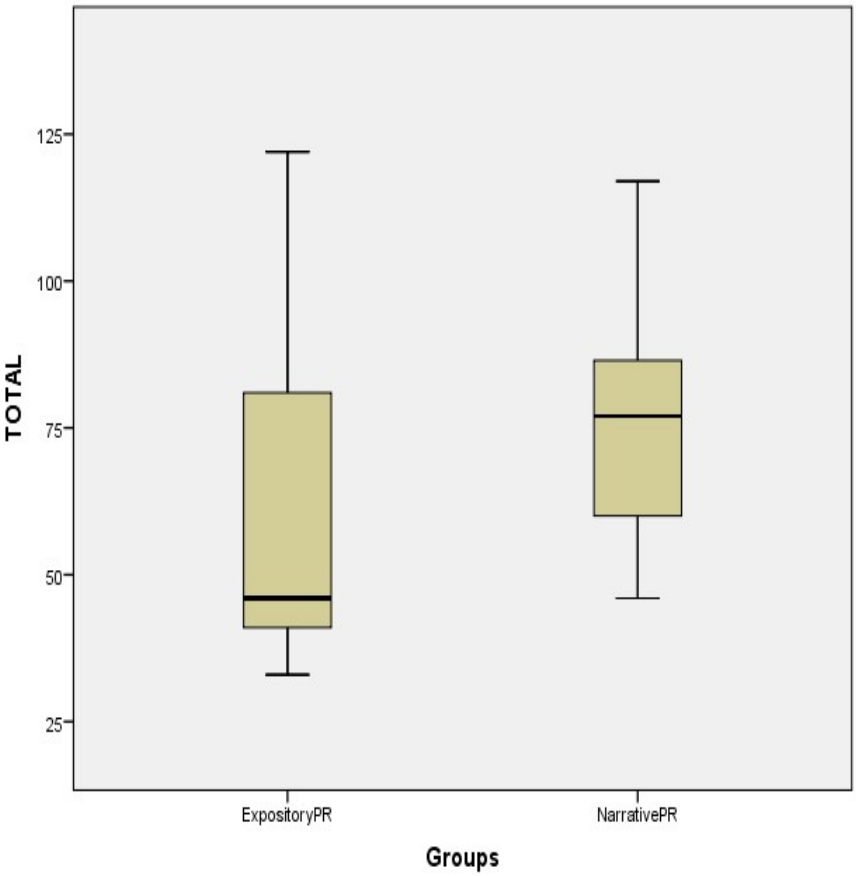

12.5
10.0
7.5
5.0
2.5
.0
IT
ExpositoryPR
NarrativePR
Groups


Histogram
for Groups= ExpositoryPR
Mean = 59.47
Std. Dev. = 25.691
N = 17
Frequency
0
1
2
3
4
5
40
60
80
100
120
TOTAL

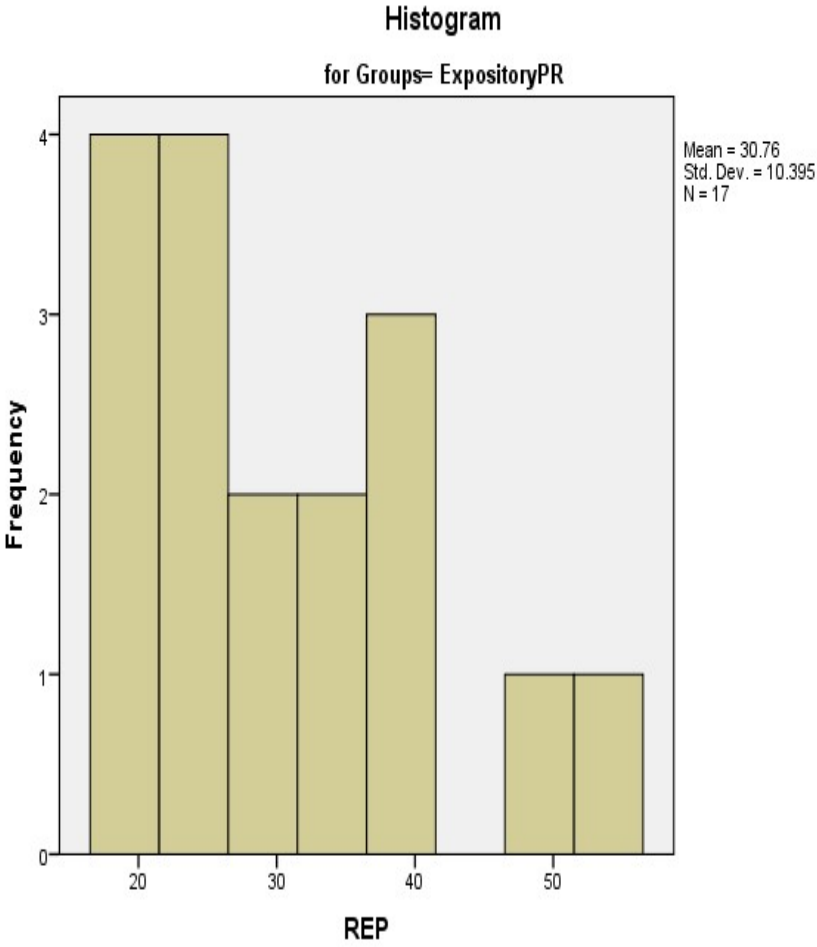

Histogram
for Groups= NarrativePR
Mean = 74.84
Std. Dev. = 19.973
N = 19
Frequency
0
1
2
3
4
40
60
80
100
120
TOTAL

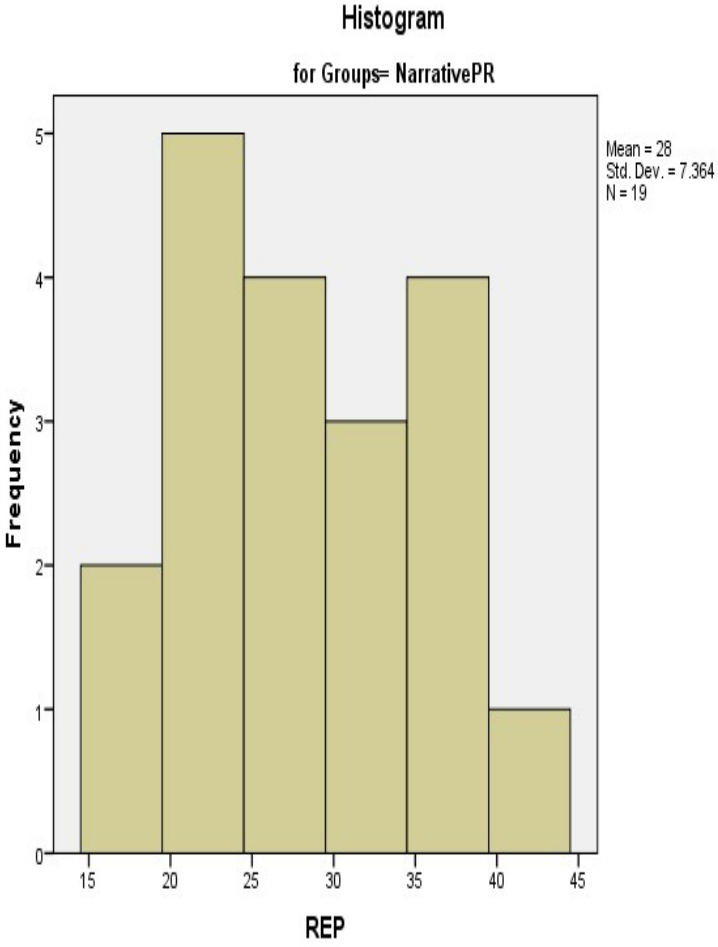

Normal Q-Q Plot of TOTAL
for Groups= ExpositoryPR
Expected Normal
3
2
1
0
-1
-2
25
50
75
100
125
Observed Value

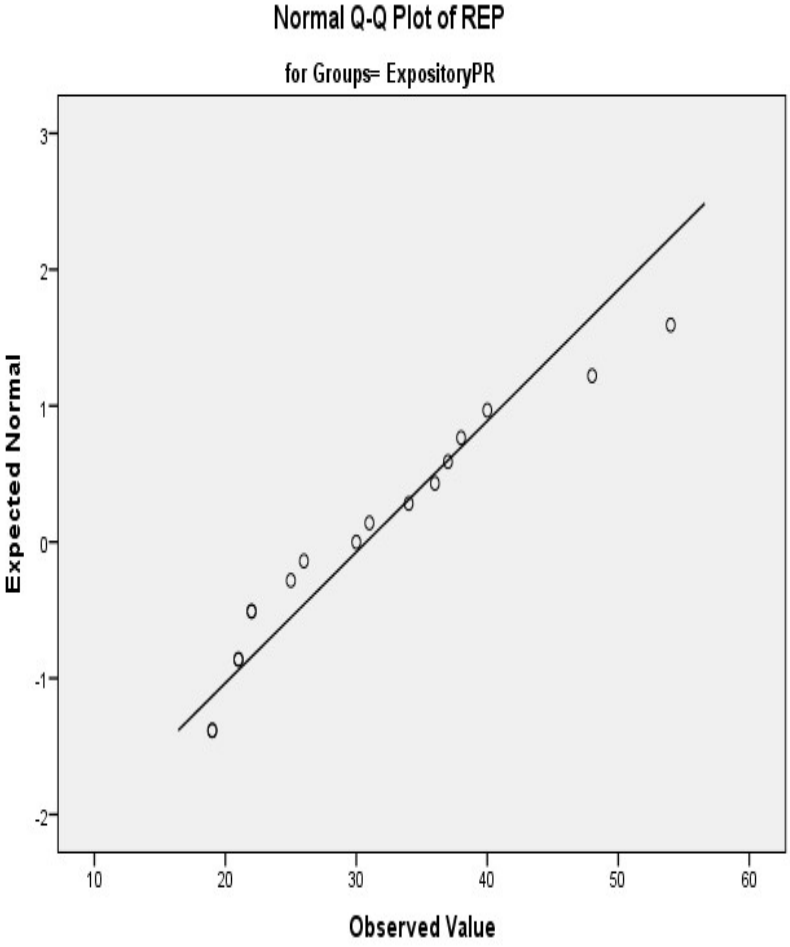

Normal Q-Q Plot of TOTAL
for Groups= NarrativePR
Expected Normal
Observed Value
3
2
1
0
-1
-2
40
60
80
100
120
140

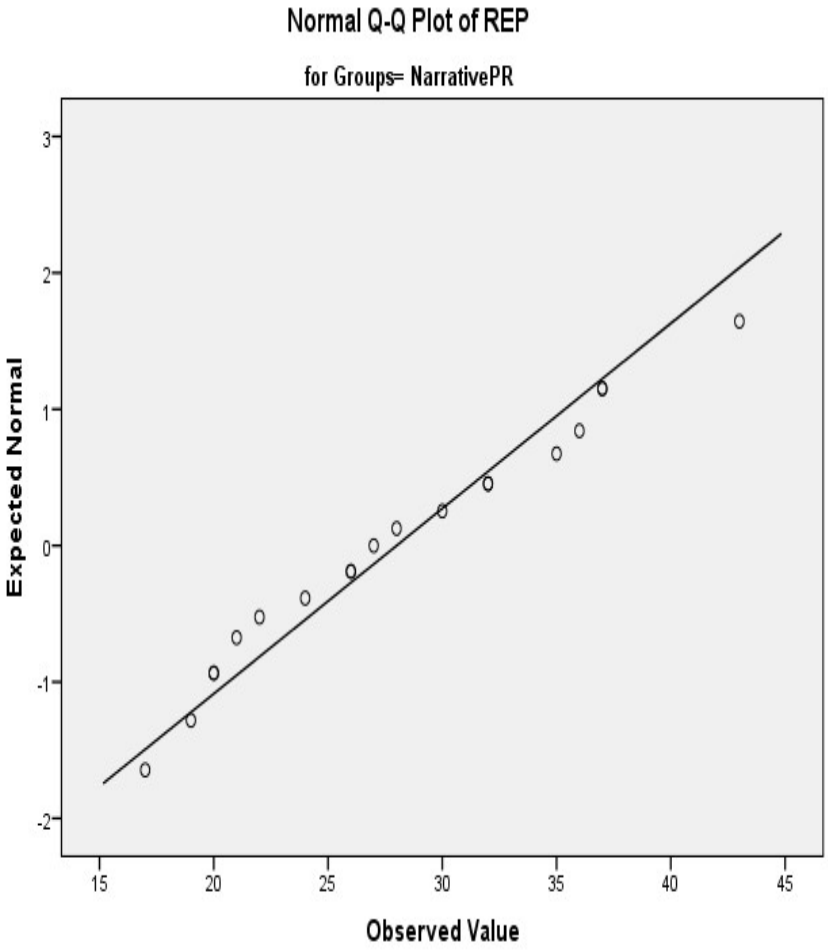

125
100
75
50
25
TOTAL
ExpositoryPR
NarrativePR
Groups

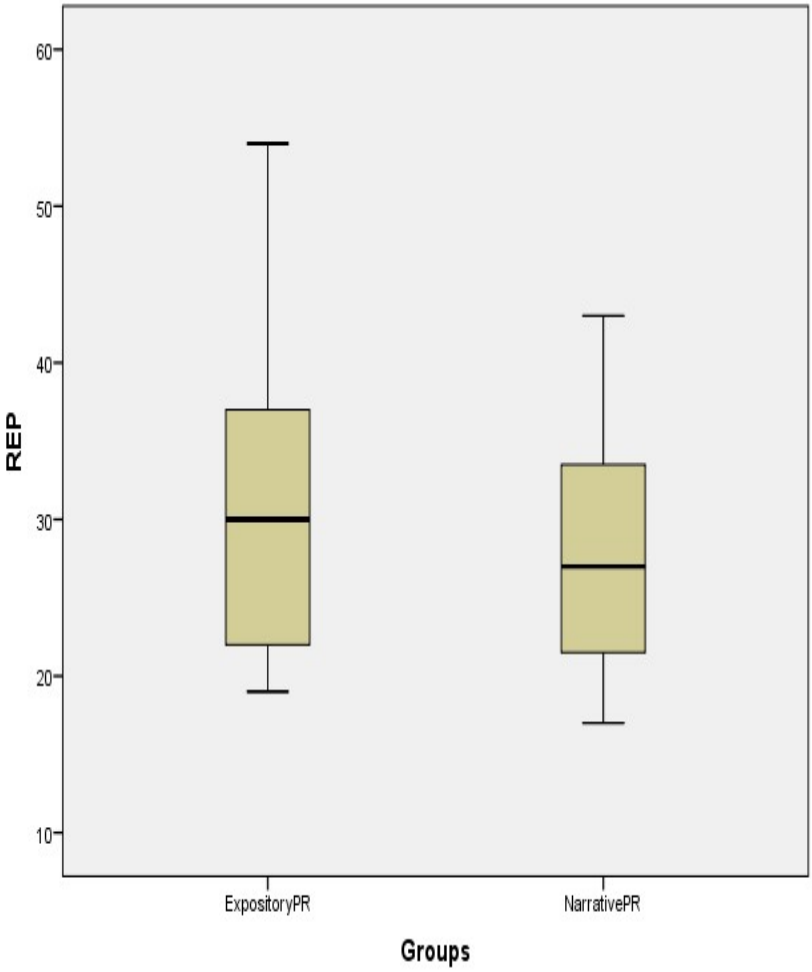
APPENDIX R2 – Histograms and Boxplots of Inference Generation for the Narrative Text

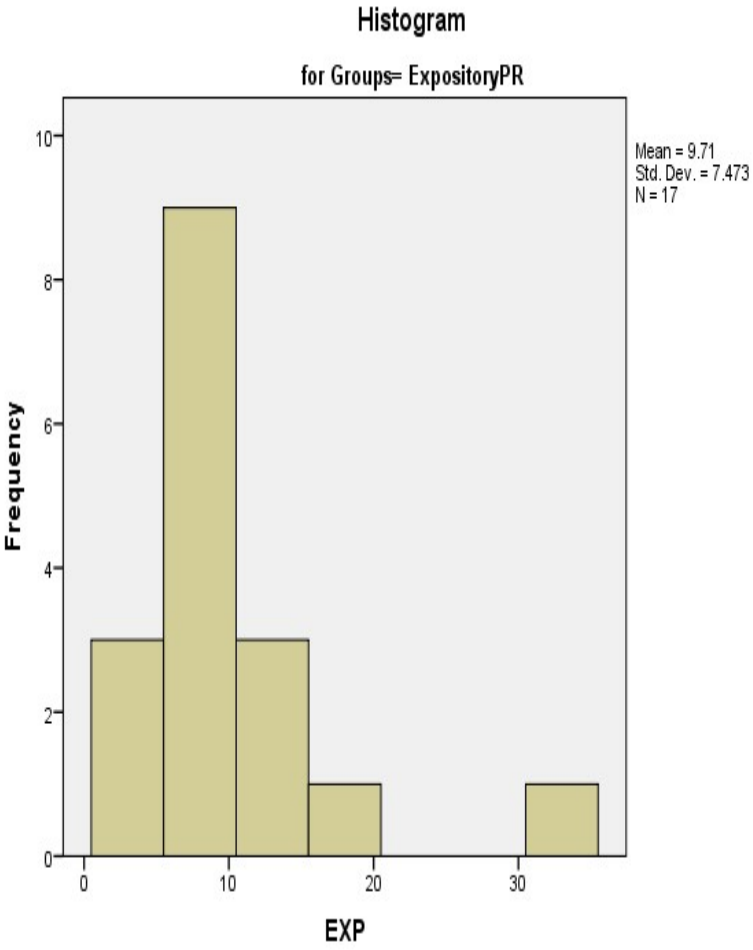


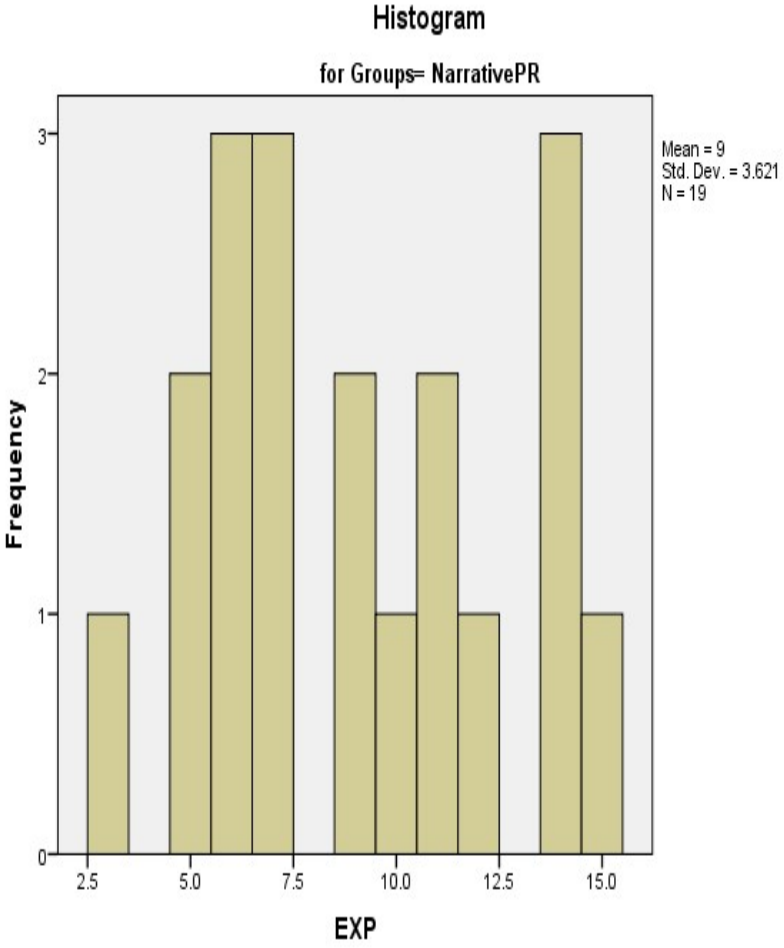

Histogram
for Groups= NarrativePR
Mean = 28
Std. Dev. = 7.364
N = 19
Frequency
0
1
2
3
4
5
15
20
25
30
35
40
45
REP

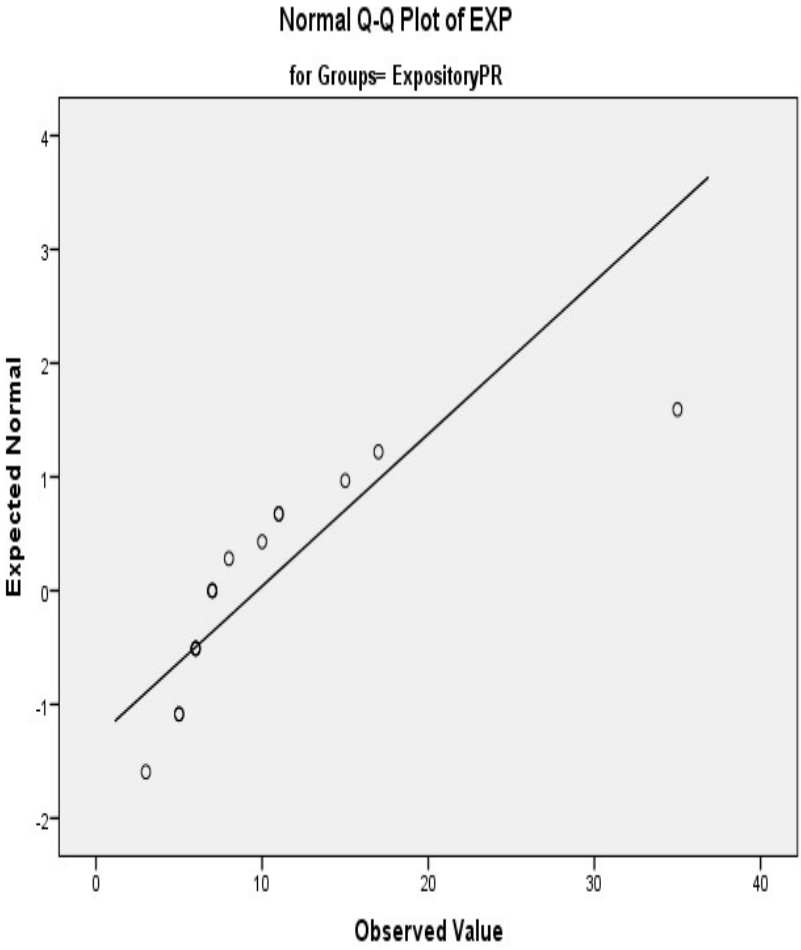

Normal Q-Q Plot of REP
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
10
20
30
40
50
60

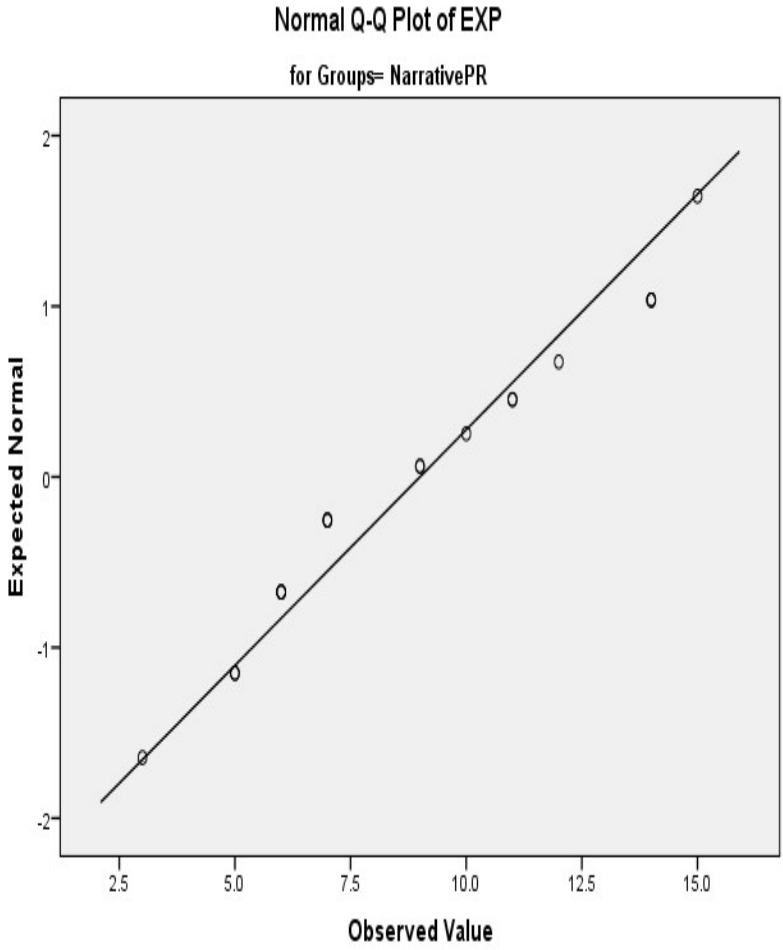

Normal Q-Q Plot of REP
for Groups= NarrativePR
Expected Normal
3
2
1
0
-1
-2
15
20
25
30
35
40
45
Observed Value

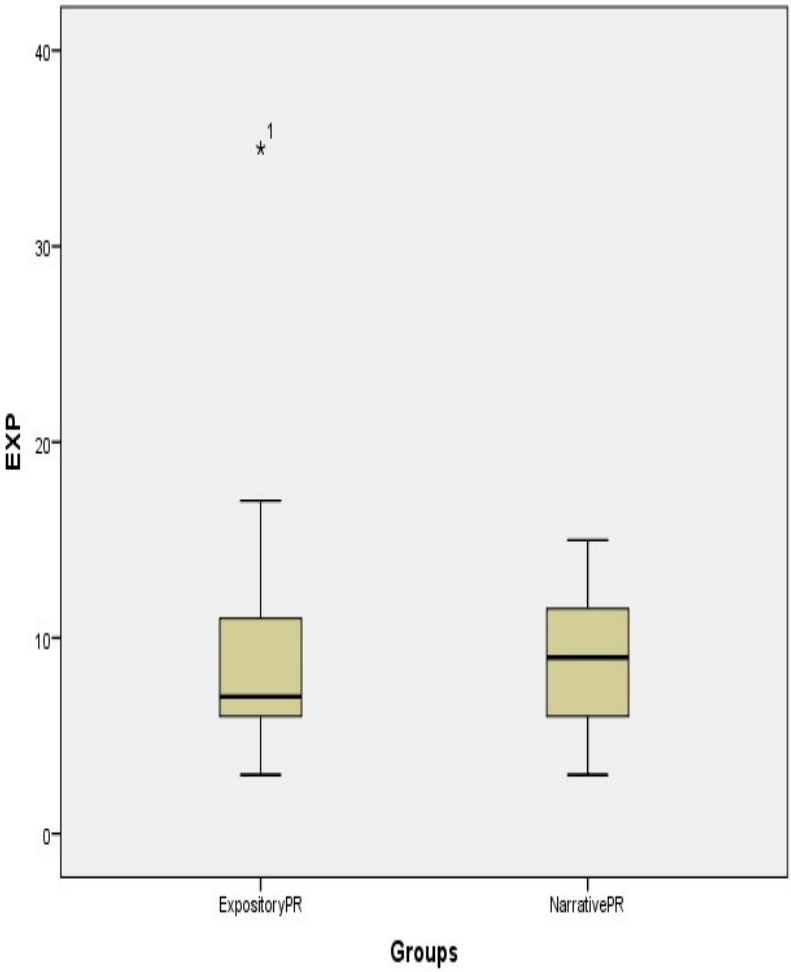

60
50
40
30
20
10
REP
ExpositoryPR
NarrativePR
Groups

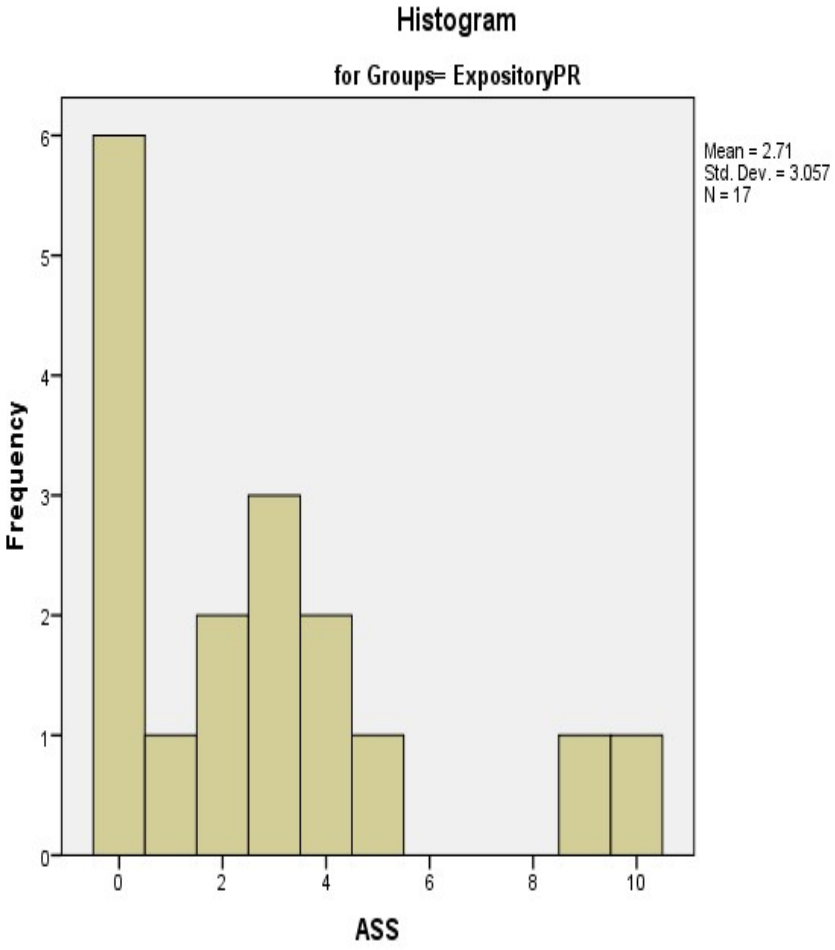

Histogram
for Groups= ExpositoryPR
Mean = 9.71
Std. Dev. = 7.473
N = 17
Frequency
EXP
0
2
4
6
8
10
0
10
20
30

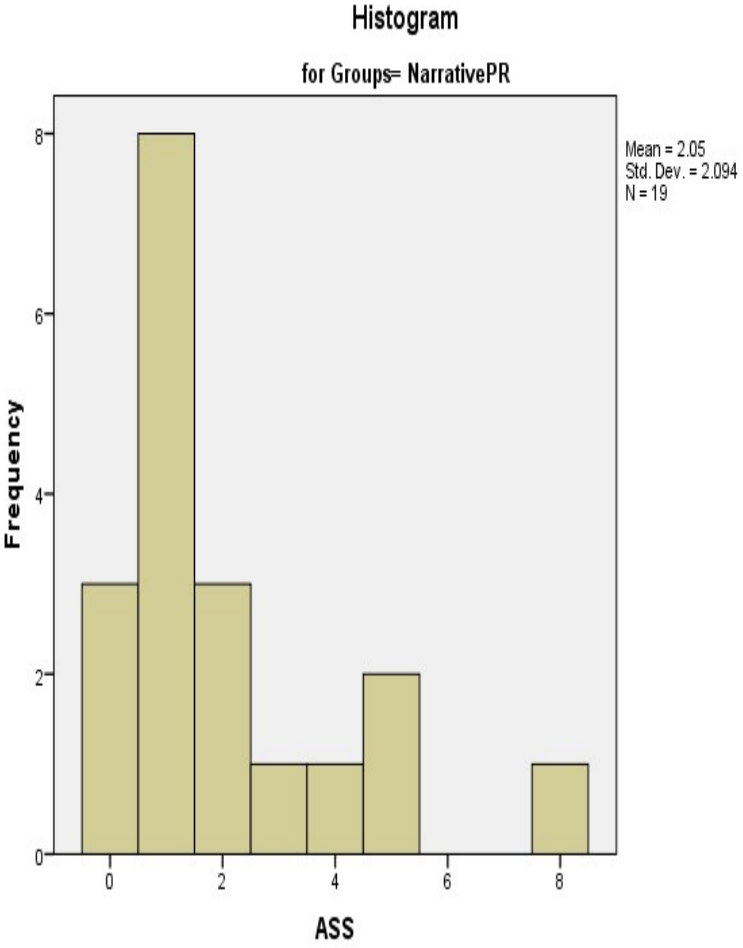

Histogram
for Groups= NarrativePR
Mean = 9
Std. Dev. = 3.621
N = 19
Frequency
0
1
2
3
2.5
5.0
7.5
10.0
12.5
15.0
EXP

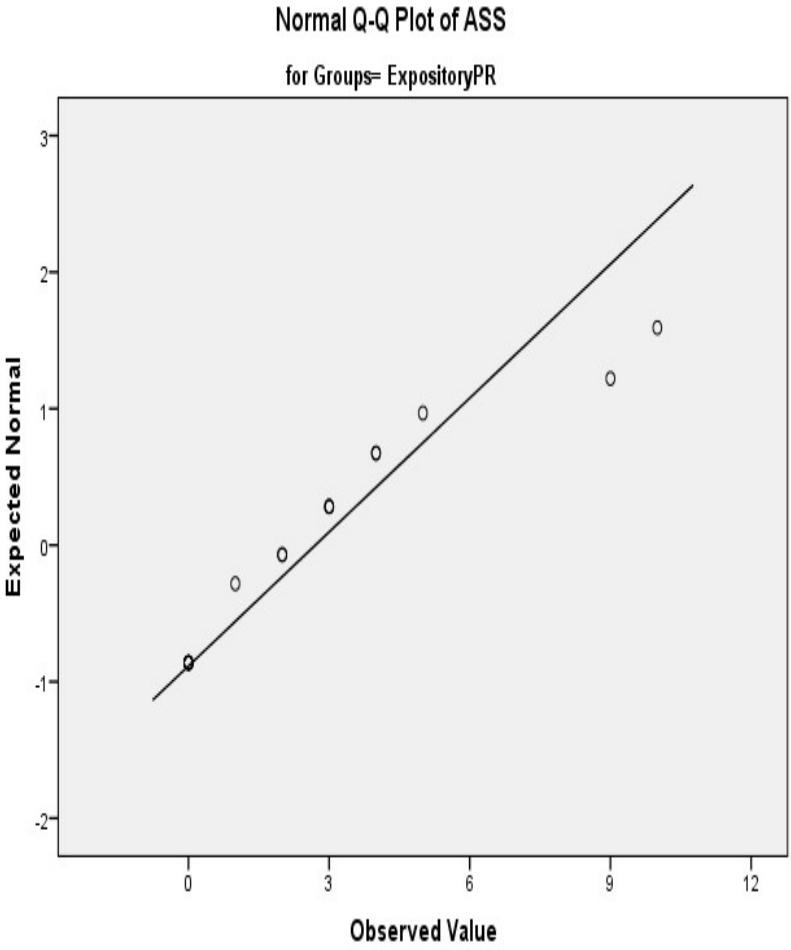

Normal Q-Q Plot of EXP
for Groups= ExpositoryPR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
0
10
20
30
40

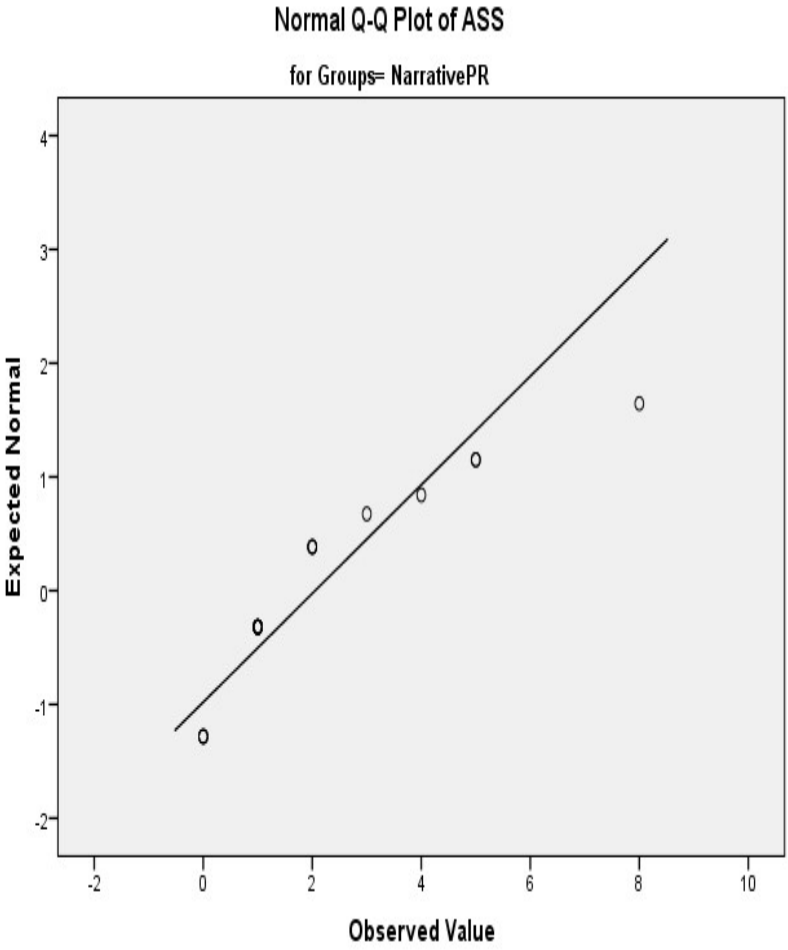

Normal Q-Q Plot of EXP
for Groups= NarrativePR
Expected Normal
2
1
0
-1
-2
2.5
5.0
7.5
10.0
12.5
15.0
Observed Value

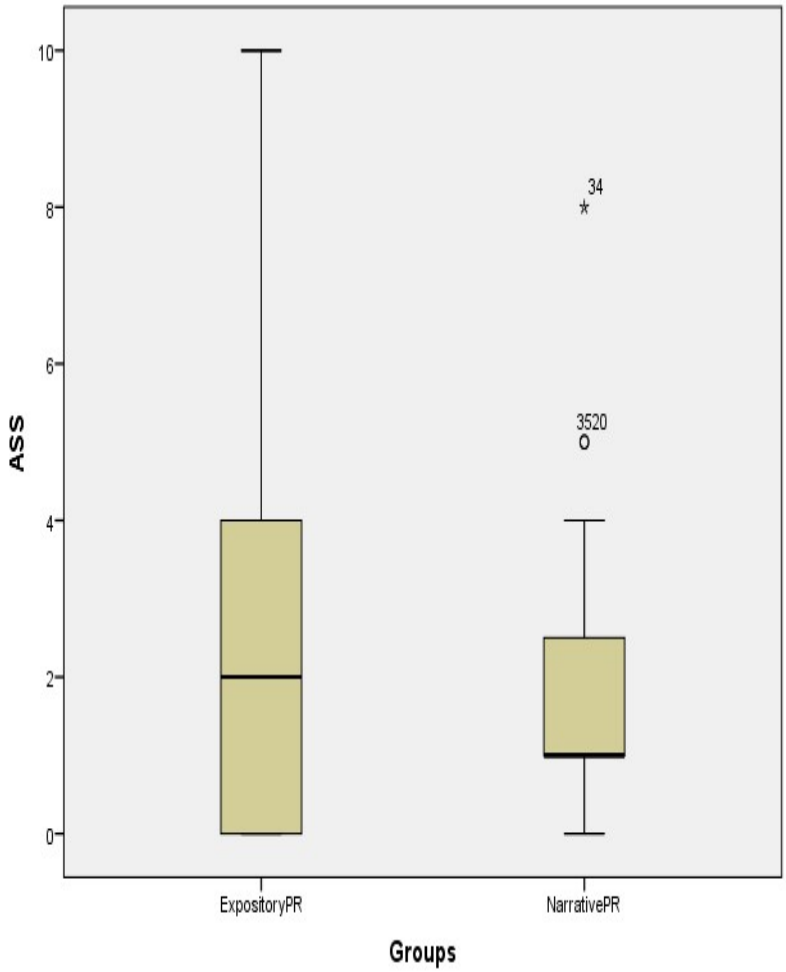

40
30
20
10
0
EXP
1
ExpositoryPR
NarrativePR
Groups

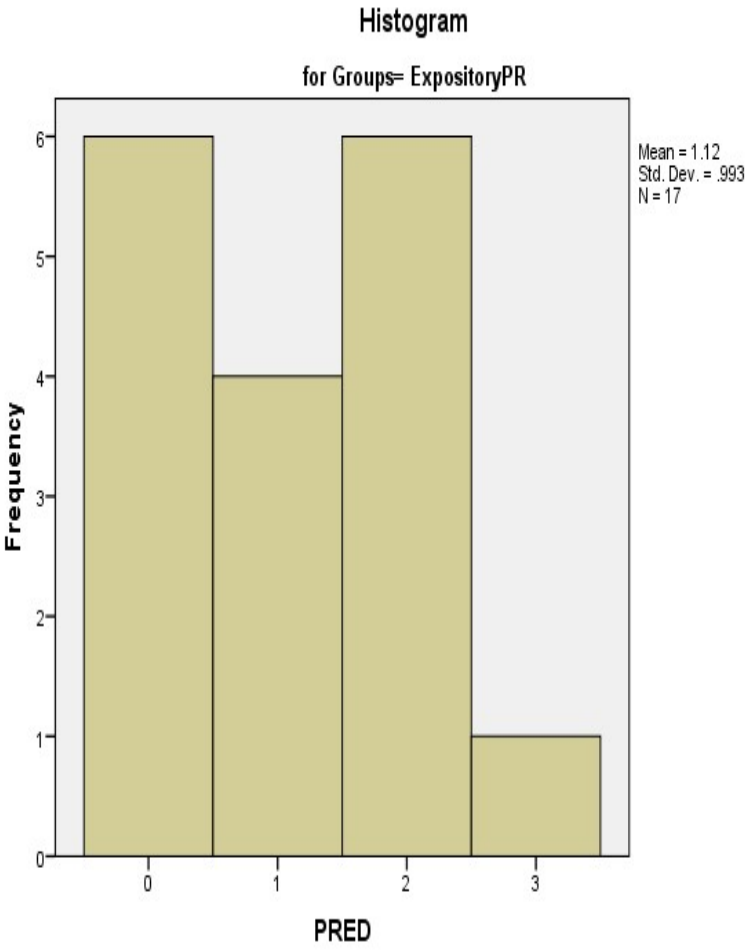

Histogram
for Groups= ExpositoryPR
Mean = 2.71
Std. Dev. = 3.057
N = 17
Frequency
0
1
2
3
4
5
6
0
2
4
6
8
10
ASS

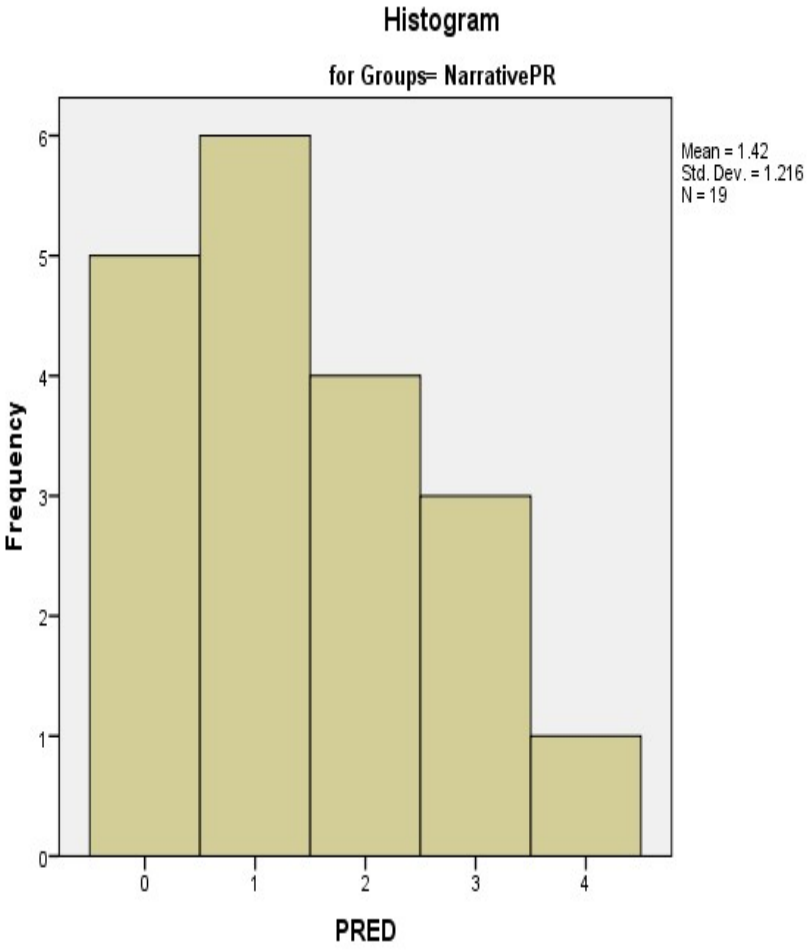

Histogram
for Groups= NarrativePR
Mean = 2.05
Std. Dev. = 2.094
N = 19
Frequency
0
2
4
6
8
ASS

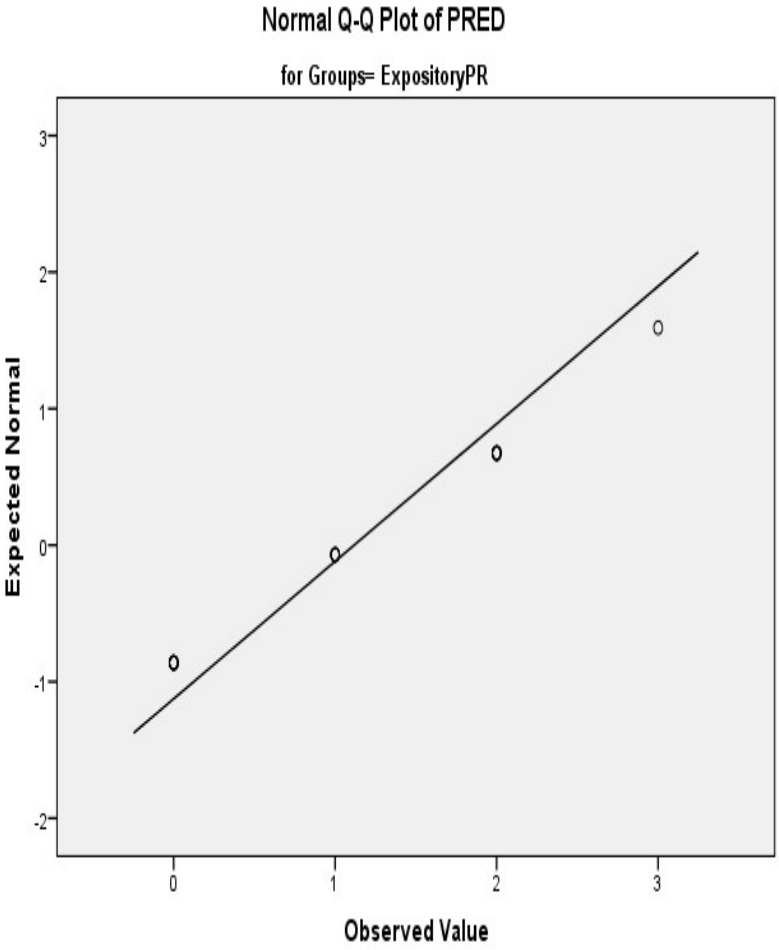

Normal Q-Q Plot of ASS
for Groups= ExpositoryPR
Expected Normal
3
2
1
0
-1
-2
0
3
6
9
12
Observed Value

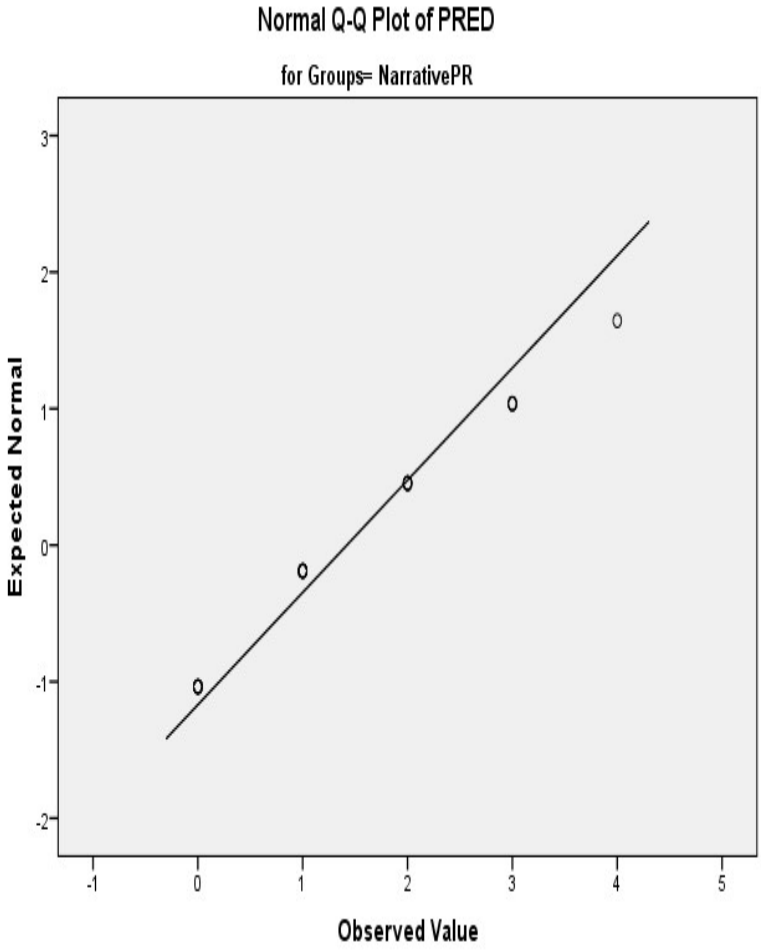

Normal Q-Q Plot of ASS
for Groups= NarrativePR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
-2
0
2
4
6
8
10

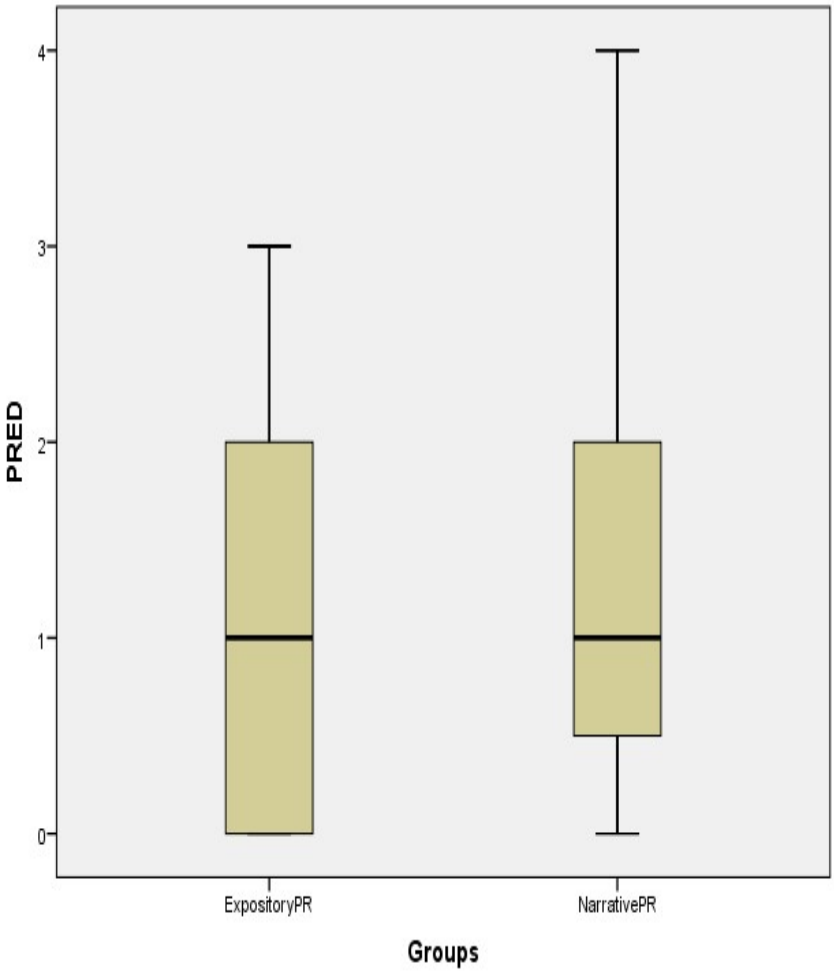

10
8
6
4
2
0
ASS
34
3520
ExpositoryPR
NarrativePR
Groups

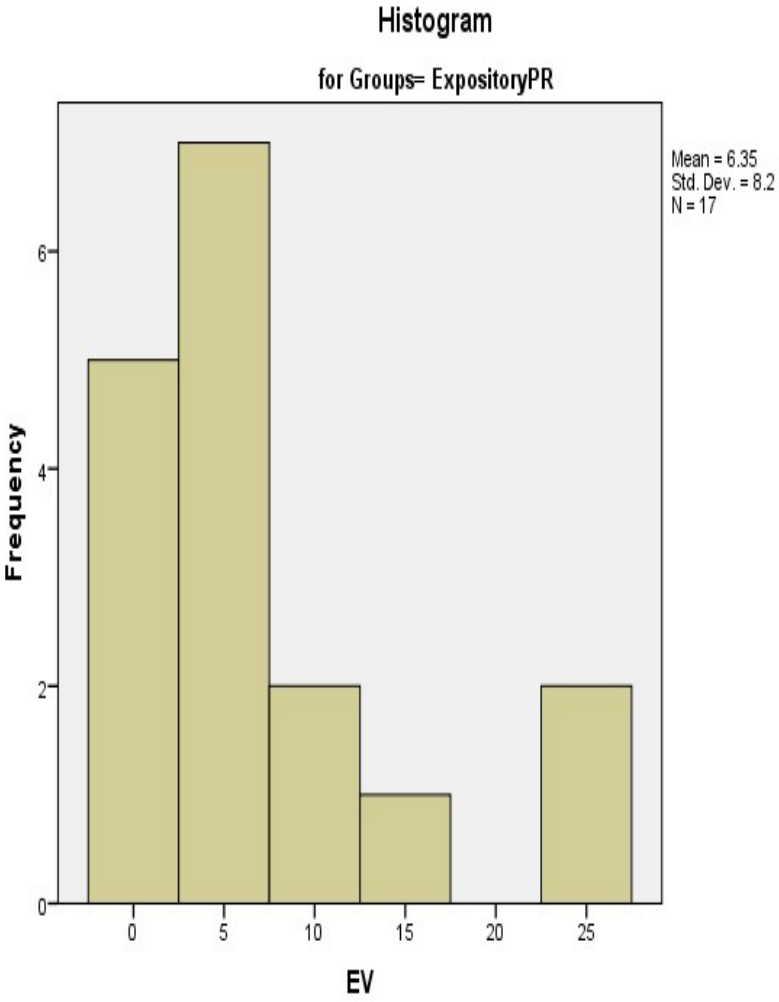

Histogram
for Groups= ExpositoryPR
Mean = 1.12
Std. Dev. = .993
N = 17
Frequency
PRED
0
1
2
3
0
1
2
3
4
5
6

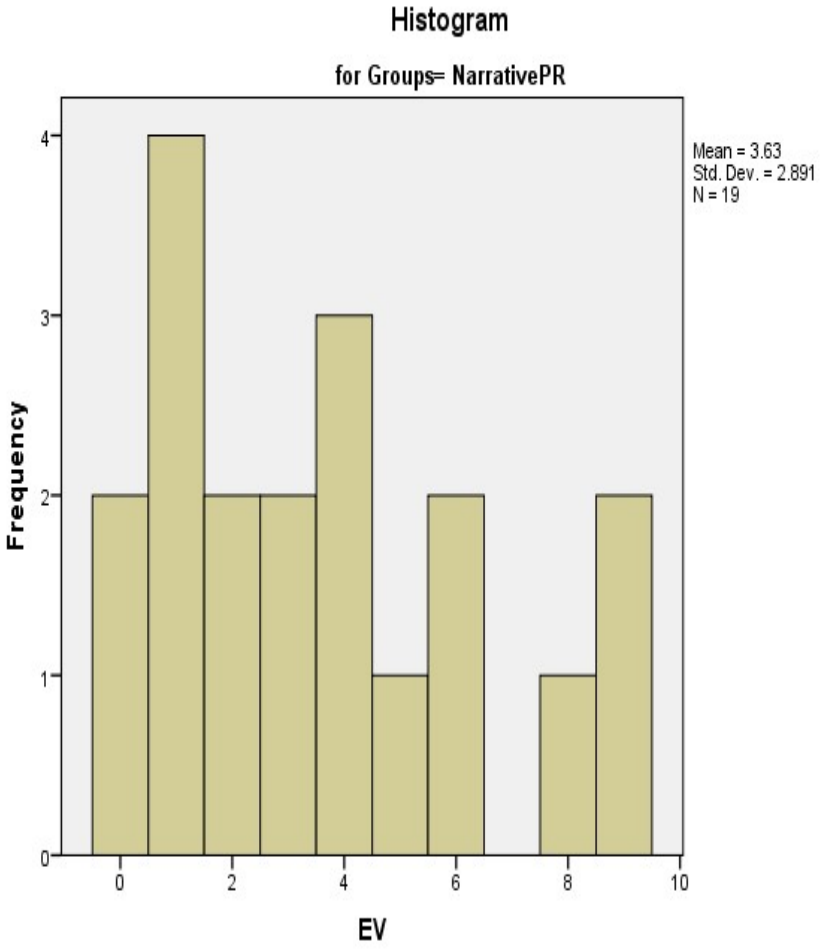

Histogram
for Groups= NarrativePR
Mean = 1.42
Std. Dev. = 1.216
N = 19
Frequency
0
1
2
3
4
5
6
0
1
2
3
4
PRED

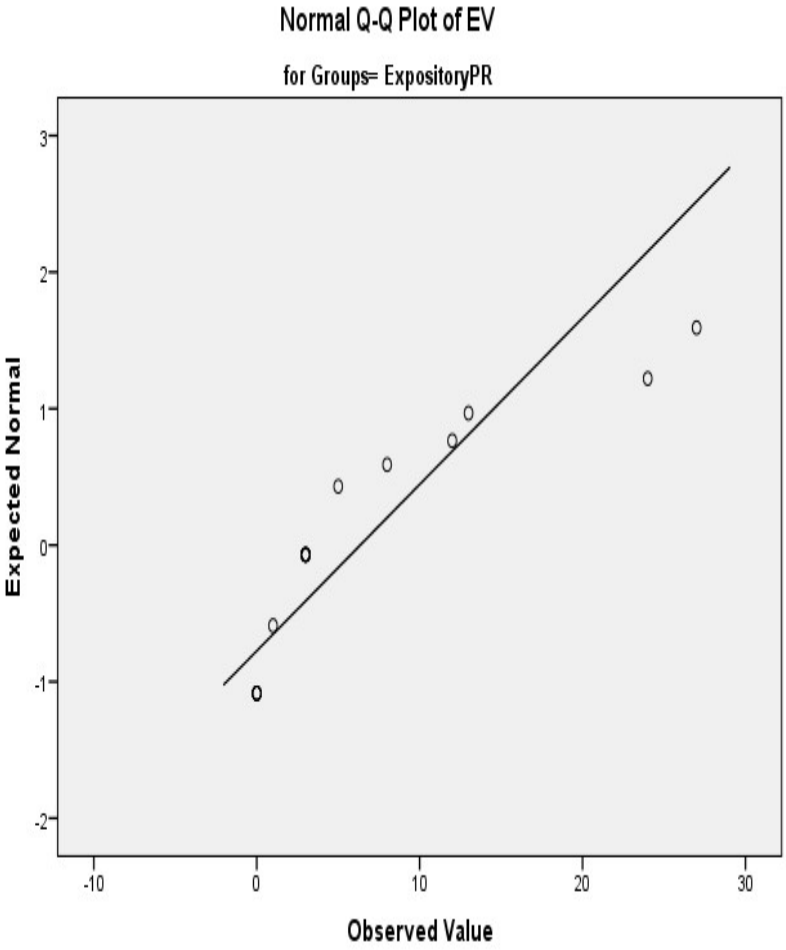

Normal Q-Q Plot of PRED
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
1
2
3

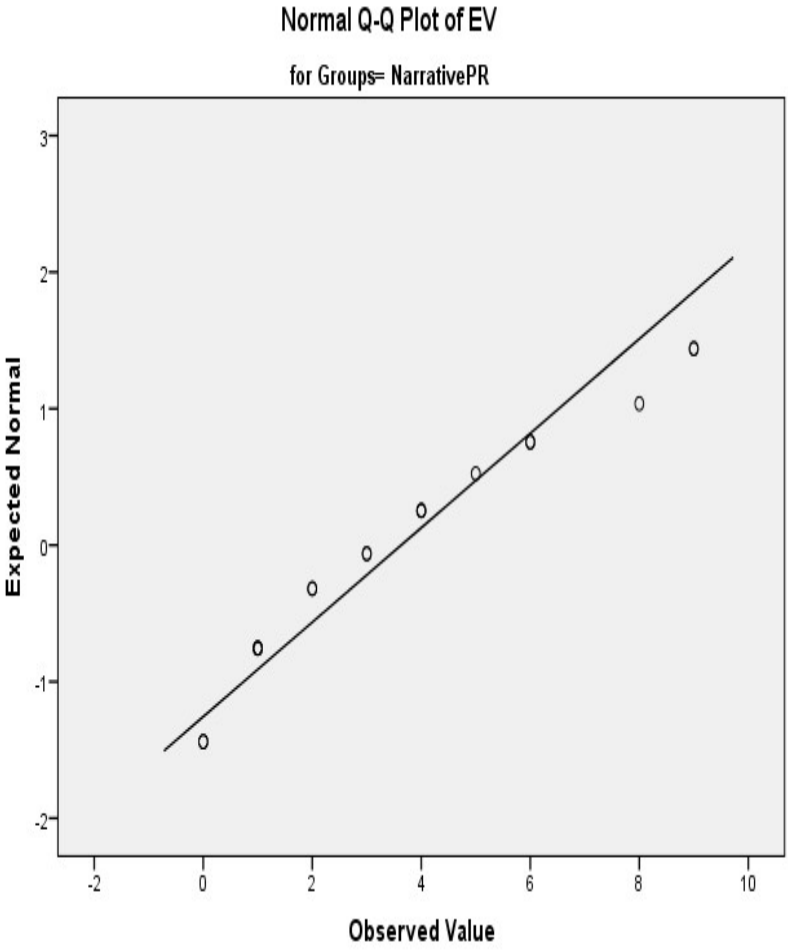

Normal Q-Q Plot of PRED
for Groups= NarrativePR
Expected Normal
Observed Value
3
2
1
0
-1
-2
-1
0
1
2
3
4
5

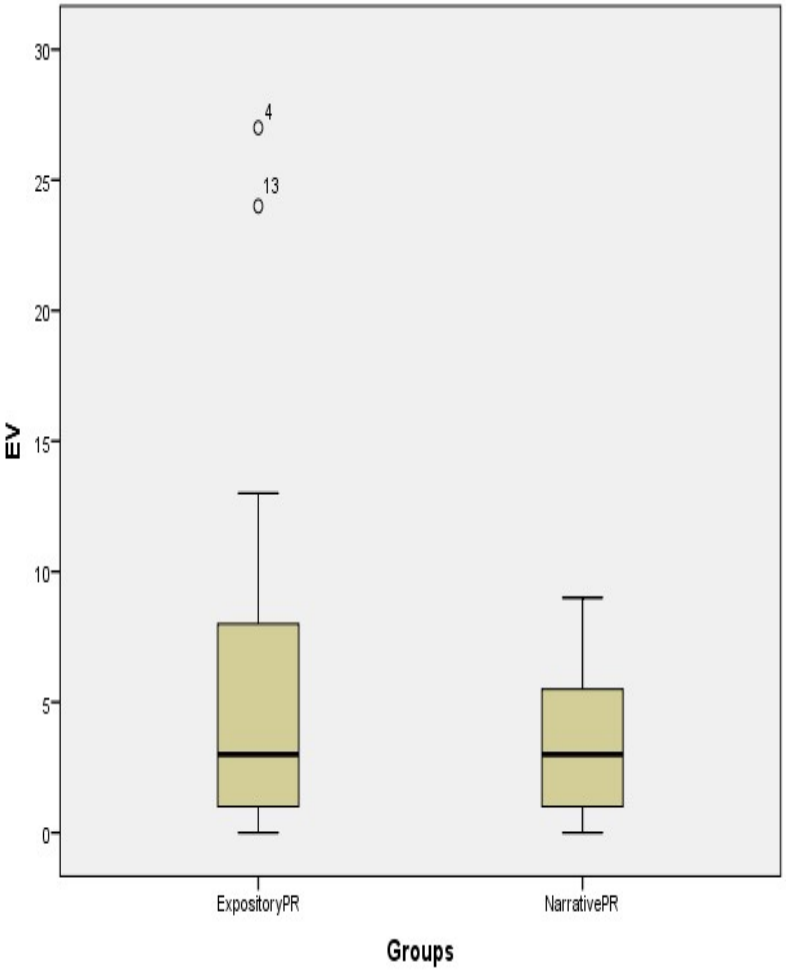

PRED
4
3
2
1
0
ExpositoryPR
NarrativePR
Groups

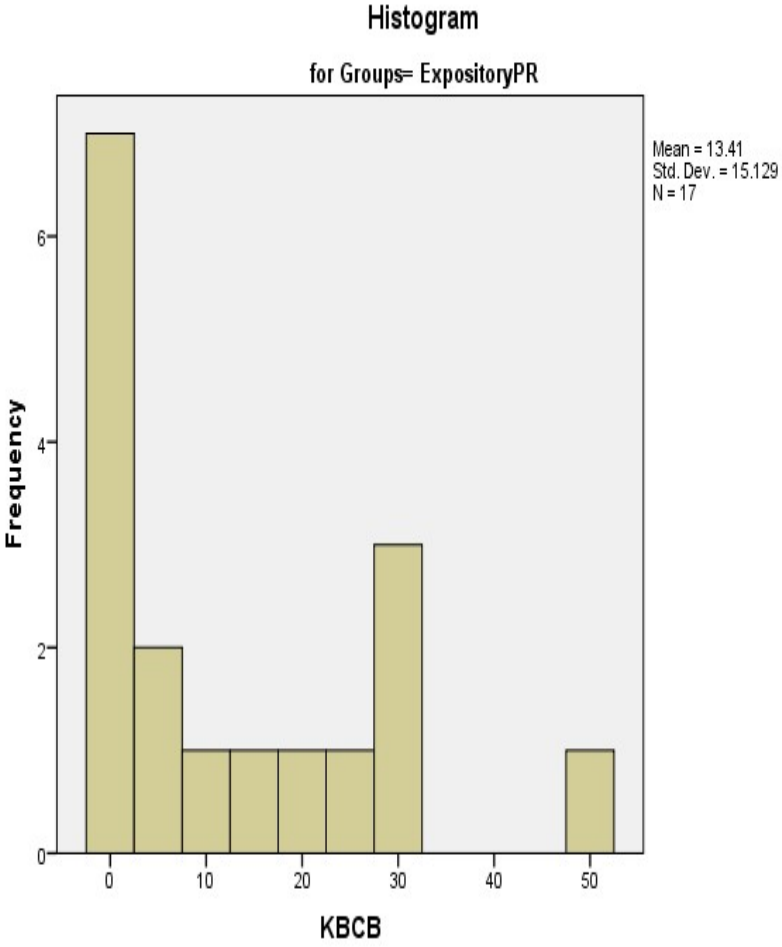

Histogram
for Groups= ExpositoryPR
Mean = 6.35
Std. Dev. = 8.2
N = 17
Frequency
0
2
4
6
0
5
10
15
20
25
EV

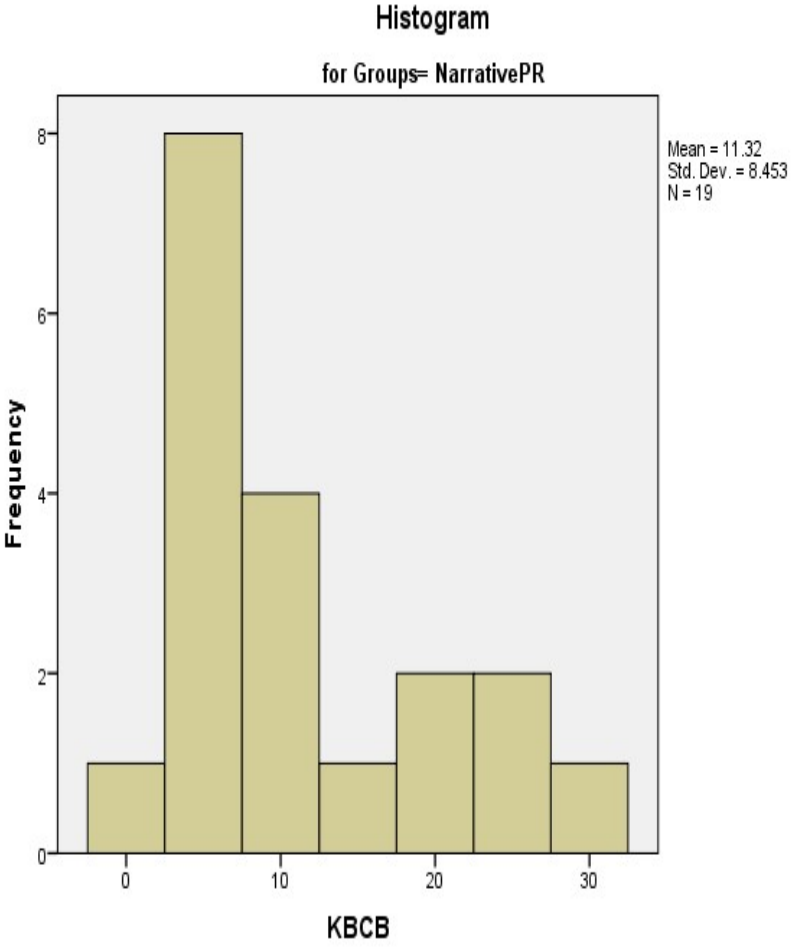

Histogram
for Groups= NarrativePR
Mean = 3.63
Std. Dev. = 2.891
N = 19
Frequency
EV
0
1
2
3
4
0
2
4
6
8
10

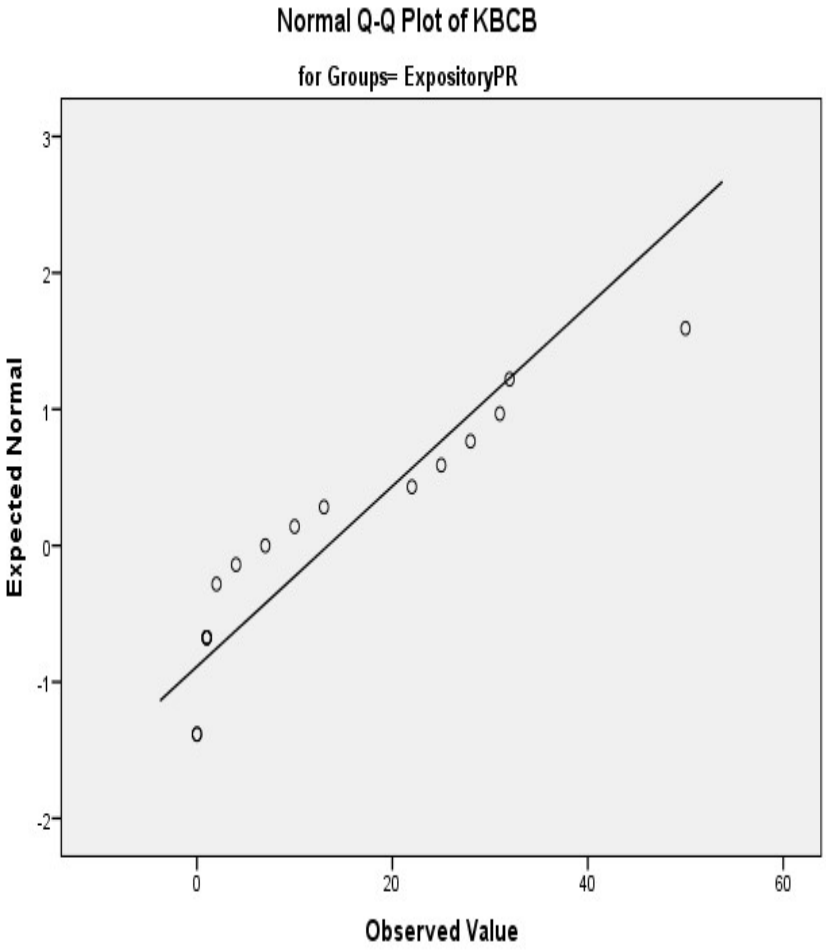

Normal Q-Q Plot of EV
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
-10
0
10
20
30

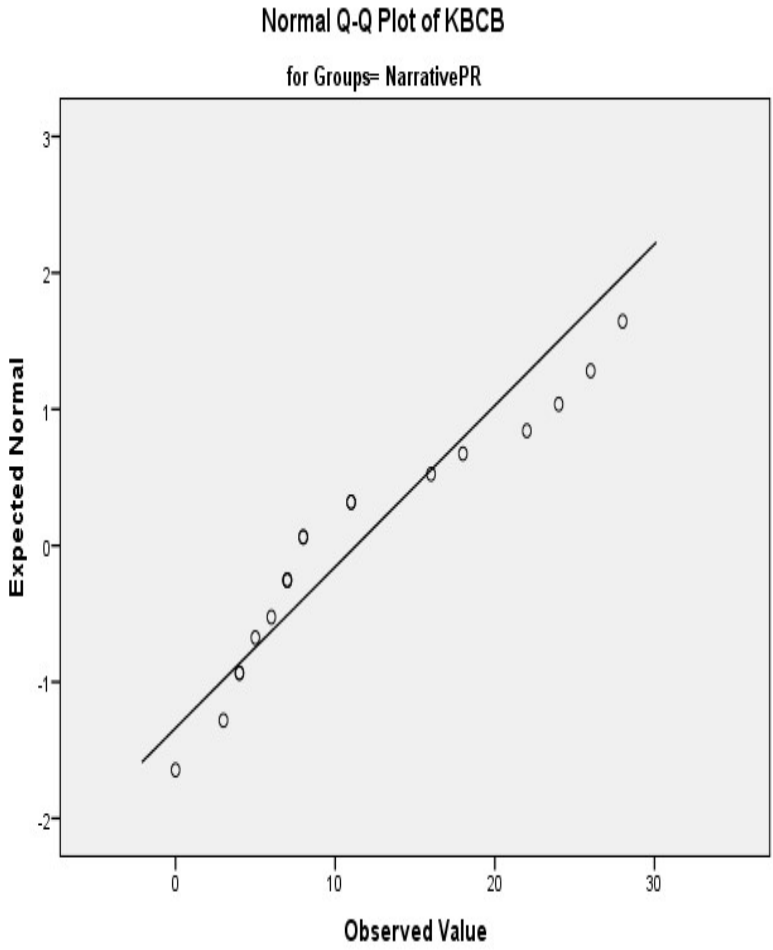

Normal Q-Q Plot of EV
for Groups= NarrativePR
Expected Normal
Observed Value
3
2
1
0
-1
-2
-2
0
2
4
6
8
10

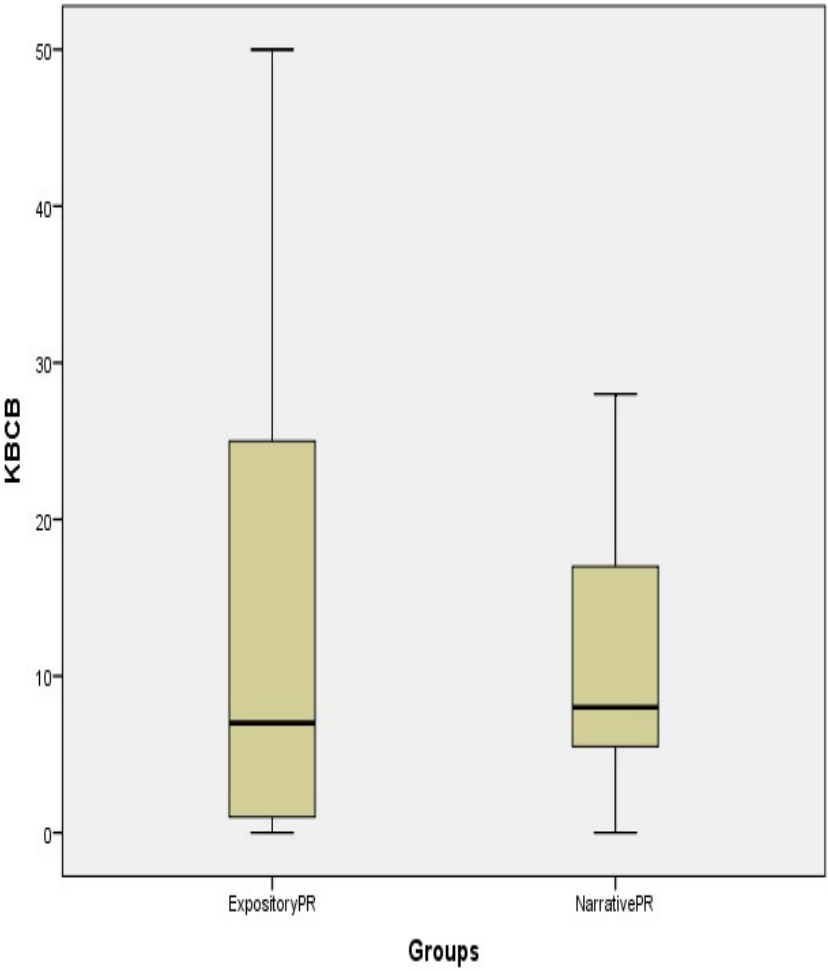

30
25
20
15
10
5
0
EV
4
13
ExpositoryPR
NarrativePR
Groups

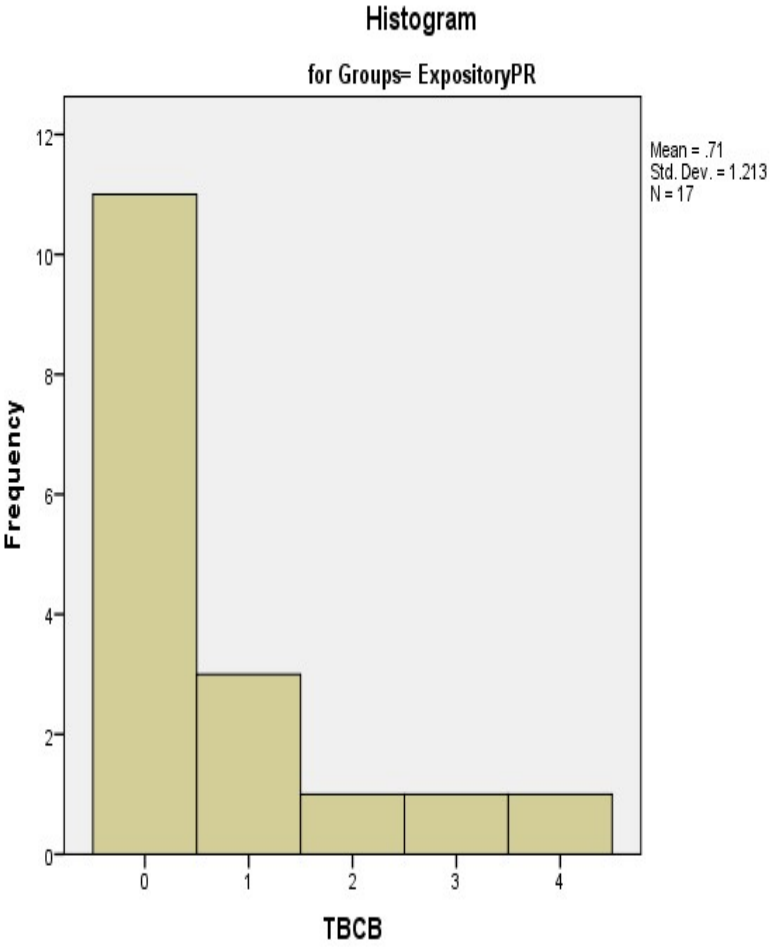

Histogram
for Groups= ExpositoryPR
Mean = 13.41
Std. Dev. = 15.129
N = 17
Frequency
0
2
4
6
0
10
20
30
40
50
KBCB

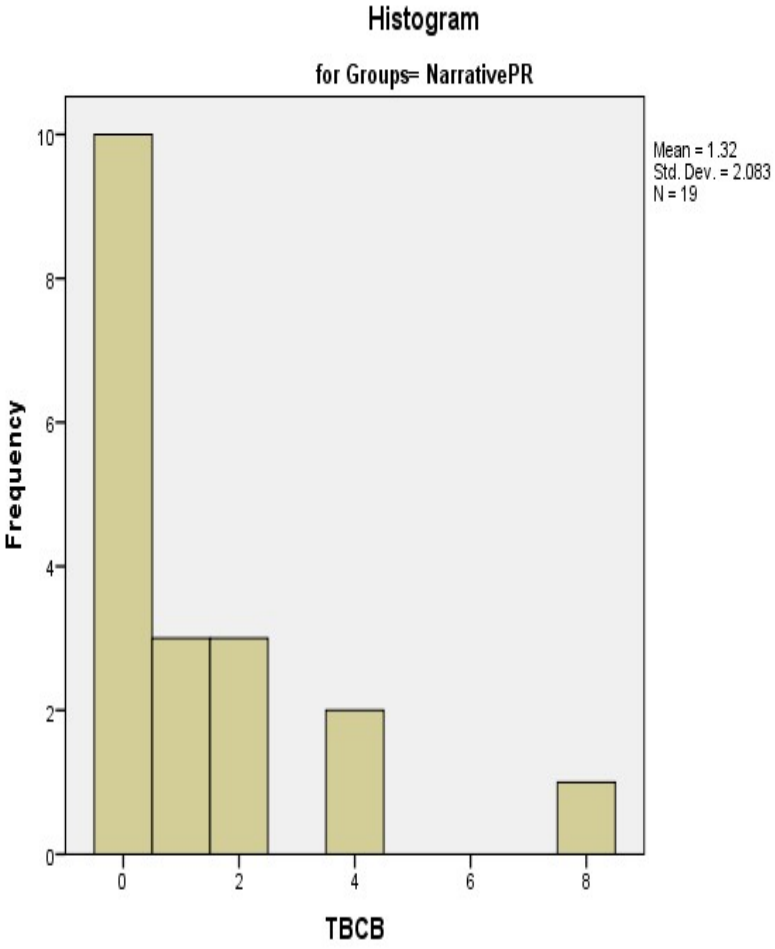

Histogram
for Groups= NarrativePR
Mean = 11.32
Std. Dev. = 8.453
N = 19
Frequency
0
2
4
6
8
0
10
20
30
KBCB

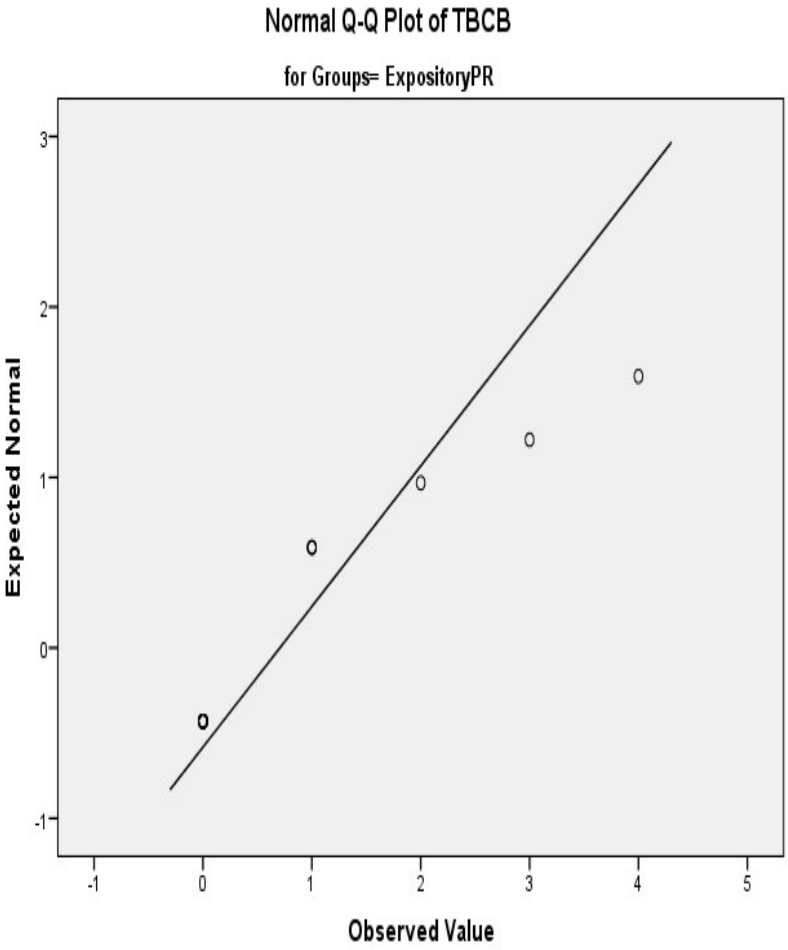

Normal Q-Q Plot of KBCB
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
20
40
60

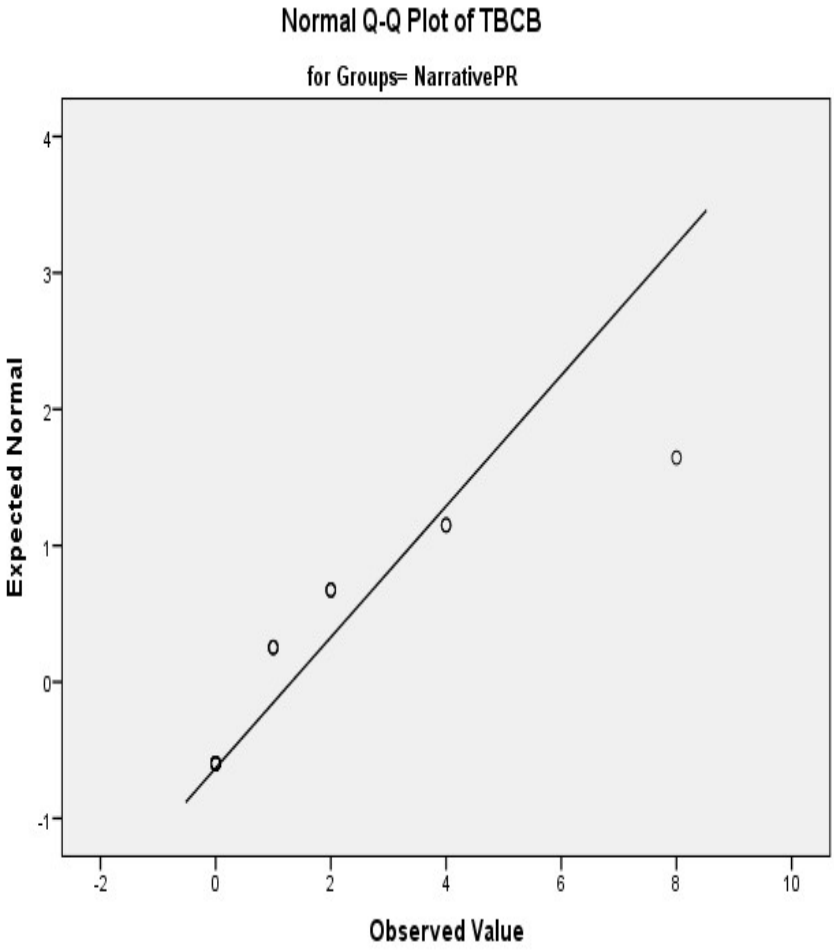

Normal Q-Q Plot of KBCB
for Groups= NarrativePR
Expected Normal
3
2
1
0
-1
-2
0
10
20
30
Observed Value

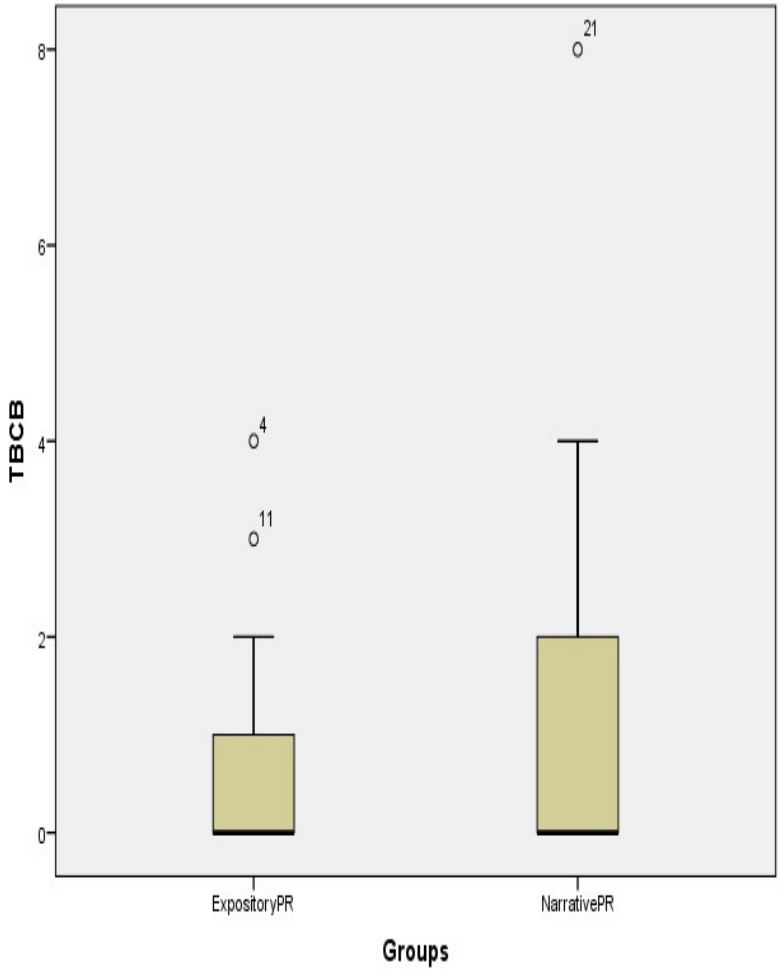

50
40
30
20
10
0
KBCB
ExpositoryPR
NarrativePR
Groups

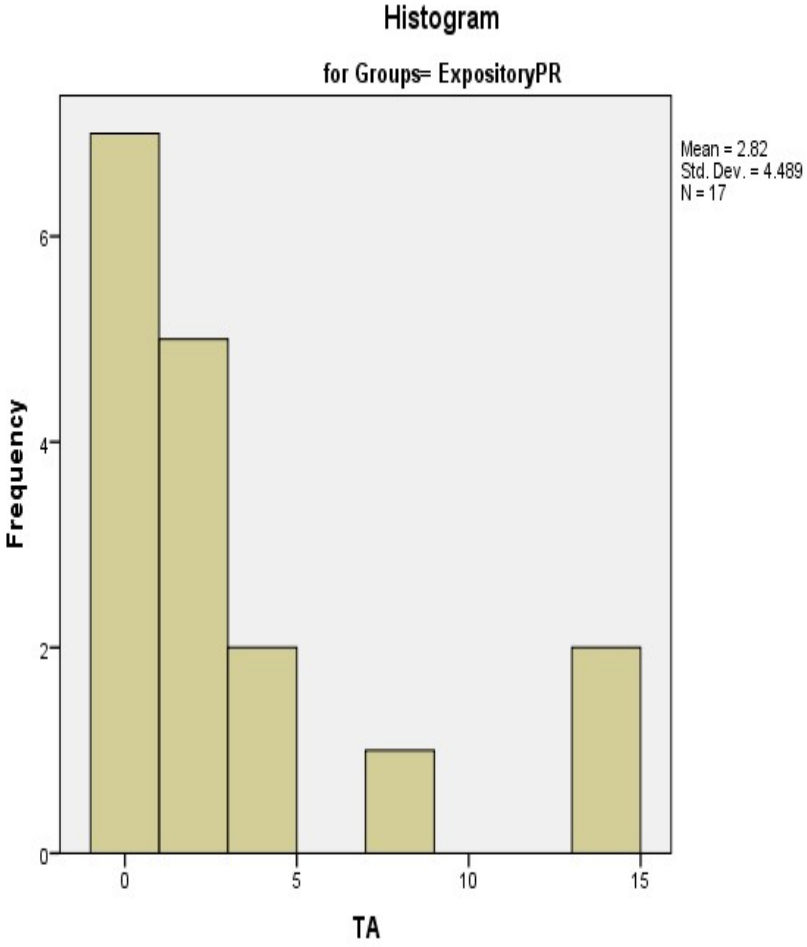

Histogram
for Groups= ExpositoryPR
Mean = .71
Std. Dev. = 1.213
N = 17
Frequency
TBCB
0
1
2
3
4
0
2
4
6
8
10
12

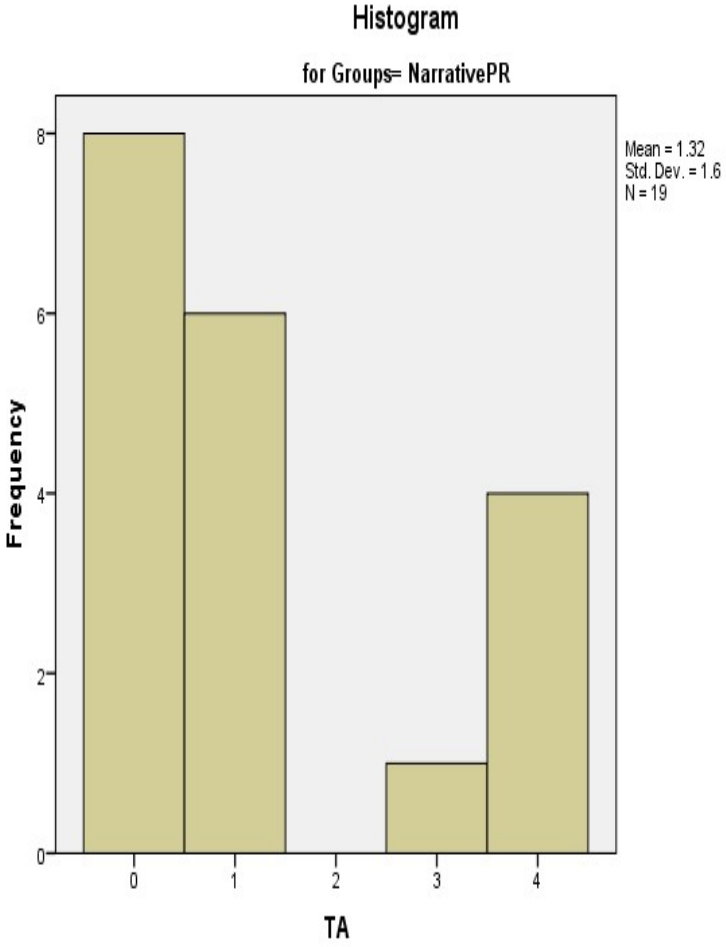

Histogram
for Groups= NarrativePR
Mean = 1.32
Std. Dev. = 2.083
N = 19
Frequency
TBCB
0
2
4
6
8
10

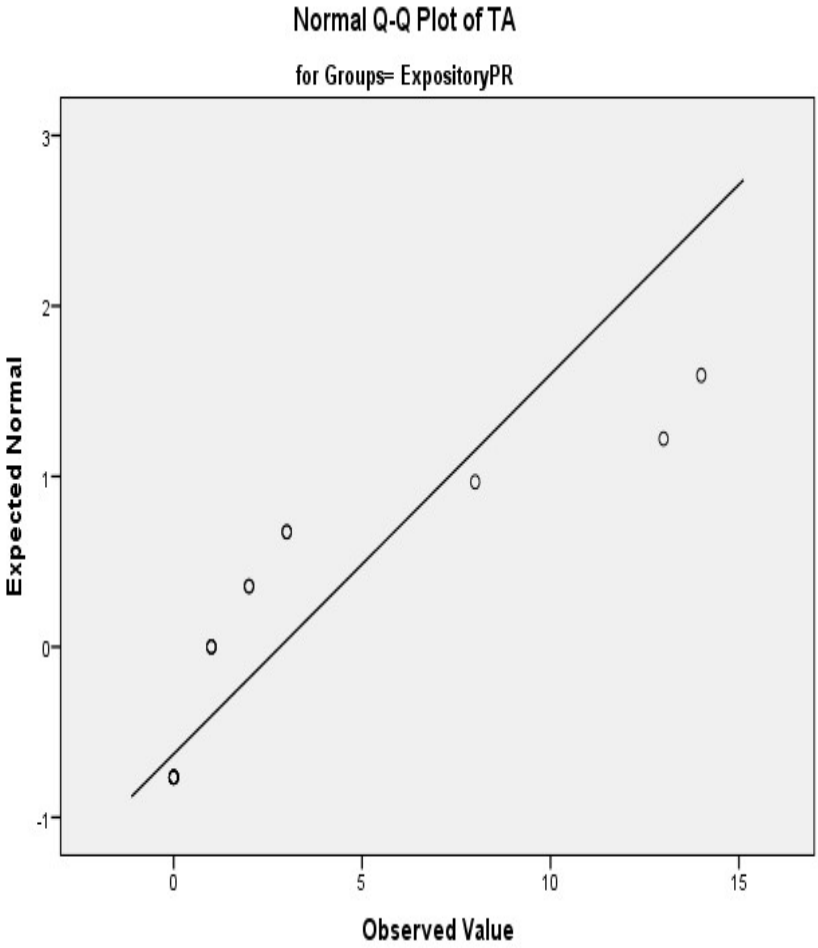

Normal Q-Q Plot of TBCB
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-1
0
1
2
3
4
5

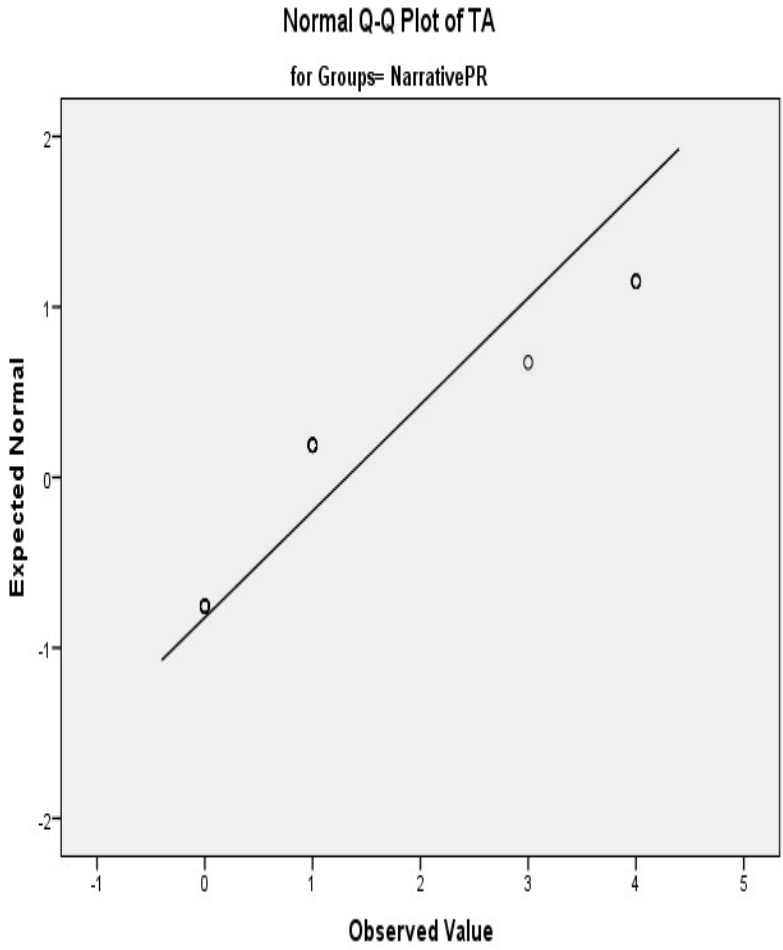

Normal Q-Q Plot of TBCB
for Groups= NarrativePR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
0
2
4
6
8
10

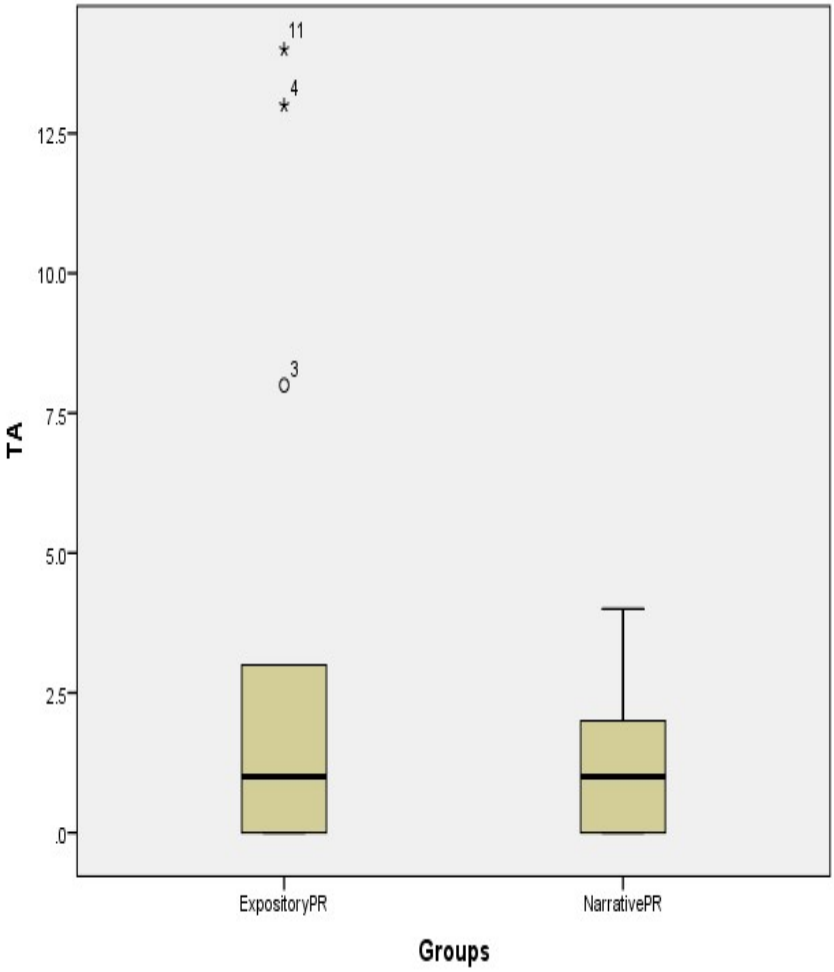

TBCB
8
6
4
2
0
21
4
11
ExpositoryPR
NarrativePR
Groups

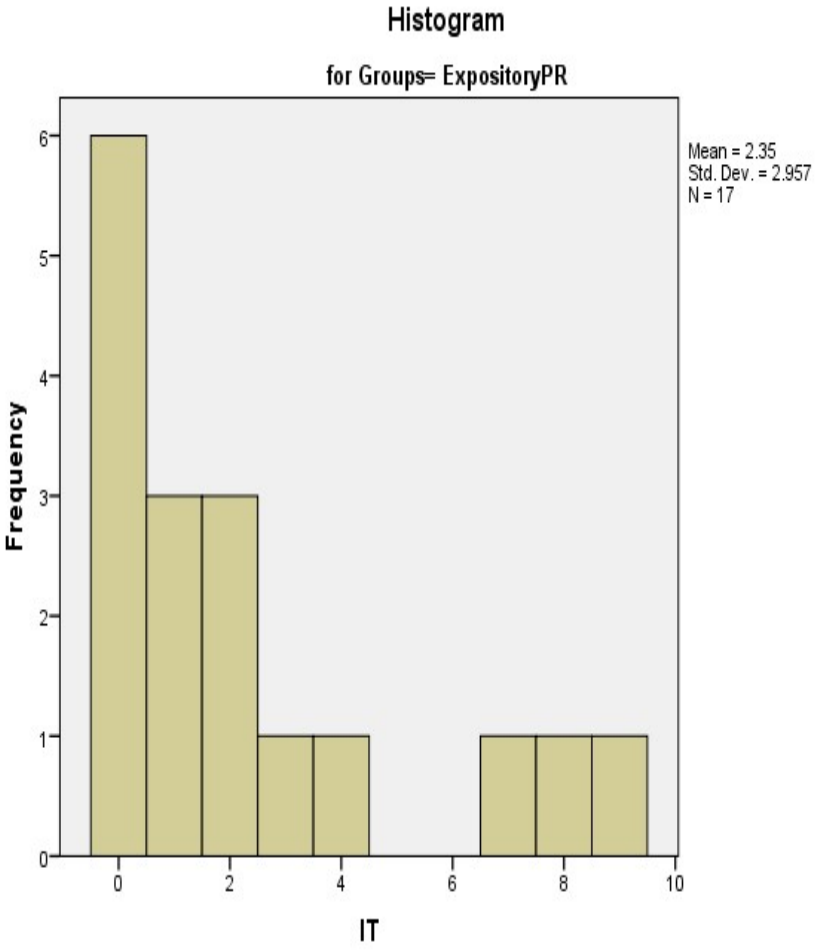

Histogram
for Groups= ExpositoryPR
Mean = 2.82
Std. Dev. = 4.489
N = 17
Frequency
0
2
4
6
0
5
10
15
TA

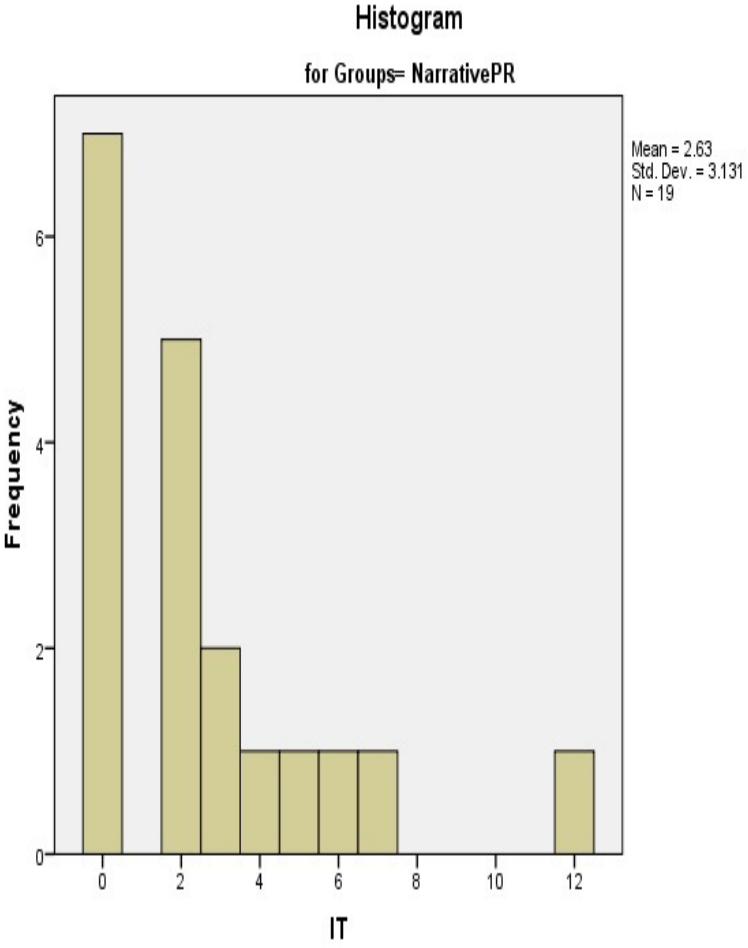

Histogram
for Groups= NarrativePR
Mean = 1.32
Std. Dev. = 1.6
N = 19
Frequency
8
6
4
2
0
0
1
2
3
4
TA

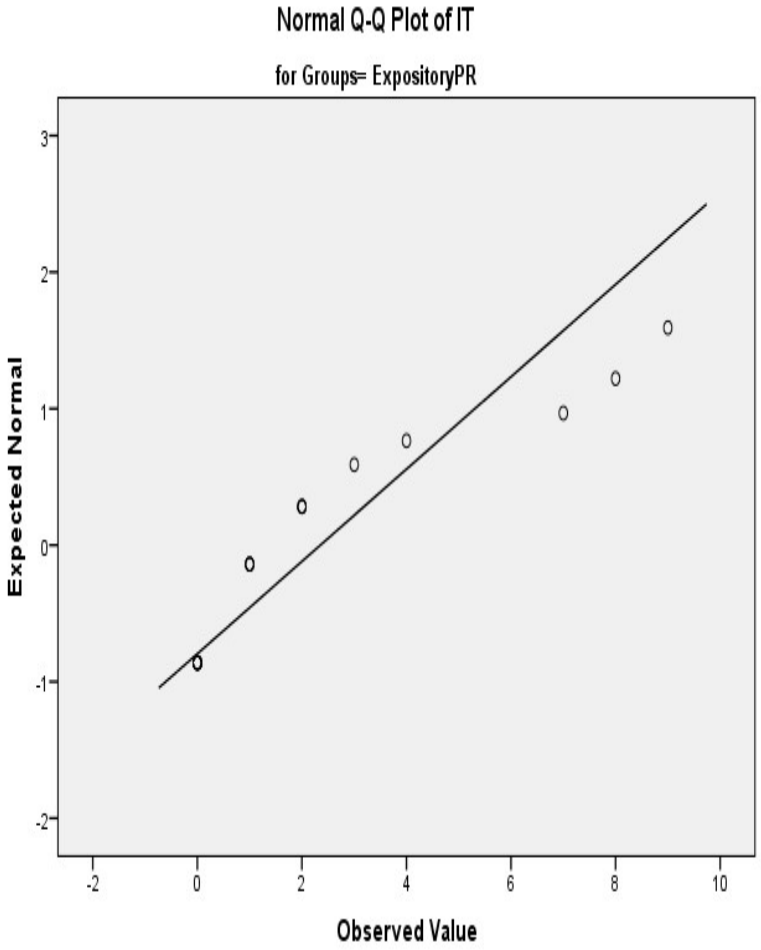

Normal Q-Q Plot of TA
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
0
5
10
15

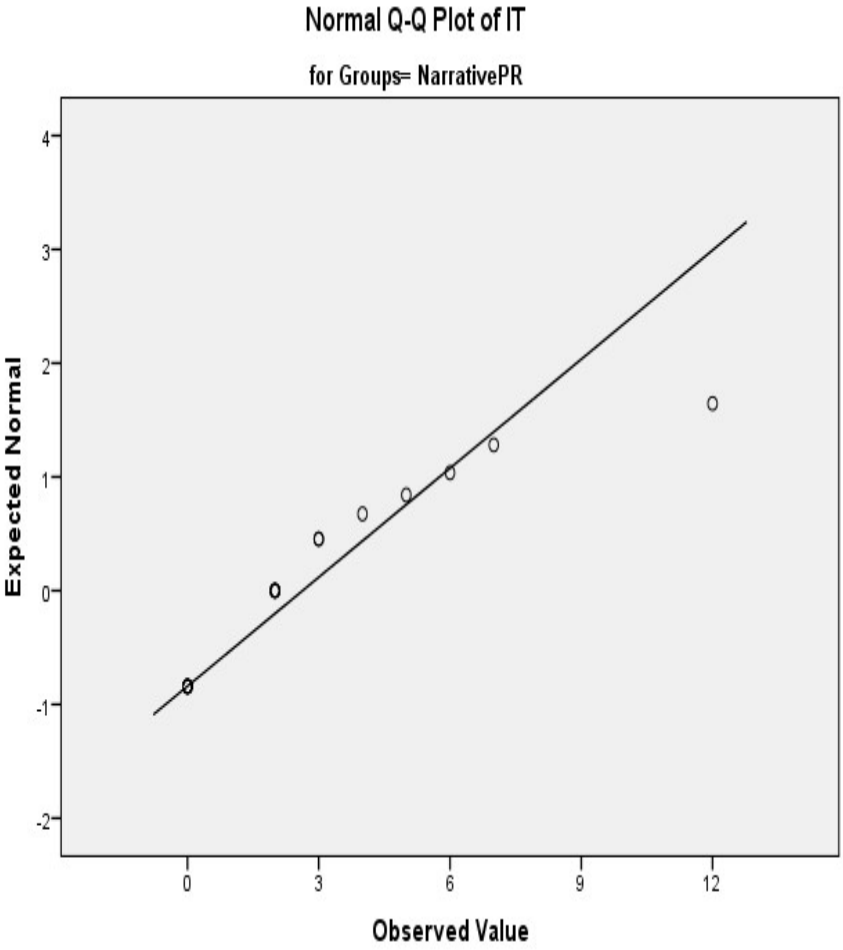

Normal Q-Q Plot of TA
for Groups= NarrativePR
Expected Normal
Observed Value
2
1
0
-1
-2
-1
0
1
2
3
4
5

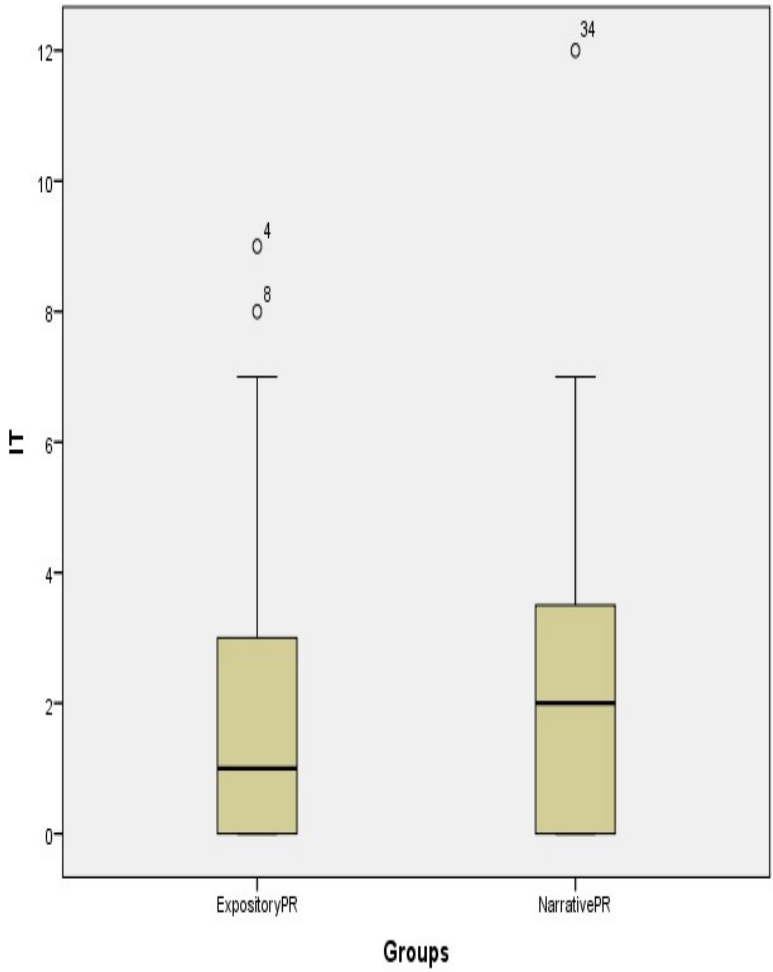

11
4
3
12.5
10.0
7.5
5.0
2.5
.0
TA
ExpositoryPR
NarrativePR
Groups

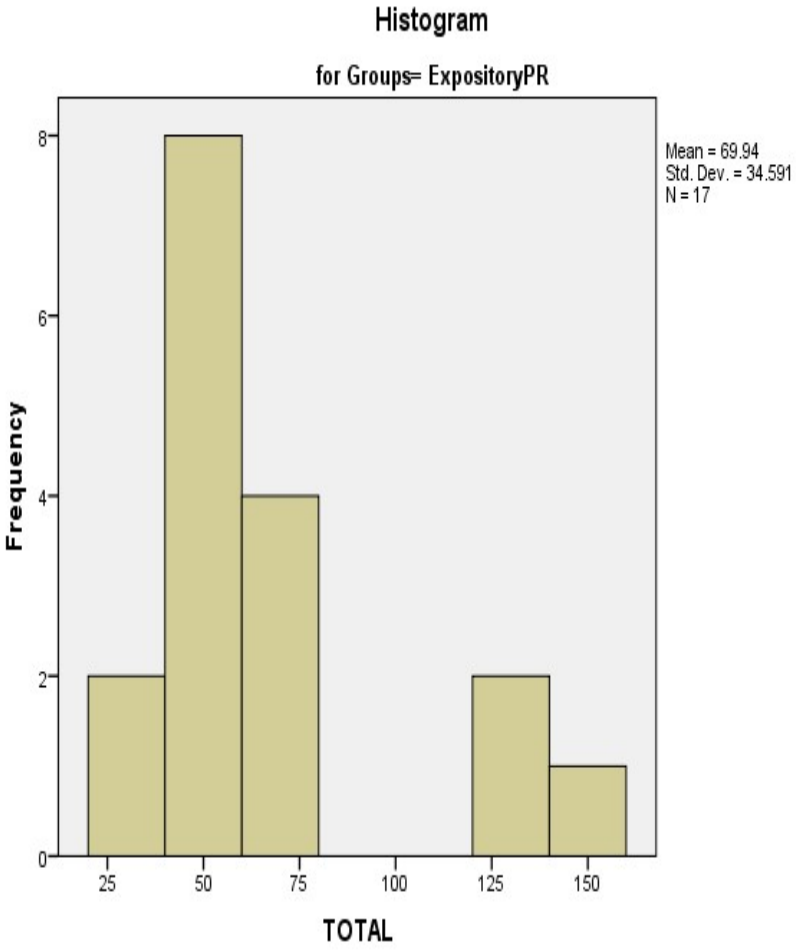

Histogram
for Groups= ExpositoryPR
Mean = 2.35
Std. Dev. = 2.957
N = 17
Frequency
IT
0
1
2
3
4
5
6
0
2
4
6
8
10

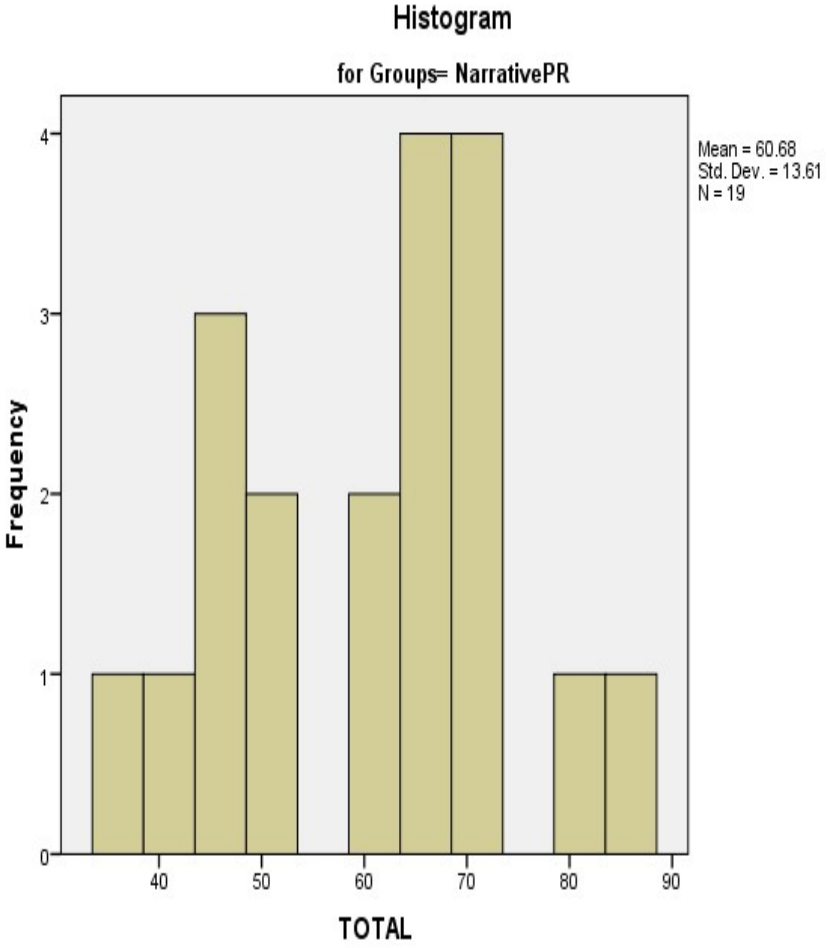

Histogram
for Groups= NarrativePR
Mean = 2.63
Std. Dev. = 3.131
N = 19
Frequency
0
2
4
6
0
2
4
6
8
10
12
IT

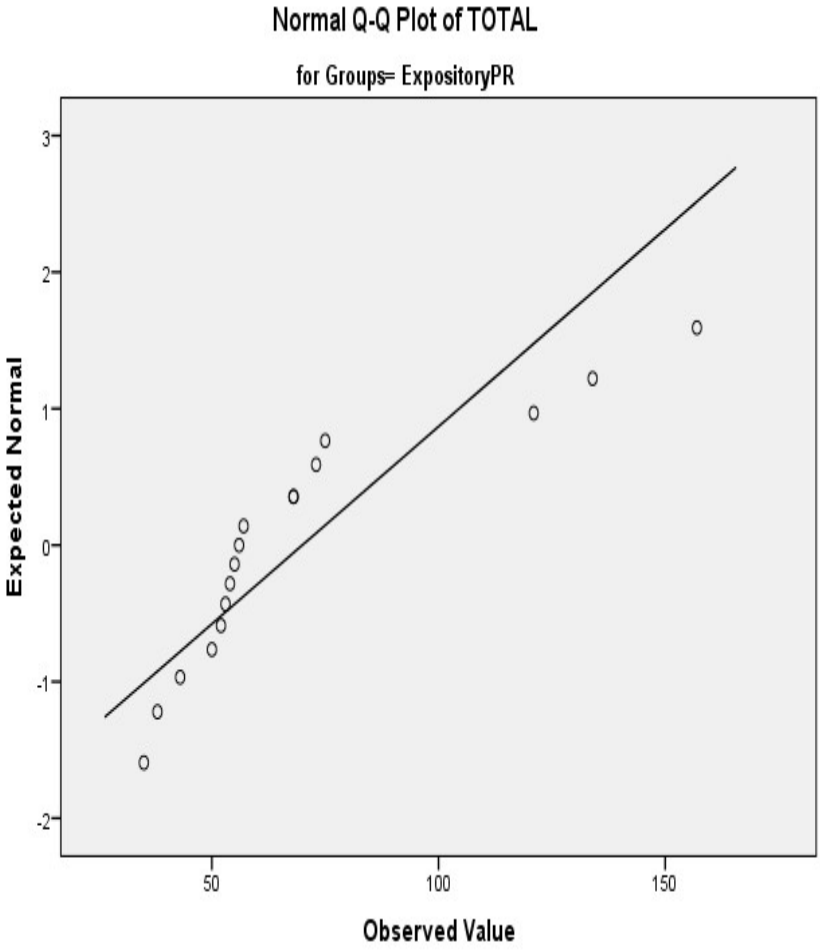

Normal Q-Q Plot of IT
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
-2
0
2
4
6
8
10

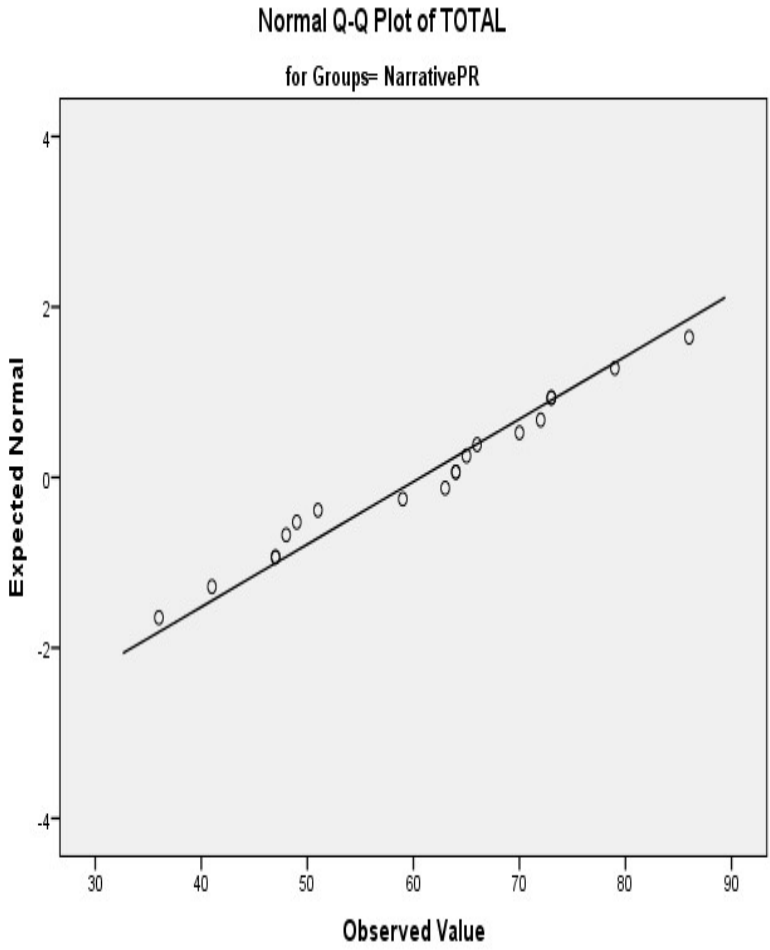

Normal Q-Q Plot of IT
for Groups= NarrativePR
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
0
3
6
9
12

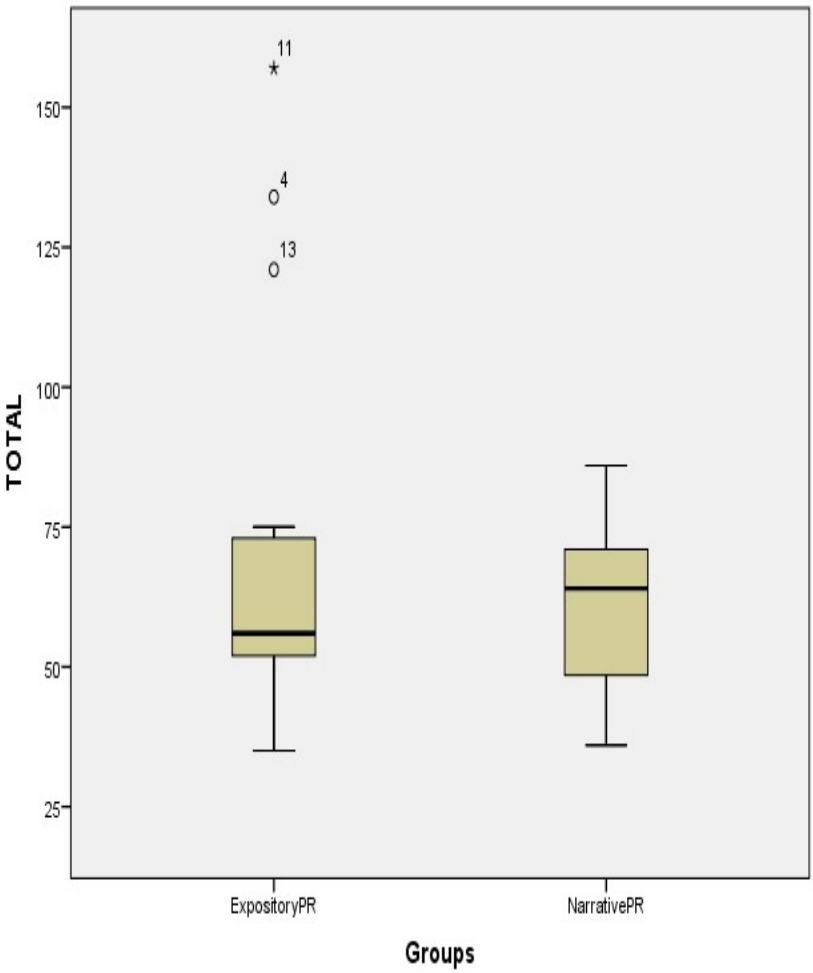

34
4
8
12
10
8
6
4
2
0
IT
ExpositoryPR
NarrativePR
Groups


Histogram
for Groups= ExpositoryPR
Mean = 69.94
Std. Dev. = 34.591
N = 17
Frequency
0
2
4
6
8
25
50
75
100
125
150
TOTAL

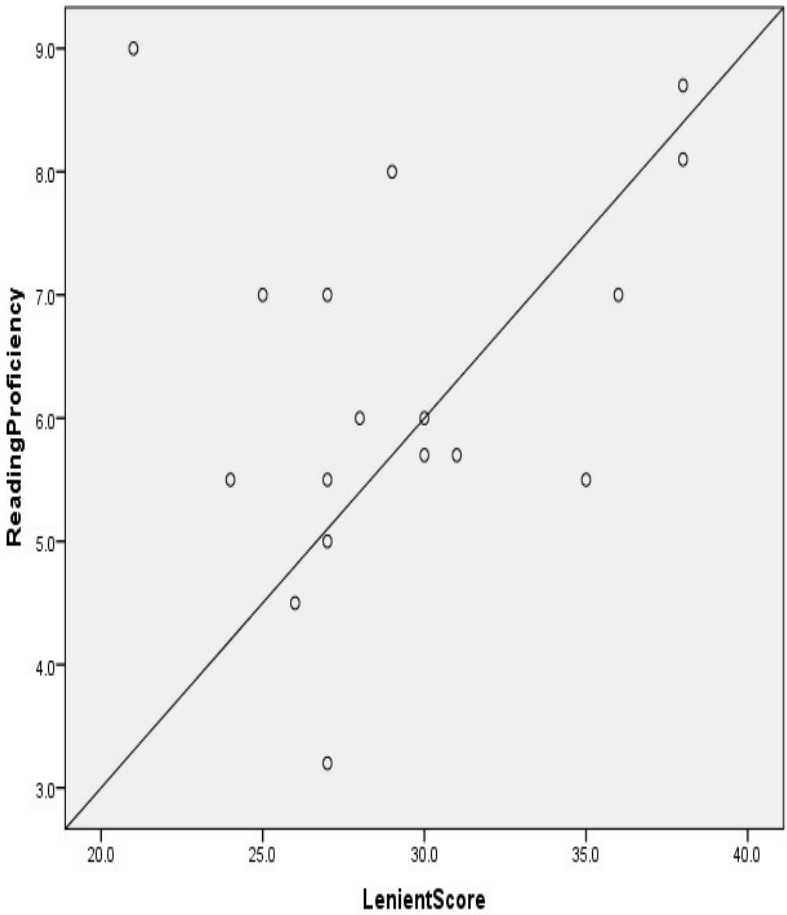

Histogram
for Groups= NarrativePR
Mean = 60.68
Std. Dev. = 13.61
N = 19
Frequency
0
1
2
3
4
40
50
60
70
80
90
TOTAL


Normal Q-Q Plot of TOTAL
for Groups= ExpositoryPR
Expected Normal
Observed Value
3
2
1
0
-1
-2
50
100
150

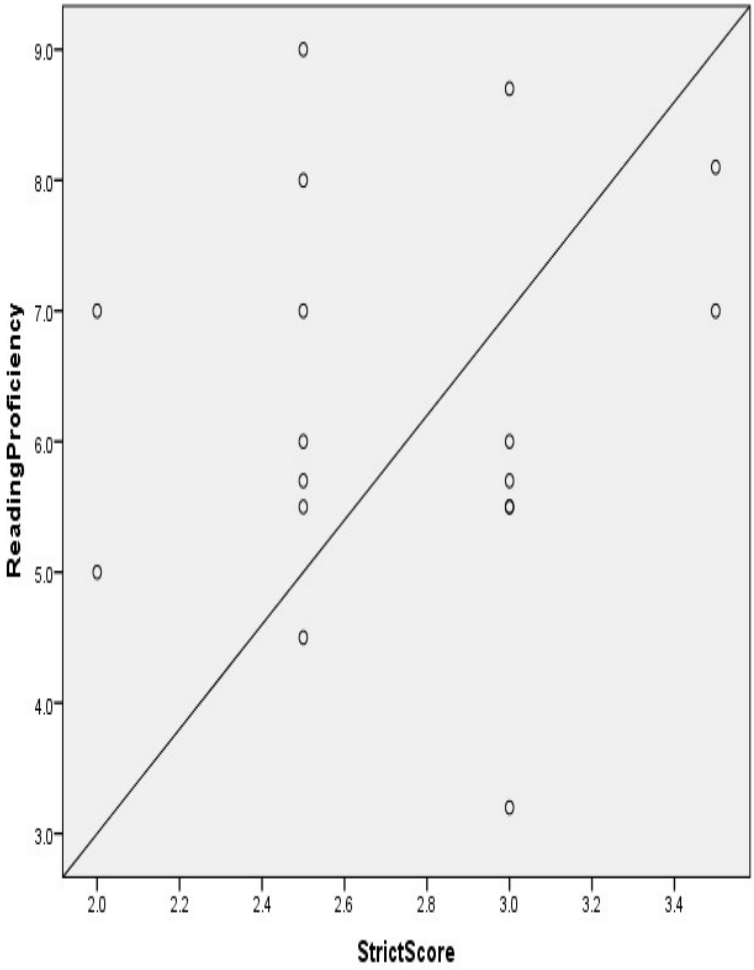

Normal Q-Q Plot of TOTAL
for Groups= NarrativePR
Expected Normal
Observed Value
4
2
0
-2
-4
30
40
50
60
70
80
90


11
4
13
150
125
100
75
50
25
TOTAL
ExpositoryPR
NarrativePR
Groups

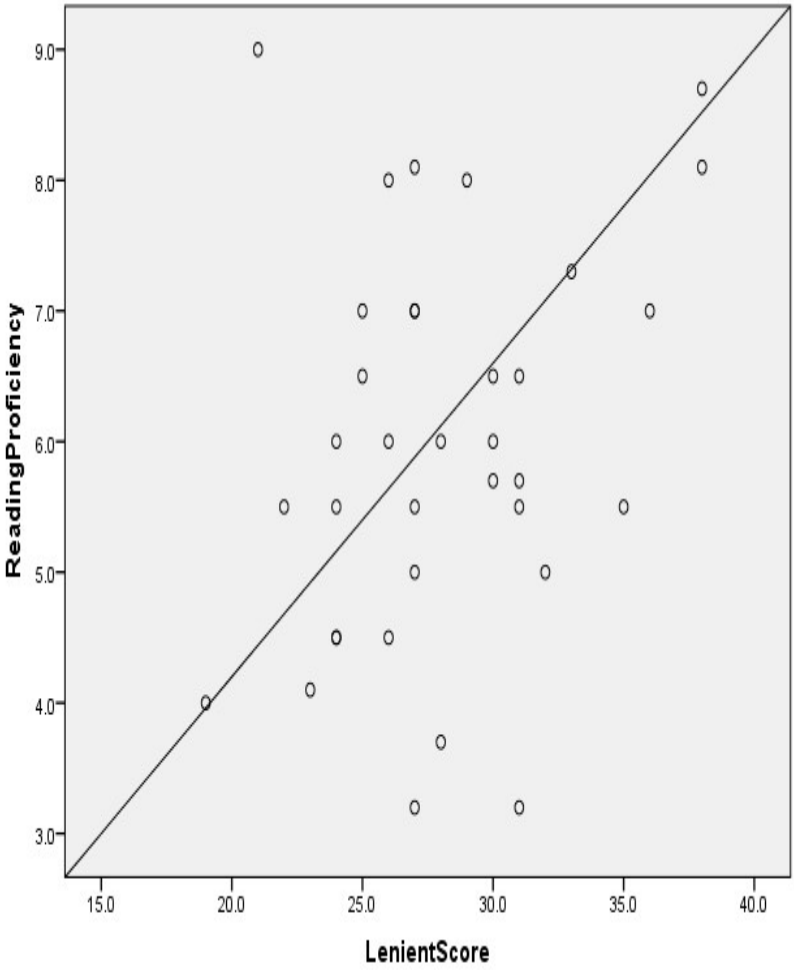
APPENDIX S1 - Scatterplots of the Correlations Between the Reading Proficiency Test and the Reading Span Test (Lenient Scoring) for the ExpositoryPR Group (With Outlier)



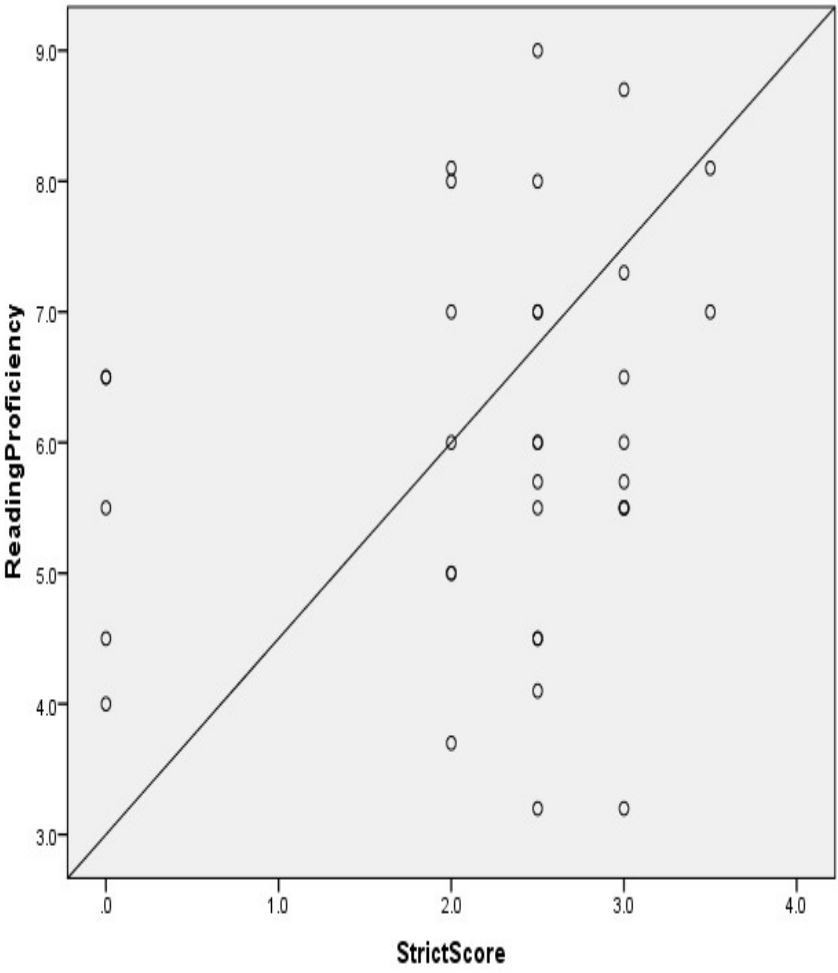
APPENDIX S2 - Scatterplots of the Correlations Between the Reading Proficiency Test and the Reading Span Test (Strict Scoring) for the ExpositoryPR Group (With Outlier)



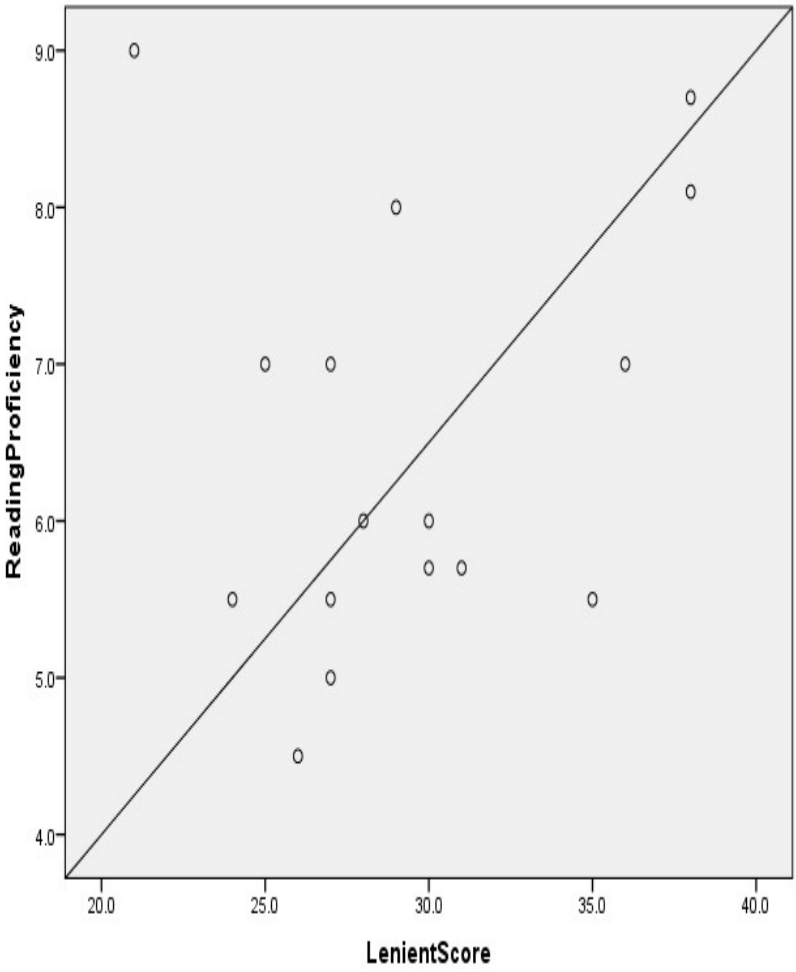
APPENDIX S3 - Scatterplots of the Correlations Between the Reading Proficiency Test and the Reading Span Test (Lenient Scoring) for the NarrativePR Group (With Outlier)



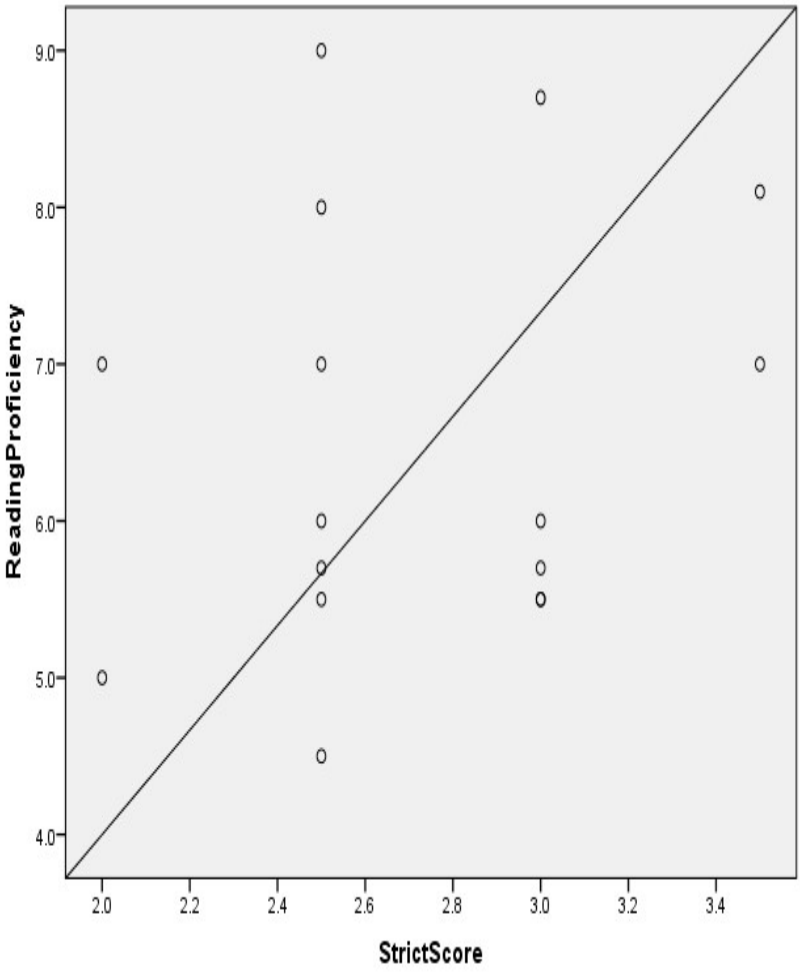
APPENDIX S4 - Scatterplots of the Correlations Between the Reading Proficiency Test and the Reading Span Test (Strict Scoring) for the NarrativePR Group (With Outlier)



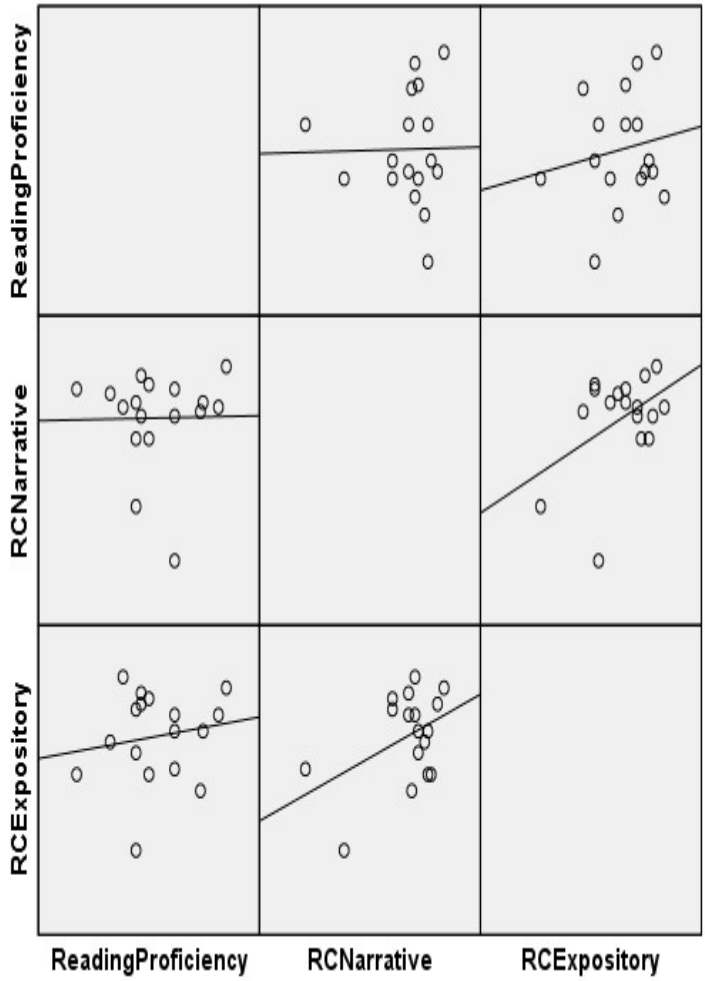
APPENDIX S5 - Scatterplots of the Correlations Between the Reading Proficiency Test and the Reading Span Test (Lenient Scoring) for the ExpositoryPR Group (Without Outlier)



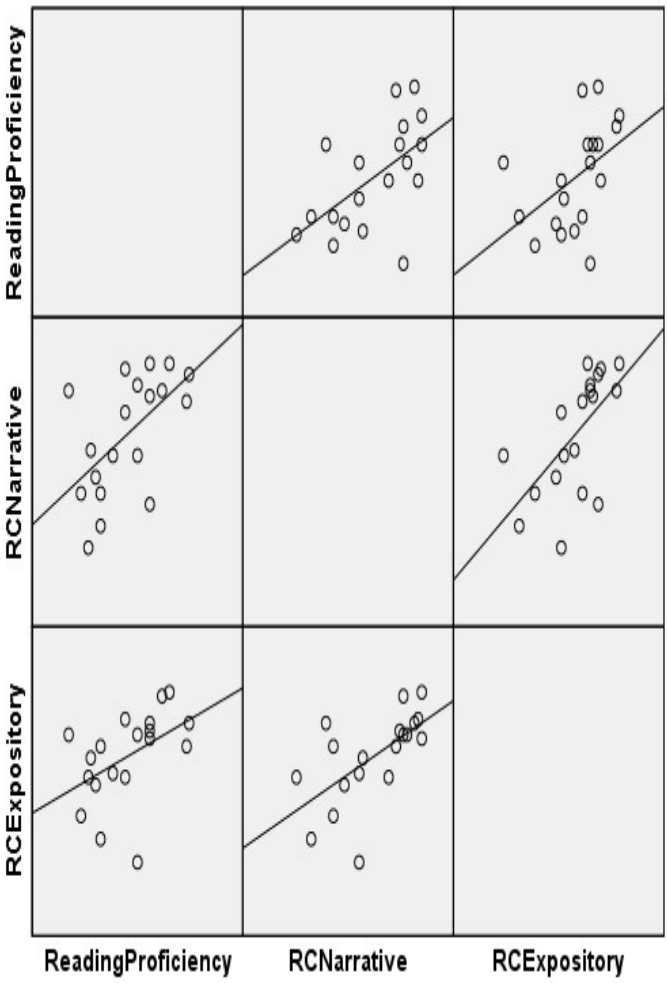
APPENDIX S6 - Scatterplots of the Correlations Between the Reading Proficiency Test and the Reading Span Test (Strict Scoring) for the ExpositoryPR Group (Without Outlier)



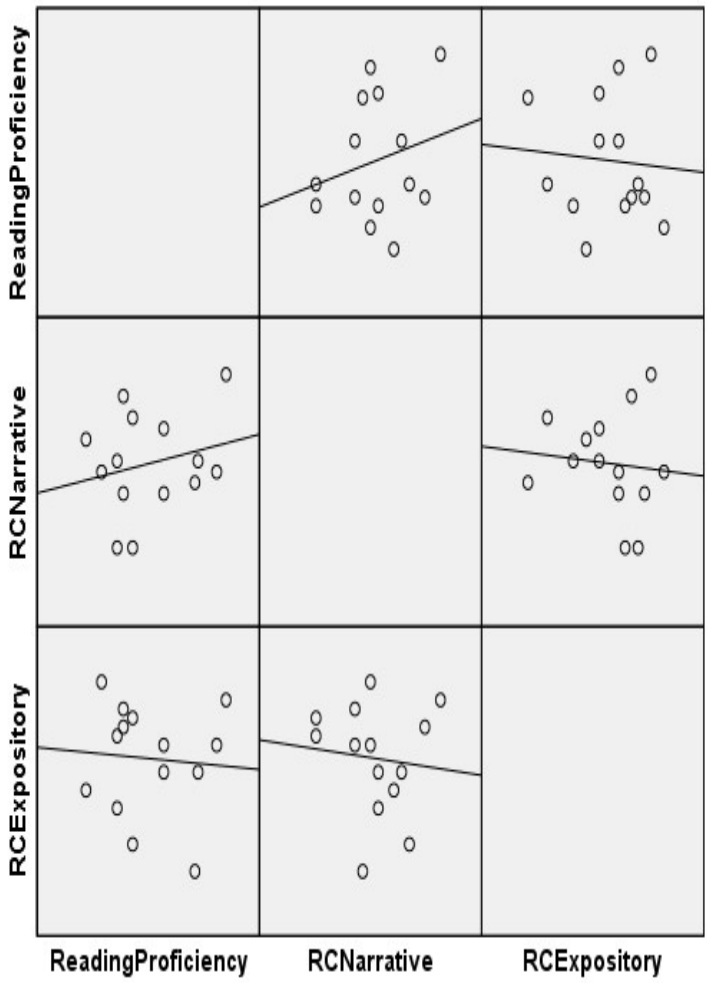
APPENDIX S7 - Scatterplots of the Correlations Between Reading Proficiency and Reading Comprehension for the ExpositoryPR Group (With Outliers)



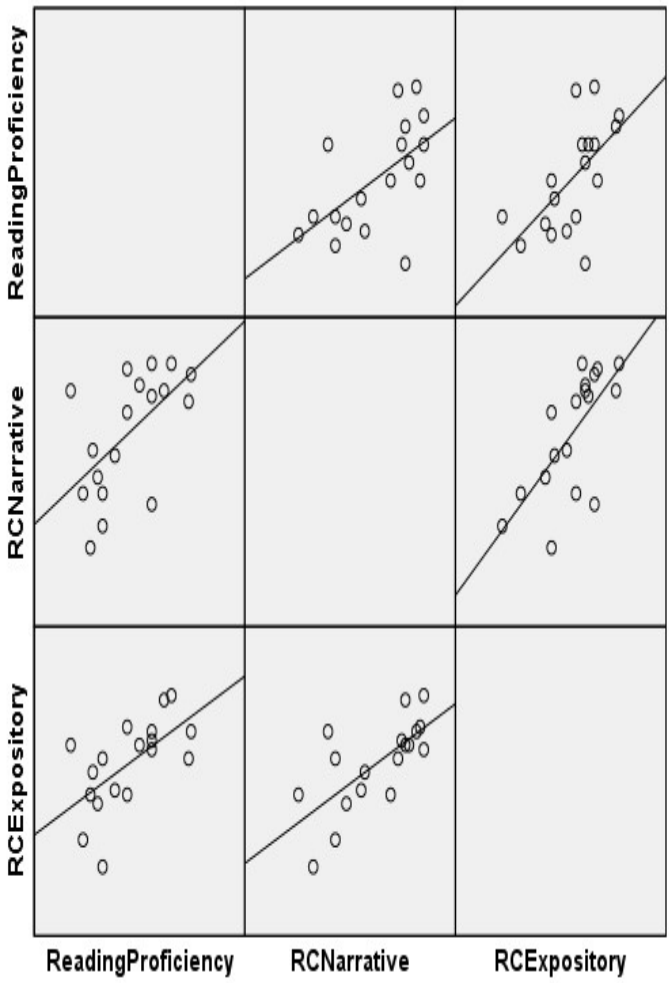
APPENDIX S8 - Scatterplots of the Correlations Between Reading Proficiency and Reading Comprehension for the NarrativePR Group (With Outliers)



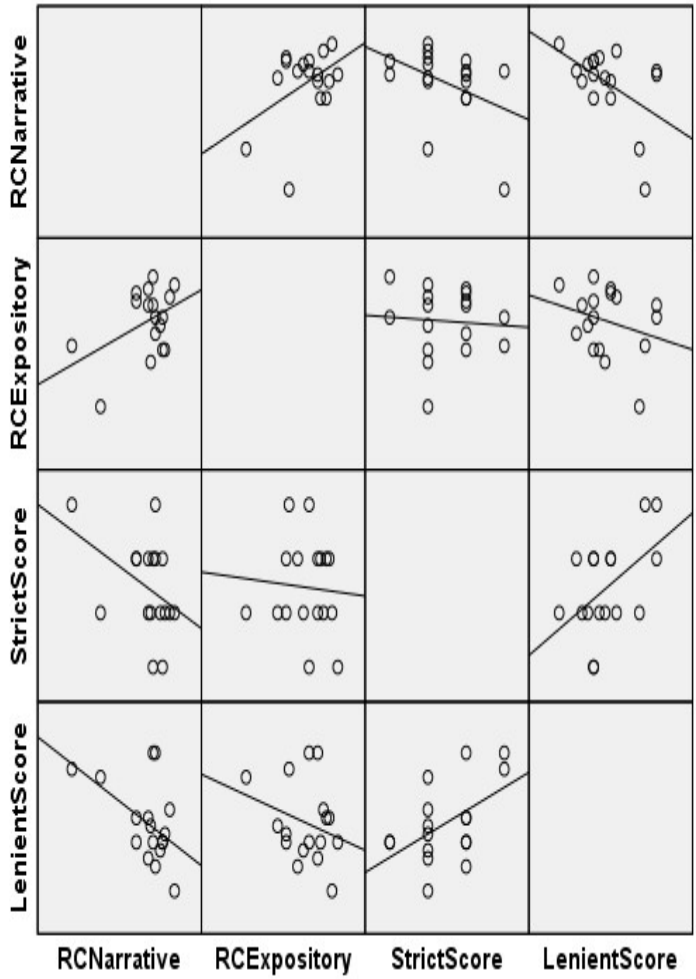
APPENDIX S9 – Scatterplots of the Correlations Between Reading Proficiency and Reading Comprehension for the ExpositoryPR Group (Without Outliers)



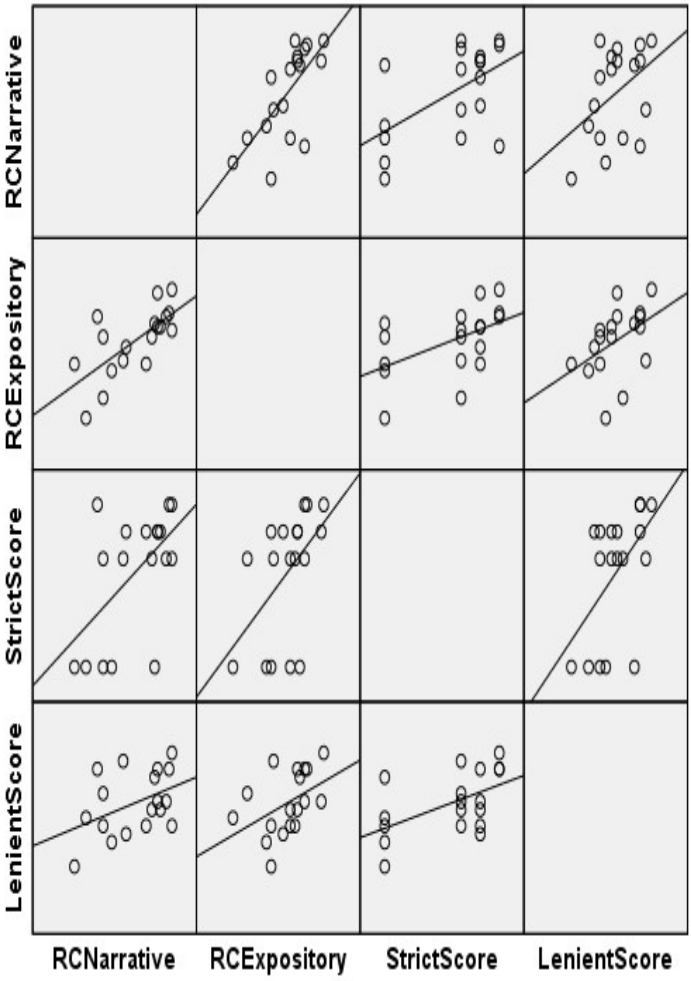
APPENDIX S10 – Scatterplots of the Correlations Between Reading Proficiency and Reading Comprehension for the NarrativePR Group (Without Outliers)



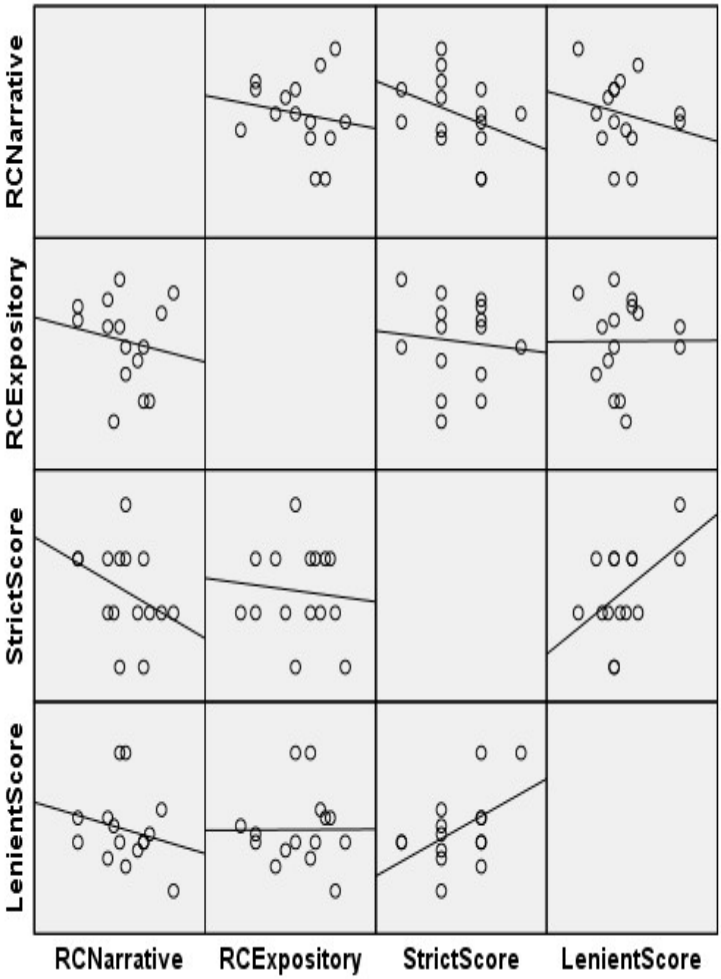
APPENDIX S11 – Scatterplots of the Correlations Between Reading Comprehension and Working Memory for the ExpositoryPR Group (With Outliers)



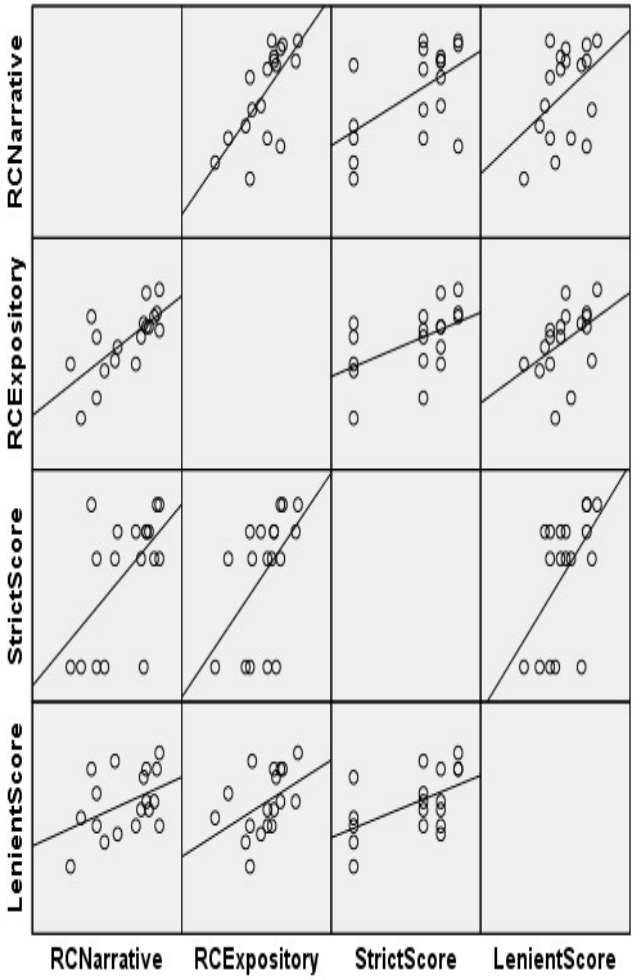
APPENDIX S12 – Scatterplots of the Correlations Between Reading Comprehension and Working Memory for the NarrativePR Group (With Outliers)



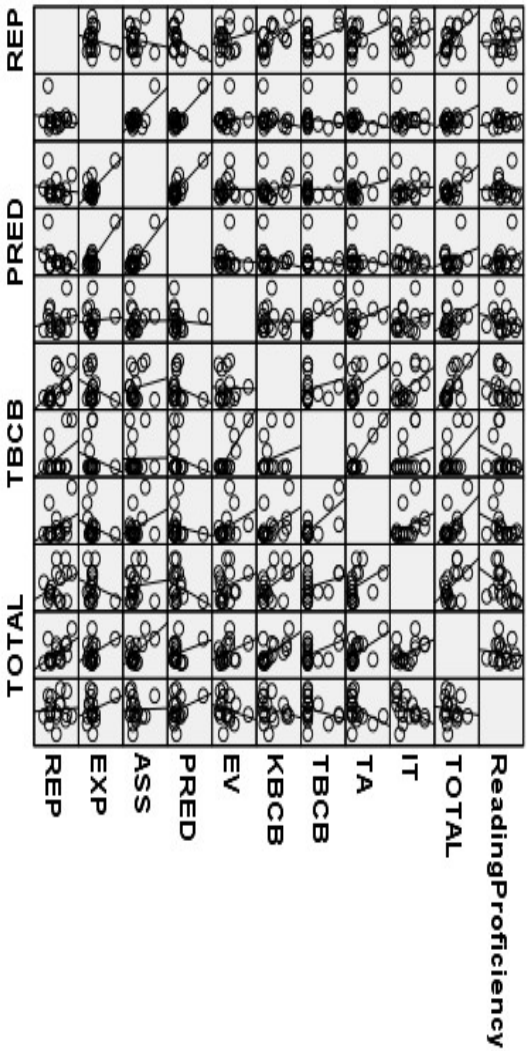
APPENDIX S13 – Scatterplots of the Correlations Between Reading Comprehension and Working Memory for the ExpositoryPR Group (Without Outliers)



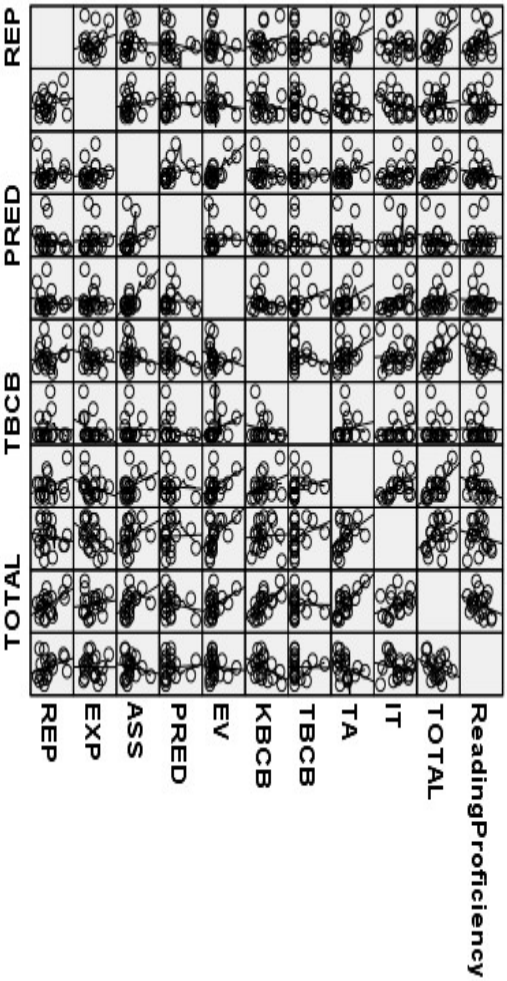
APPENDIX S14 – Scatterplots of the Correlations Between Reading Comprehension and Working Memory for the NarrativePR Group (Without Outliers)



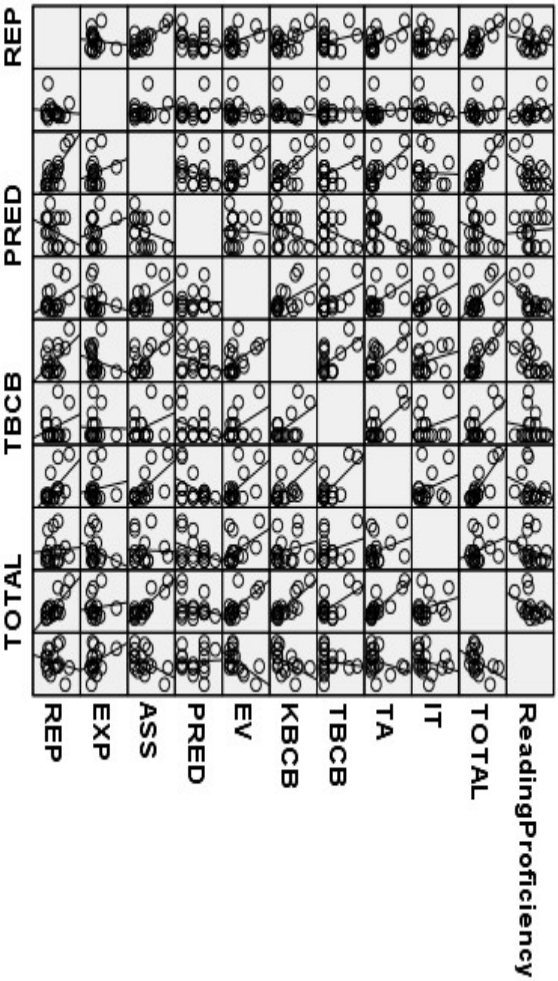
APPENDIX S15 – Scatterplots of the Correlations Between Reading Proficiency and Types of Inferences Generated by the ExpositoryPR Group for the Expository Text



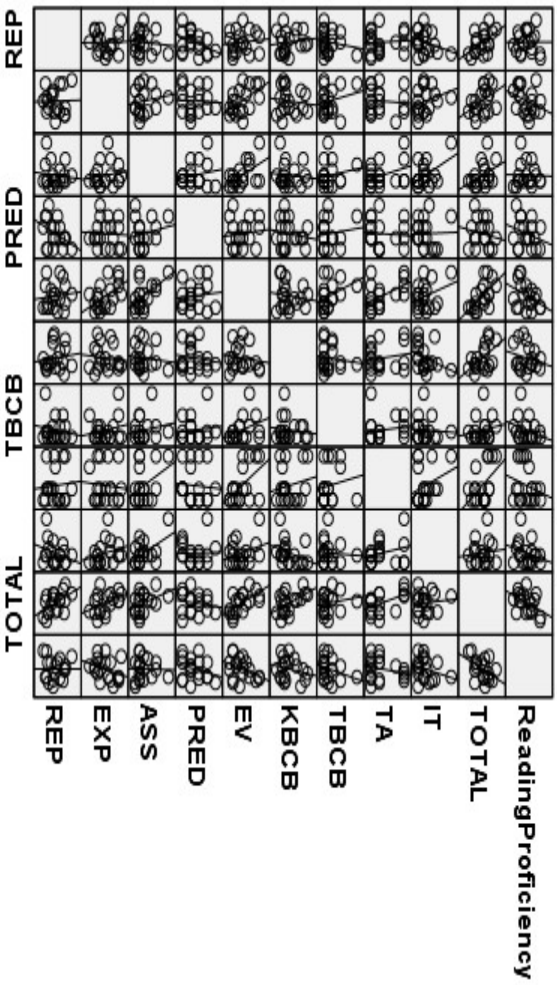
APPENDIX S16 – Scatterplots of the Correlations Between Reading Proficiency and Types of Inferences Generated by the NarrativePR Group for the Expository Text



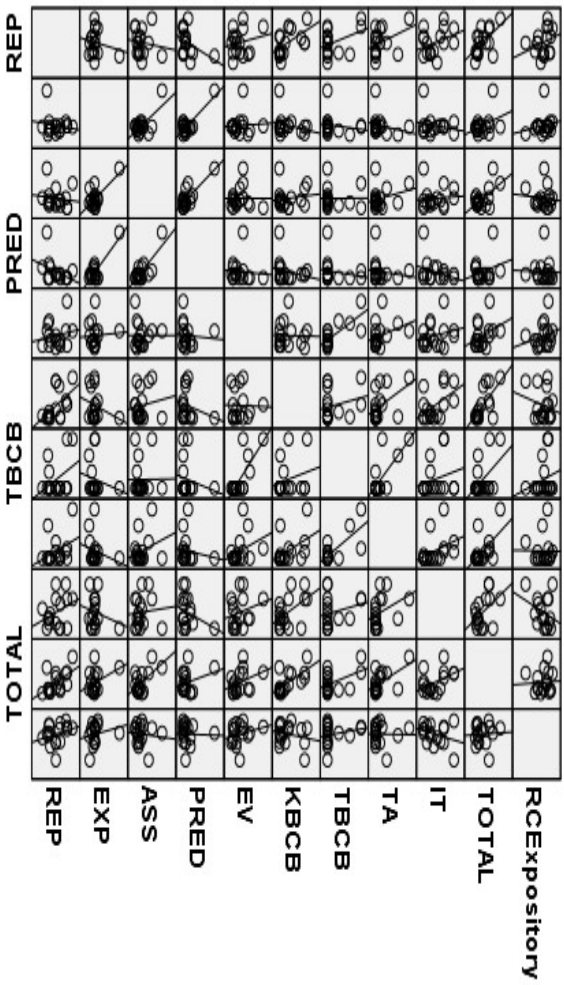
APPENDIX S17 – Scatterplots of the Correlations Between Reading Proficiency and Types of Inferences Generated by the ExpositoryPR Group for the Narrative Text



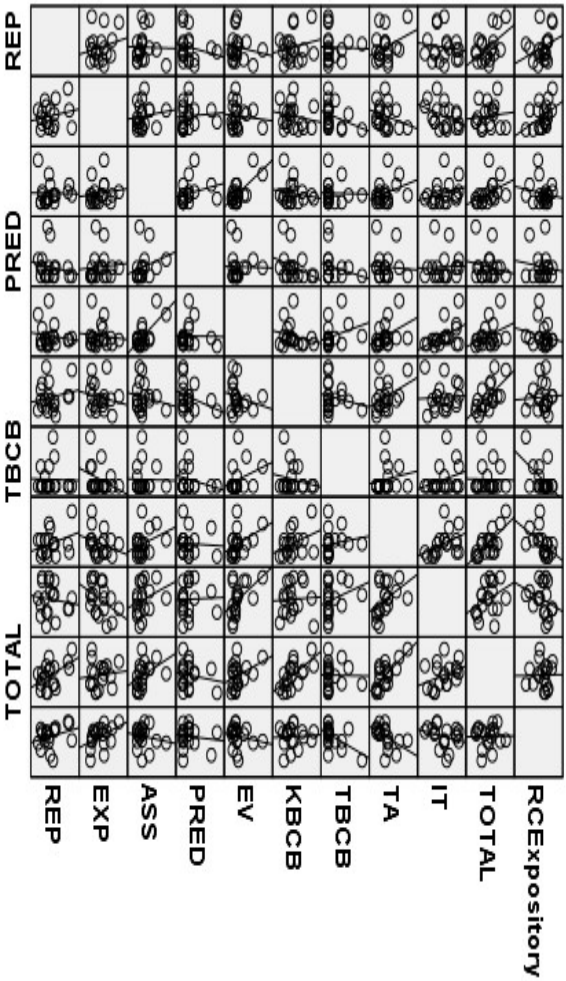
APPENDIX S18 – Scatterplots of the Correlations Between Reading Proficiency and Types of Inferences Generated by the NarrativePR Group for the Narrative Text



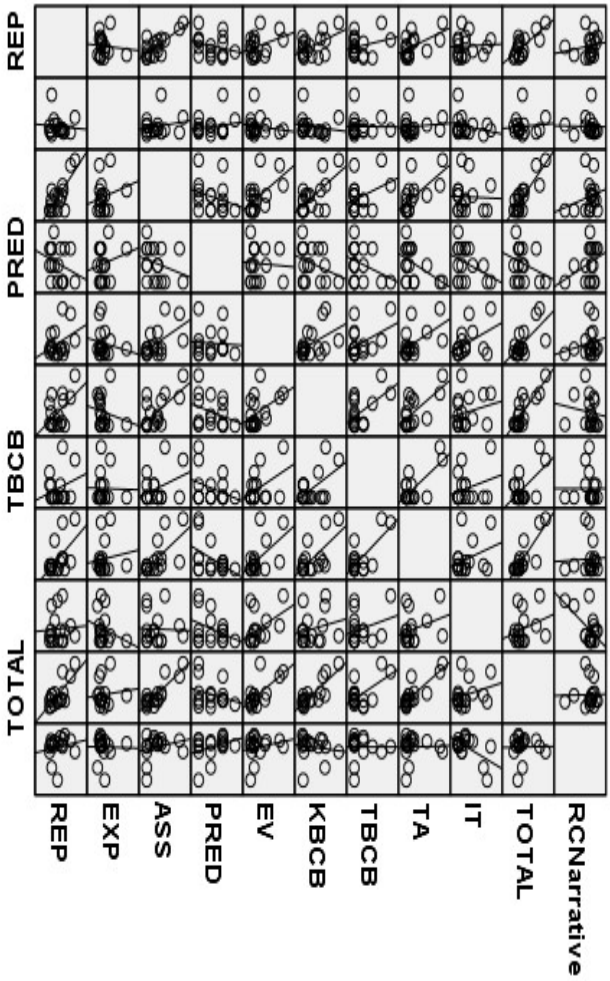
APPENDIX S19 – Scatterplots of the Correlations Between Reading Comprehension and Types of Inferences Generated by the ExpositoryPR Group for the Expository Text



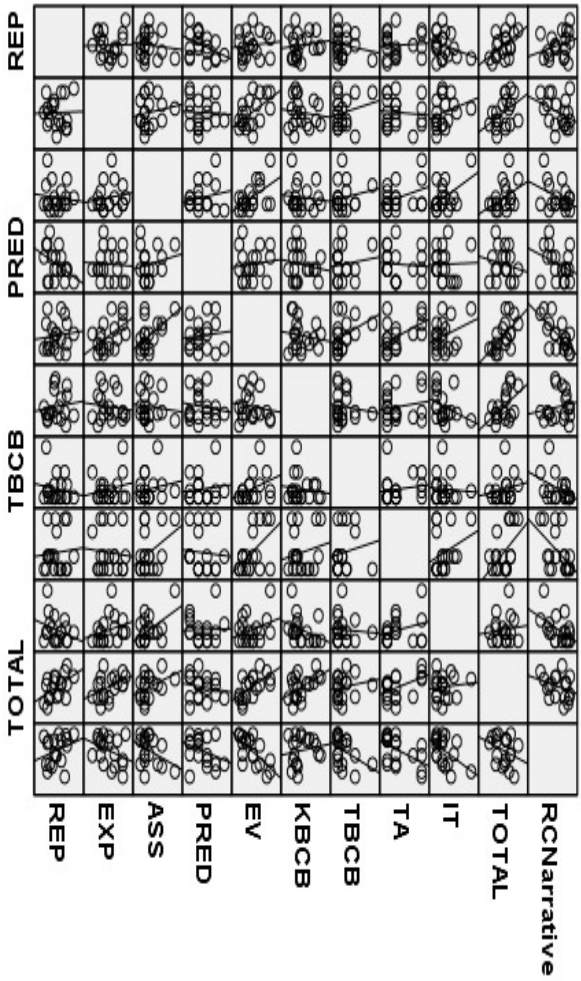
APPENDIX S20 – Scatterplots of the Correlations Between Reading Comprehension and Types of Inferences Generated by the NarrativePR Group for the Expository Text



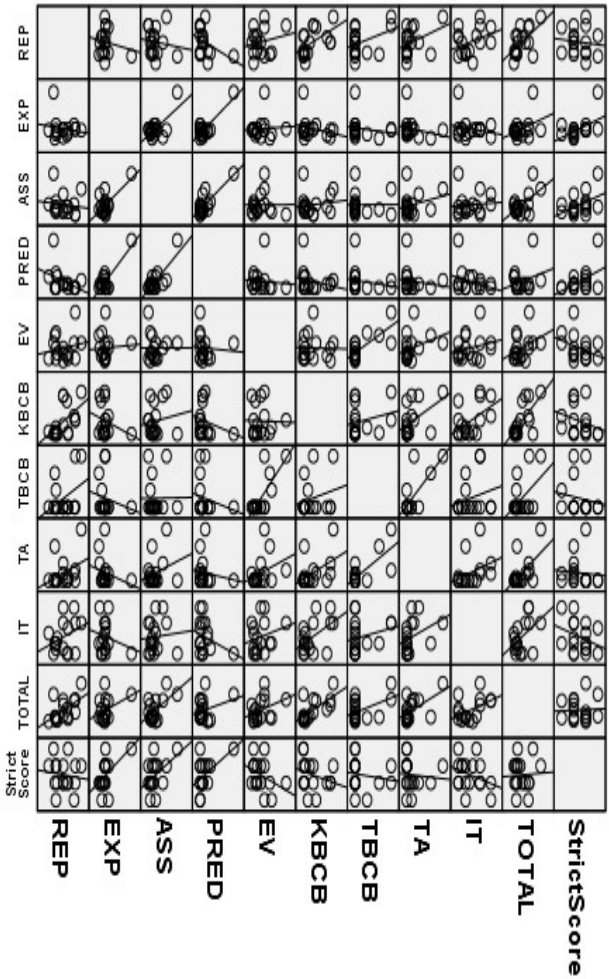
APPENDIX S21 – Scatterplots of the Correlations Between Reading Comprehension and Types of Inferences Generated by the ExpositoryPR Group for the Narrative Text



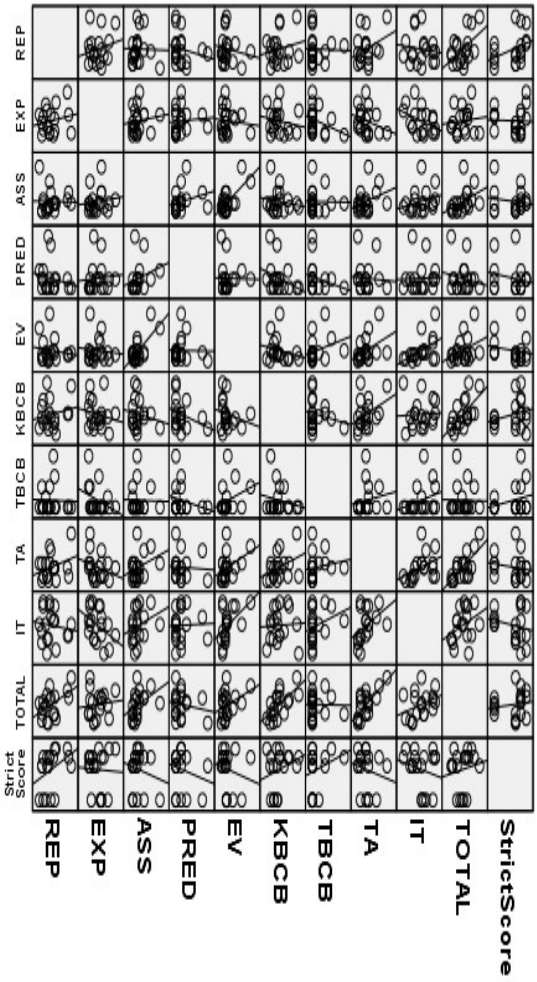
APPENDIX S22 – Scatterplots of the Correlations Between Reading Comprehension and Types of Inferences Generated by the NarrativePR Group for the Narrative Text



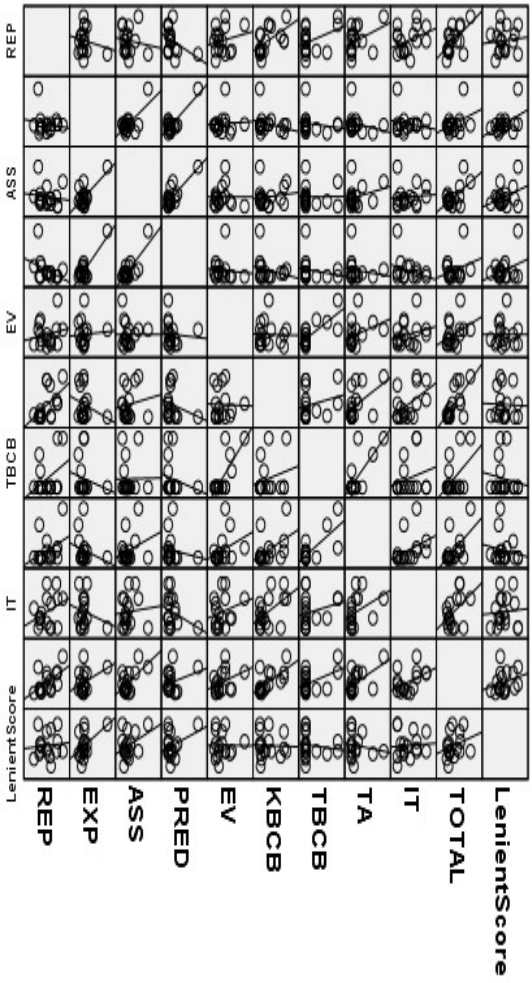
APPENDIX S23 – Scatterplots of the Correlations Between Working Memory (Strict Scoring) and Types of Inferences Generated by the ExpositoryPR Group for the Expository Text



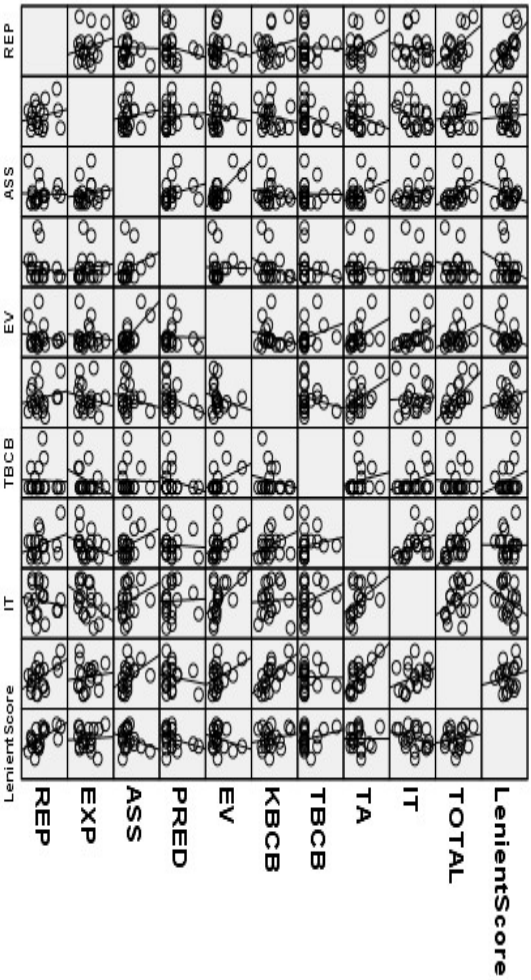
APPENDIX S24 – Scatterplots of the Correlations Between Working Memory (Strict Scoring) and Types of Inferences Generated by the NarrativePR Group for the Expository Text



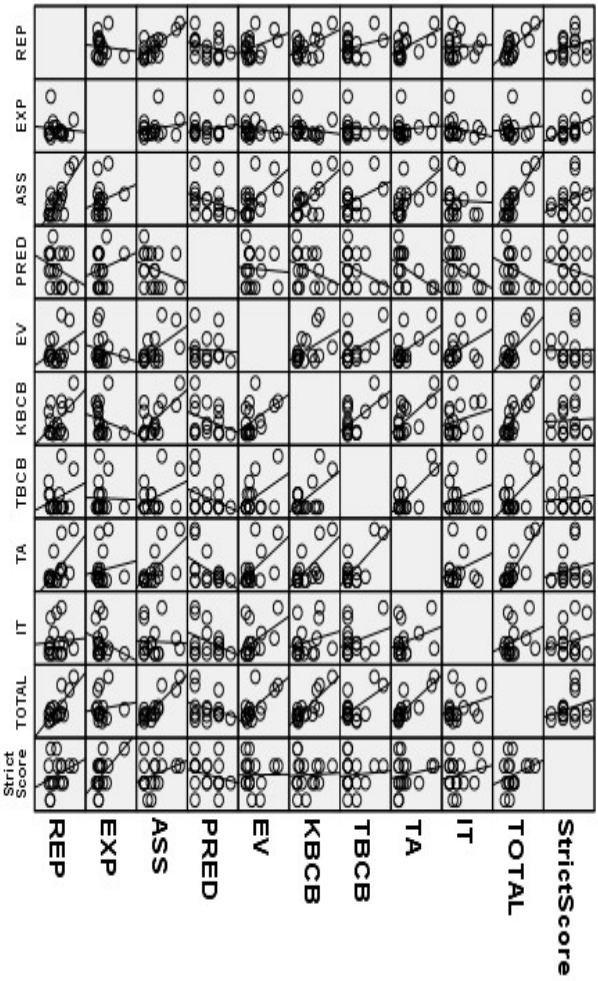
APPENDIX S25 – Scatterplots of the Correlations Between Working Memory (Lenient Scoring) and Types of Inferences Generated by the ExpositoryPR Group for the Expository Text



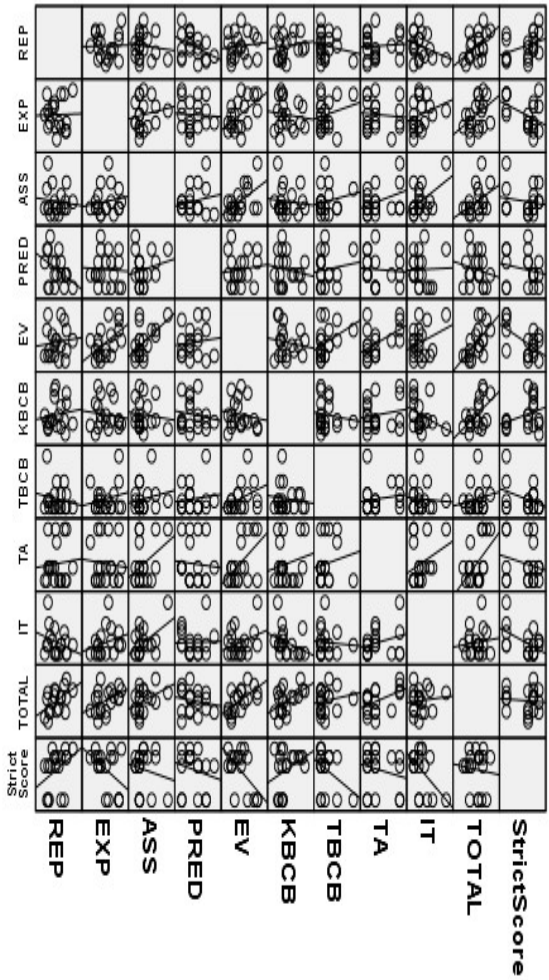
APPENDIX S26 – Scatterplots of the Correlations Between Working Memory (Lenient Scoring) and Types of Inferences Generated by the NarrativePR Group for the Expository Text



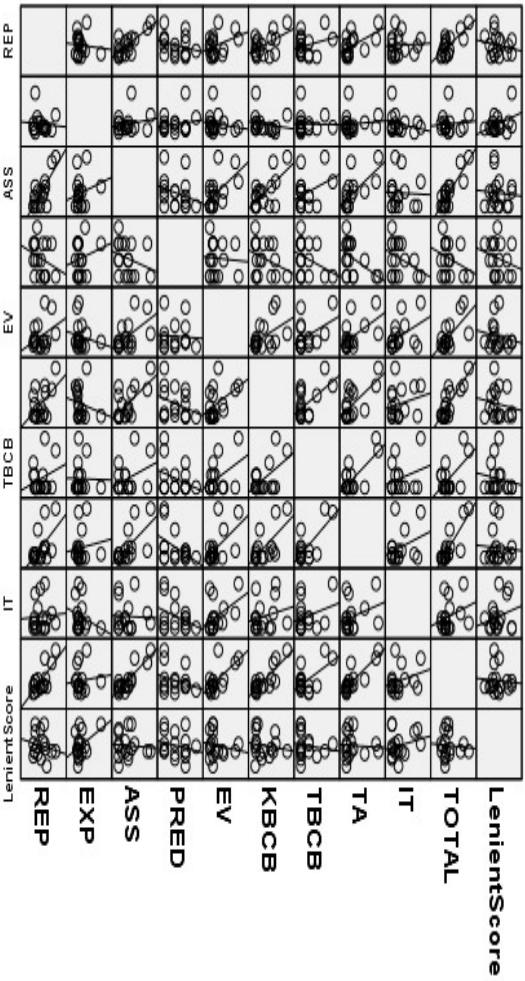
APPENDIX S27 – Scatterplots of the Correlations Between Working Memory (Strict Scoring) and Types of Inferences Generated by the ExpositoryPR Group for the Narrative Text



APPENDIX S28 – Scatterplots of the Correlations Between Working Memory (Strict Scoring) and Types of Inferences Generated by the NarrativePR Group for the Narrative Text



APPENDIX S29 – Scatterplots of the Correlations Between Working Memory (Lenient Scoring) and Types of Inferences Generated by the ExpositoryPR Group for the Narrative Text



APPENDIX S30 – Scatterplots of the Correlations Between Working Memory (Lenient Scoring) and Types of Inferences Generated by the NarrativePR Group for the Narrative Text